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Health care professionals' caretaking of persons with dementia who use dietary supplements

Hilde Risvoll

A dissertation for the degree of Philosophiae Doctor – May 2023

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Studio photograph of Mahatma Gandhi, London 1931. Download from Wikipedia.

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"Happiness is when what you think, what you say, and what you do are in harmony."

Gandhi, Mahatma, 1869-1948. The Collected Works of Mahatma Gandhi. New Delhi: Publications Division, Ministry of Information and Broadcasting, Govt. of India, 20002001.

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Motivation for this project

Over my eight years of practice as a neurologist in a memory clinic, I assessed many people with dementia (often accompanied by their caregivers), most of whom had regular follow-ups every sixth month. Many patients and caregivers asked about dietary supplements (DS) during these assessments. The questions often focused on specific DS products that, in one way or another, had been advertised as improving memory. Sometimes caregivers and patients wanted my opinion, asking, "Could this really help?" Other common questions were, "Are these products safe? and "Do they go well with the prescribed medications?" These questions were often difficult to answer, mostly because little, if any, research was available on the safety and effects of these specific DS. In one case, a family bought a DS on the internet, believing that research showed that this supplement could do wonders for a person with dementia. When I looked up the brand name, I found a small group II study performed years ago with only a few participants and claiming "promising results". I felt that the people with dementia themselves were quite helpless in this situation, as they may have lost some of their judgement and therefore had problems understanding how trustworthy the available information on the product's effects and safety was. Another issue about DS raised by the caregivers was the chaos of tins and boxes of medications and DS at their homes, and the fear that the person would make mistakes administrating the pills. In one case, a lady with dementia was storing her DS all over her house, even in the microwave oven, and the daughter felt she has completely lost control. I found little research about the safety aspects of DS use by people with dementia. My search for knowledge about specific products used by people with dementia initiated a collaboration with the regional pharmacovigilance centre, RELIS Nord. We started collecting information on specific products and possible interactions with these patients' prescribed medications and found data showing potential interactions in several cases. I had never heard this topic discussed among my colleagues before, and clearly there was a need to investigate the phenomena further. I was interested in the caretaking of these patients within the health care system. And because most of the caretaking of these patients is done in primary health care, I wanted to investigate how the safety of a person with dementia who uses DS is managed by the different actors within the primary health care system. This line of approach led to cooperation with NAFKAM (Norway's National Research Centre in Complementary and Alternative Medicine) and the Department of

Pharmacy and the research group in Clinical Pharmacy and Pharmacoepidemiology at UiT The Arctic University of Norway. And so, a research question developed.

Acknowledgements

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First, my supervisors Frauke Musial, Marit Waaseth, Kjell H. Halvorsen and Trude Giverhaug for excellent support with research design, analyses of data and manuscripts. Trude Giverhaug started the process of making my question about safety into a scientific project, and she helped me establish contact with the other supervisors. Frauke was central in clarifying the research question and believed in me the whole time. All my supervisors were open for questions or supervision throughout the process and available whenever I needed them. I am so grateful for all your support! Kjell has been very valuable for analysis. Marit was always thorough and saw the details that were missed.

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Last, but most important to me, I would also like to thank my family for patience and support in the process. My husband and best friend, Helge, himself finished his thesis within the period that I have been working on mine, and my children, Maja, Sunniva, and Magne were growing up into wonderful adults during the time this work took. I would like to thank the rest of my family, and especially my sister-in-law, Ellen, who also provided advice in the research process, and my future daughter in law, Morgan, who helped me with the English phrasing. My daughter Maja drew the illustration on the front page and helped me with the English phrasing. I would also like to thank several friends that have given me advice on lay-out and wording.

Definition of terminology

Activities of daily living (ADL) is a term used to collectively describe fundamental skills required to independently care for oneself, such as eating, bathing, and mobility (1). To administer prescribed medicine (PD) and dietary supplements (DS) are also important aspects of ADL.

Adverse effect is a secondary unwanted effect that occurs due to drug therapy. Adverse effects can occur at normal doses or unintended doses. If a person with dementia suffers from liver damage due to a medication used at the wrong dose, that is an adverse effect. (The related concept of **side effect** is a secondary effect that may be desirable or not desirable.)

Automated drug delivery system (or multidose drug dispensing system) implies that the patient receives drugs machine-dispensed into one unit for each dose occasion, packed in disposable bags. The dose unit bags are labelled with patient data, drug contents data, and time for intake (2).

Complementary and alternative medicine (CAM) is defined by WHO (World Health Organization) as a broad set of health care practices that are not part of a country's own tradition or conventional medicine, and that are not fully integrated into the dominant health-care system (3). DS including herbal remedies often fell under the definition of CAM, as there is often no evidence for the claimed effect.

Composite products are DS that contain various products (herbs, herbal extracts, vitamins, fatty acids, and so forth) in combination.

Dementia is a medical term that includes several conditions with progressive decline in cognitive function and the ability to be self-sufficient in activities of daily living. In this thesis, persons with a dementia diagnosis will be referred to as persons with dementia, clients with dementia, customers with dementia, or patients with dementia, depending on the context.

Dietary supplements (DS). This thesis uses the definition of DS from the United States' (US) "Dietary Supplement Health and Education Act of 1994" as products meant to supplement the

diet. Included are vitamins, minerals, herbs, botanical products, amino acids, or other dietary substances (4).

Patient research partners are defined as "persons (or as in this project relatives) with a relevant disease who operates as an active research team member on an equal basis with professional researchers, adding the benefit of their experiential knowledge to any phase of a project."(5).

Patient safety is the prevention of errors and adverse effects to patients under treatment or follow-up from health care. According to WHO's global patient safety activation plan 2021–2030, patient safety is "*a framework of organized activities that creates cultures, processes, procedures, behaviours, technologies and environments in health care that consistently and sustainably lower risks, reduce the occurrence of avoidable harm, make errors less likely and reduce the impact of harm when it does occur*" (6).

Placebo. The placebo effect is defined as a phenomenon in which some people experience a benefit after the administration of an inactive look-alike substance or treatment. This substance, or placebo, has no known medical effect.

Practice style is the difference(s) in the professional behaviour of health care providers under otherwise similar conditions. Practice style depends on experiences, tolerance of uncertainty and feeling of responsibility, among other things.

Prescription drugs (PD) (can also be called prescription medication or prescription medicine) are pharmaceutical drugs that legally require a medical prescription to be dispensed.

Abbreviations

ADL: Activities of daily living

CAM: Complementary and alternative medicine

DS: Dietary supplements

GP: General practitioner

HCS: Home care service

MMSE-NR: Mini Mental State Examination – Norwegian revision

NAFKAM: Norway's National Research Centre in Complementary and Alternative Medicine

OTC: Over the counter drugs

PD: Prescription drugs

RDRS-2: Rapid Disability rating Scale-2

RELIS: Regional pharmacovigilance Centre

WHO: World Health Organization

Sammendrag

Demens kjennetegnes av progressiv reduksjon av kognitiv funksjon og økende behov for hjelp med dagliglivets funksjoner, blant annet hjelp med administrering av medisiner. Denne tesen har undersøkt bruk av kosttilskudd, inklusivt urter, hos personer med demens, og risiko relatert til bruken av kosttilskudd pga. bivirkninger og interaksjoner, samt ivaretagelsen av disse pasienten innenfor primærhelsetjenesten. Studiemetoder har vært spørreundersøkelse til personer med demens/pårørende, ansatte i apotek og i hjemmetjenesten, og individuelle intervju av fastleger.

Førtiseks prosent av personene med demens brukte kosttilskudd, og det var klinisk potensielle interaksjoner mellom kosttilskudd og medisiner hos 11% av disse. Bare en tredjedel fikk hjelp med å ta kosttilskuddene riktig, selv om flere av de som ikke fikk hjelp hadde kognitiv svekkelse som tydet på at de trengte hjelp. Flertallet av helsearbeiderne visste at DS ikke har sikker effekt på demens, og at DS kan ha potensielle bivirkninger. Mindretallet av personene med demens og halvparten av pårørende var klar over risikoen for negativ effekt.

Halvparten av fastlegene og de ansatte i hjemmetjenesten, men få av de apotekansatte, hadde vært bekymret for pasienter med demens pga. deres bruk av kosttilskudd. En tredjedel fra hjemmetjenesten og to-tredjedeler av fastlegene hadde intervenert ved mulig skadelig bruk. Ingen av yrkesgruppene ville ha ansvaret for at bruken skulle bli tryggere, og det var ingen enighet om hvilke tiltak som kunne bedre sikkerheten. Fastlegene hadde generelt lite søkelys på kosttilskudd, eller at pasientene med demens er ekstra sårbare for bivirkninger, men det var variasjoner i praksis. Hovedårsaken til at fastlegene ikke ville ha ansvaret for kosttilskudd, var mangel på tilgjengelig informasjon om sikkerhet, effekt og noen ganger også om innholdet i produktene.

Konklusjon: Bruk av kosttilskudd er vanlig hos personer med demens, og bruken kan utgjøre en risiko. Ingen av yrkesgruppene i primærhelsetjenesten ønsker ansvaret for å øke sikkerheten. Det er behov for tydeligere ansvarsfordeling, og også bedre regulering av kosttilskudd med økt krav til dokumentasjon om innhold, effekt og risiko/sikkerhetsprofil. Helsepersonell bør gjøres oppmerksom på at sårbare pasientgrupper har behov for ekstra oppfølging.

Summary

Persons with dementia experience progressive loss of cognitive functioning and increasing need for help with activities of daily living, including help with administering their prescribed drugs (PD). This thesis describes the use of dietary supplements (DS) (including herbs) by persons with dementia and the risk related to their use as DS may cause adverse effects. It further describes the awareness of this risk and the attributed responsibility by relevant primary health care professional. Study methods are surveys (questionnaires) of patients with dementia/their caregivers, employees in pharmacy and home care service (HCS) and individual interviews with general practitioners (GPs).

Forty-six percent of the persons with dementia used DS and 11% of these had potentially clinically relevant DS-PD interactions. Only one-third of the patients received help with the administration of their DS, even though several of the one who did not receive assistance had a cognitive decline indicating that they needed such help. The majority of health care personnel were aware of the limitations of DS to help improve symptoms of dementia and were aware of potential negative effects. Few of the patients with dementia and half of their caretakers knew that DS use may impose a health-risk.

Half of the employees in HCS and half of the GPs, but few of the employees in pharmacies, had been worried about patients with dementias' DS use. One-third of the employees in HCS and two-third of the GPs had intervened to increase safety. None of the health care professionals studied attributed the responsibility for the safety of these patients to their own profession, and there was no common agreement on how to improve safety. GPs had little focus on DS and on these patients' extra vulnerability, although there were some differences in practice style. The main reason why the GPs did not want to take on the responsibility was the lack of available information about safety, effects and sometimes even DS's content.

To conclude: DS use are common in patients with dementia, and may represent a risk to them, but no group of health care professionals wants to take the responsibility. There is a need for clear lines of responsibility and a stronger regulation of DS, including stricter demands for documentation on DS contents, safety, and effect. Health care professionals should be made aware of the extra need for assessment in vulnerable patient groups.

List of publications included in the thesis.

The thesis is based on the following papers:

Paper 1. Risvoll H, Giverhaug T, Halvorsen K H, Waaseth M, & Musial F. (2017). Direct and indirect risk associated with the use of dietary supplements among persons with dementia in a Norwegian memory clinic. *BMC Complementary and Alternative Medicine*, *17*(1), 261. https://doi.org/10.1186/s12906-017-1765-5

Paper 2. Risvoll H, Musial F, Halvorsen K H, Giverhaug T, & Waaseth M. (2019). Pharmacy employees' involvement in safeguarding persons with dementia who use dietary supplements: Results from a survey of Norwegian pharmacies. *BMC Complementary and Alternative Medicine* 19, 179. https://doi.org/10.1186/s12906-019-2587-4

Paper 3. Risvoll H, Musial F, Waaseth M, Giverhaug T, & Halvorsen K H. (2021). Home care service employees' contribution to patient safety in clients with dementia who use dietary supplements: a Norwegian survey. *Scandinavian Journal of Primary Health Care*, *39*(4), 403–412. https://doi.org/10.1080/02813432.2021.1970944

Paper 4. Risvoll H, Risør T, Halvorsen K H, Waaseth M, Trine Stub, Giverhaug T, & Musial F. General practitioners' roles in safeguarding use of dietary supplements among patients with dementia. A qualitative study. Submitted to *Scandinavian Journal of Primary Health Care 2022.*

1 Background

1.1 Dementia

Dementia is a medical term that includes several conditions with progressive decline in cognitive function and the ability to be self-sufficient in activities of daily living (ADL) (1, 7). Alzheimer's disease is the most common form of dementia (8). The prevalence of dementia increases with age and in Europe and North America, 40% of individuals older than 90 years are affected (9). Because of the increasing age of the population worldwide, the prevalence of dementia will increase. It is estimated that the number of people with dementia will increase from 57.4 million cases globally in 2019 to 152.8 million cases by 2050 (10). At present, dementia is estimated to affect more than 100,000 Norwegians, and is projected to increase to 230,000 and 380,000 in 2050 and 2100, respectively (11).

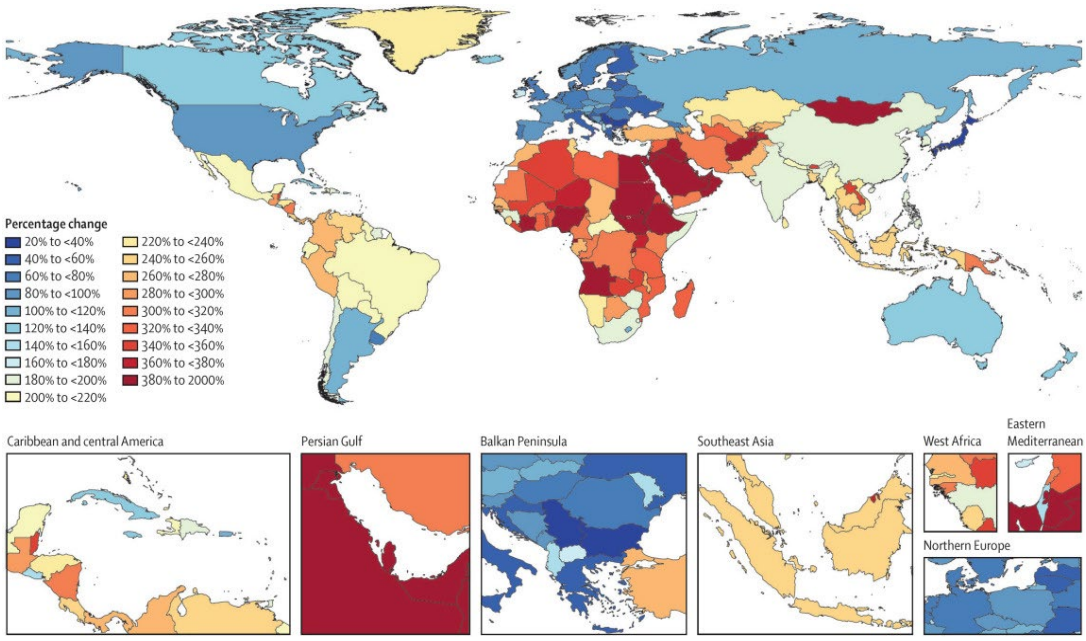

Figure 2 The global burden of dementia. Estimated percentage change between 2019 and 2050 in all-age number of individuals with dementia by country.

Reprinted from Estimation of the Global Prevalence of Dementia in 2019 and Forecasted Prevalence in 2050: An Analysis for the Global Burden of Disease Study 2019. Lancet Public Health. 2022;7(2):e105-e25. with permission of E Nichols.

As only symptomatic prescription drug (PD) is available (8, 12), progressive loss of cognitive functioning is the result. The key symptoms of dementia are memory loss, loss of judgement,

or problems in reasoning, that interfere with a person's daily life and activities. As the dementia symptoms increase due to the progressive character of the condition, persons with dementia progressively need more help in managing ADL. Help with managing PD is often needed early in the progression of the disease (8). Assistance is provided both by the person's caregivers and by the primary health care system. Dementia creates an economic burden on society and an increased workload on caregivers (13, 14).

1.2 Dietary supplements (DS)

DS (see Definitions, page xii) are often used for improving general health (15, 16), but also for specific conditions such as dementia, even though the evidence of effect is generally weak (17-21). Regulation of production, sale and use of DS is scarce compared to PD (16). In Norway, the Norwegian Food Safety Authority is responsible for controlling the safety of DS, according to "Regulation No. 247 of 26 February 2010", on the addition of vitamins, minerals, and certain other substances to foods (22). Advertising health benefits for specific symptoms or conditions is illegal, but this regulation is frequently violated. A inquiry made on behalf of the Norwegian Food Safety Authorities that checked 50 different DS from 45 different corporations found illegal claims of medical effects in nine out of ten products, and none of the products fulfilled all the criteria for correct labelling (23). A Canadian study examined the 25 most frequently retrieved websites marketing DS for Alzheimer's disease. They found that the majority of websites and products claimed medical effects using word and phrases such as: treatment for Alzheimer's' disease, improvement of functioning, delayed progression et cetera (24). DS are considered food according to Norwegian law, the regulation being enforced by the Norwegian Food Safety Authority. Very few products (27 registered per August 2021) have a marketing authorization as herbal medicinal products in Norway (25), and are thereby regulated by the medicinal laws, enforced by the Norwegian Medicines Agency (25). Herbal medicinal products are subjected to stricter control than DS, but not as strict as PD.

DS that are pure vitamins or minerals often come with clear recommendations regarding the indication of use and dosage recommendation, and it is possible to monitor correct use with blood samples (26). Vitamins and minerals are necessary for bodily functions, and a lack of these compounds can lead to deficiency-related diseases. However, overdosage of vitamins can in some case harm health or increase the risk for various diseases such as coronary heart disease and cancer (27, 28). Mineral supplements may also give adverse effects, although

some of these are self-limited and include effects diarrhoea and headache (28). Even though fatty acids initially showed promising results in cardiovascular health, newer large studies have found small or no significant effect (29, 30). Adverse effects from fatty acids such as increased risk of bleeding and atrial fibrillation have been debated (31, 32).

Figure 3 Illustration of herb preparation for medicine production

From Roesslin "Kreuterbuch", herbs and herb-garden 3. Edition, 1536, Scenes from the title page showing the distillation of herbs. Source: Wellcome Images, operated by Wellcome Trust and licensed under the Creative Commons Attribution 4.0 International, available from https://commons.wikimedia.org/w/index.php?curid=36107343

Herbs have been used historically and several PD are a result from this historical herb use, such as digitalis (33). Herbs are associated with risk both for interactions with PD and for adverse effects such as liver toxicity (34, 35). Potential interactions with PD have also been found in patients with dementia or cognitive dysfunction (36, 37). Composite DS products often contain various herbs combined with different vitamins and fatty acids or other compounds. Few studies document the effects and safety of composite DS products, and the studies that do exist can be small and preliminary (38). It can sometimes be difficult to be sure of the exact ingredients in such products (16, 39).

Few studies have evaluated the overall use of DS in the Norwegian population, and response rates are generally low, so non-response bias cannot be excluded. A 2009 report from the Norwegian Food Safety Authority found that 500 Norwegian respondents had used an average of 3.7 different DS products in their lifetime (have used) (40). A 2021 Norwegian study reported use of natural remedies by 68 % of the study participants within the last 12

months, and use of CAM natural remedies by 48% (41). A 2020 report from Norway's National Research Centre in Complementary and Alternative Medicine (NAFKAM) found that 71% of 1002 adult Norwegian participants had used DS in 2020 (42).

1.3 Patient safety

Patient safety can be defined as "*a discipline in the health care sector that applies safety science methods toward the goal of achieving a trustworthy system of health care delivery. Patient safety is also an attribute of health care systems; it minimizes the incidence and impact of, and maximizes recovery from, adverse events"* (43). A global action plan was adopted by the World Health Organization (WHO) at the Seventy-Fourth World Health Assembly in 2021 with a vision of "*a world in which no one is harmed in health care, and every patient receives safe and respectful care, every time, everywhere*" (6). "Harm" here includes harm from treatment and harm because treatment and/or assessment is deficient. A study of a stratified random sample of 621 patients receiving care over a two-year period found deficient care in 82%. Among errors of omission were obtaining insufficient information from histories and physicals (25%), inadequacies in diagnostic testing (34%), and patients not receiving needed medications (21%) (44).

Hollnagel and Woods argue (page 347) "*safety is something a system or an organisation does, rather than something a system or an organisation has*" (45). Safety is thus "shown more by its absence – namely, [in] accidents". Hollnagel and Wood further argue that (page 348) "*[k]nowing that control has been lost is of less value than knowing when control is going to be lost, i.e., when unexpected events are likely*" and (page 349) "*[k]nowledge is obviously important both for knowing what to expect (anticipation) and for knowing what to look for or where to focus next (attention, perception)*." When health care professionals know what to expect, they need the competence necessary to know what to do about the anticipated problems. They also need the resources to be able to do these things. (45).

1.4 Direct and indirect risks from DS

In medicine, risk is the chance or likelihood that something will harm or otherwise affect one's health (negatively). One can divide risk into direct and indirect risks (46-48).

Direct risk is a risk that is caused directly by an intervention. An intervention is a treatment, procedure, or other action taken to prevent or treat disease, or improve health. Direct risk is a risk related to the treatment itself, such as adverse effects and DS-PD interactions (46, 47).

Indirect risk is a risk that is not caused by the intervention itself, but as an indirect effect of the intervention (46, 47). An example of indirect is thrombosis after an operation, often caused by inactivity, which is avoided by giving thrombosis prophylaxis in conjunction with the operation (49).

Although DS are perceived by many to be safe and natural, adverse effects such as liver toxicology and interactions with PD do occur (35, 50, 51). Some DS may also increase bleeding during surgery (52). Moreover, there are other threats to patient safety from DS use, such as variability in quality and content (16, 39). Adulterants have been found in DS (53, 54). These factors are direct patient risk from using DS, that is, the products themselves present a risk (46, 47). Some of these adverse effects are serious and require emergency visits to a hospital. Geller et al. (51) used nationally representative surveillance data from 63 emergency departments (2004–2013) to describe visits to US emergency rooms. Based on 3667 cases, they estimated that 23,005 emergency department visits per year could be attributed to adverse events related to DS. These visits resulted in an estimated 2154 hospitalizations annually (51). Even lethal outcomes have occurred, such as a case of fatal seizure because of an interaction between the DS gingko biloba and antiepileptics (55) and because of fatal liver toxicity (34).

Indirect risks from the use of DS can include delayed diagnosis and a lack of awareness of the therapeutic limitations of DS among DS retailers, or among health care professionals (46-48). Information on DS products has been found to be misleading, or partial with regard to safety aspects (56-58), which was also found in a Norwegian study initiated by the Norwegian Food Safety Authority (23). Furthermore, there is a profound lack of studies documenting safety, tolerability, and efficacy (16). Another safety issue is a striking lack of reliable information about DS-PD interactions (56, 58).

Some direct and indirect risks from DS are more specific to persons with dementia. Persons with dementia may need DS because an inadequate diet may lead to vitamin deficiency (59, 60). This is important, but not controversial, and the risk of over – and underdosing can be assessed by blood-tests. This aspect will therefore not be the focus of this thesis.

Up to 57% of people with dementia use DS (61, 62). Interactions between DS and PD have been found in studies of patients with dementia (36). Adulterant pharmaceuticals have been found in cognitive enhancement supplements (63). It is known that dementia symptoms (may)

add to indirect risk related to use of PD, such as risk of overdosing, confusing various PD for each other, and forgetting what the pills are taken for (64). Error in administering medication may lead to serious adverse effects, exemplified by a study showing that serious toxicity in RA patients using methotrexate has been associated with the presence of probable dementia, low socioeconomical status, and older age (65). These problems would also apply to use of DS, and with the added problem of confusing DS with PD. Not receiving help with administration because the person with dementia lives alone or because the caregiver is also cognitively impaired will add to the burden. The fact that persons with dementia do not always disclose their use of DS to health care personnel also adds to the risk (61, 66).

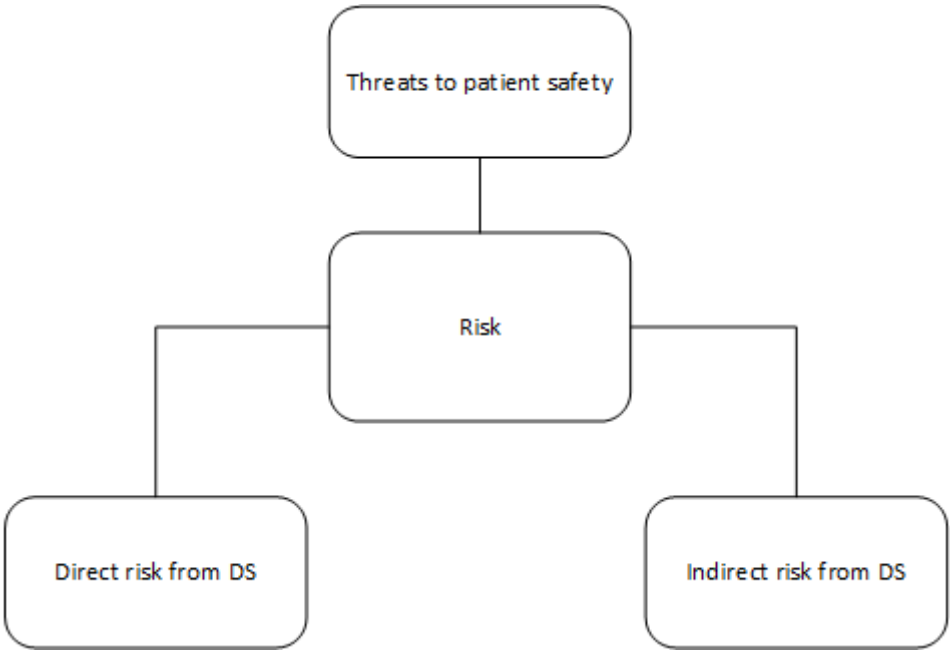

Figure 4 A model of direct and indirect risk from DS

1.5 Relevant perspectives for the safety of persons with dementia who use DS

Both caregivers and health care personnel have the potential to help persons with dementia who use DS, to evaluate the use and to help them take the DS correctly.

Caretakers, an unpaid resource of care, support a person with dementia in several aspects of and tasks in life (13) and may be involved in helping the person with dementia take a DS

correctly. I have found only one older study about a caregivers' influence on DS use and safety in persons with dementia; this study demonstrated that DS were used more frequently by married persons with dementia than singles (the study also included persons with depression) (67). However, not all persons with dementia have a caretaker (68). According to Statistics Norway, in 2022, 58% of Norwegians aged 80 years and older and 33% of Norwegians between 67 and 79 lived alone. Seventy-three percent of women aged 80 years old and older lived alone (69). It is also important to bear in mind that in Norway, as in several other Western countries, caring for the elderly population was traditionally managed by relatives, but is now often maintained by professional health care workers, i.e., the home care service (HCS) (70). As a group, caretakers do not have education about PD, DS and dementia. However, they are close to the persons with dementia, and their views on these subjects are therefore important.

The Norwegian health care system is funded publicly and covers the responsibility for all inhabitants in need of health care (71), and consists of a primary and a specialized health system. Private actors outside the publicly funded health care system do exist, mostly in the specialized health care system. In the publicly funded health care system, all inhabitants are entitled to receive adequate help after paying a small deductible. Publicly funded health service covers visits to general practitioners (GPs), specialised medical doctors, HCS, physiotherapist, caretaking in nursing homes, and certain PD (reimbursable prescriptions) bought in pharmacies; it does not cover DS. Research here was restricted to primary health care because it is the backbone of the Norwegian health care system (71). Many patients with late-onset dementia are diagnosed at the primary health care level and might not have any contact with the specialist health care system related to their dementia symptoms.

Four main perspectives (Figure 5) have been identified as most important when it comes to patient safety in patients with dementia who use DS: 1) the user perspective, represented by the person with dementia and his or her caretaker; 2) the product perspective, represented by employees in pharmacies; 3) the home care perspective, represented by the employees in

HCS; 4) the medical perspective, represented by GPs.

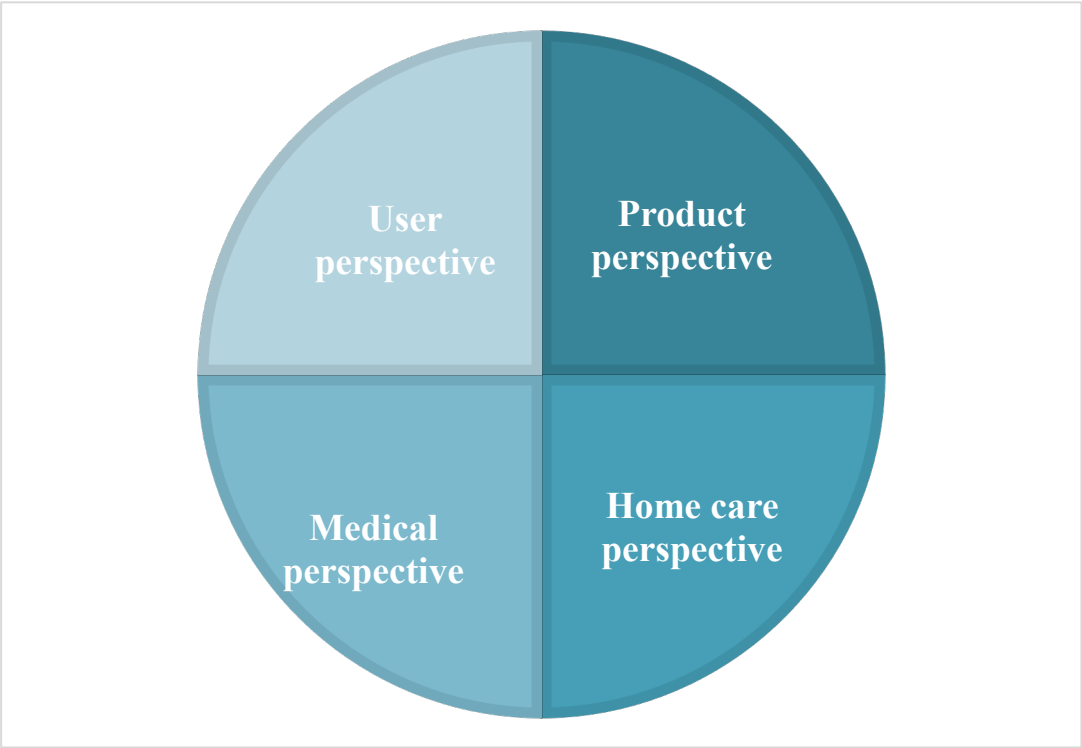

Figure 5 Relevant perspectives regarding the safety of persons with dementia who use DS

This thesis focusses on health care professionals who may interfere with patients' DS use as part of their professional conduct as health care personnel can help persons with dementia towards a safe or safer use of DS. Pharmacy employees, HCS and GPs are often involved in helping persons with dementia with taking their PD correctly. If the persons who receive help with PD are accounted for in the automated drug delivery system (also called the multidose system), the cooperation between these three health care professions are formalized (2).

Two groups that were considered for inclusion in this project were in the end omitted. The first group was dietitians, who also could recommend DS; these were left out because few patients with dementia have access to a dietitian, as there are very few dietitians registered in Norway at present (72). The second group that was left out was non-pharmacy DS retailers (DS are sold in pharmacies but can also be sold by other actors). DS retailers should be responsible for giving correct information about the DS content according to the regulations (22), but these people, as a group, are not necessarily educated about dementia and the challenges that persons with dementia may face, nor are they educated about PD. For practical reasons, and because they are not part of the health care system, DS retailers who do not work in pharmacies were not included in this thesis.

1.6 The roles of relevant primary health care personnel in patient safety

1.6.1 Pharmacy employees

Pharmacies employ master-level and bachelor-level pharmacists and pharmacy technicians, who have health-related education at the high school level. A few employees may have another health-related background, such as nurse education, or have no formal health-related education. Pharmacists have specialised knowledge about PD, dispense PD and are responsible for helping customers use PD correctly. Pharmacy technicians may prepare a prescription before review by a pharmacist, but their main responsibility is non-prescription sale and information, logistics, and administration (73). Pharmacies sell PD, over-the-counter products (OTC), and DS to patients, which also includes home-dwelling patients with dementia (74). When buying DS in a pharmacy, a customer is more likely to meet a pharmacy technician than a pharmacist. Therefore, all types of pharmacy employees were included in this dissertation. Most studies from pharmacies include only pharmacists. Several studies have explored pharmacists' (excluding pharmacy technicians) knowledge about and practical behaviour towards DS in general (75-84), although no studies from Scandinavia are included in that list. These studies demonstrate a need for improvement in practice. The majority of pharmacists use and recommend DS (75, 78, 82); however, many do not use high-quality sources when recommending DS to customer (77). One study found that their decision to recommend DS was seldom based on objective evaluation of evidence (77), and many employees work in pharmacies without access to an evidence-based herbal medicine resource (79). One study found that only one-third of the pharmacists were confident in their ability to effectively counsel patients on herbal medicines (79). Studies of pharmacists have shown that about two-thirds of questions about knowledge of DS were answered correctly (76, 79). Pharmacists have little or no prior herbal medicine education (79) and generally do not report adverse effects and interactions from DS (80, 84). I have identified one study about weight loss DS that included non- pharmacists (85) (see Chapter 5, section 5.4 for discussion). I have found no studies that have investigated the practical conduct of pharmacy employees towards customers with dementia who use DS. The few studies about the professional conduct of pharmacy employees towards customers with dementia demonstrated that pharmacists need more education about the condition (86, 87). Pharmacy employees do not have access to patients' medical records, so they are often unaware of the cognitive status of their customers.

1.6.2 Home care services (HCS)

In Norway, HCS is part of the social welfare system and is mostly provided by local health authorities at the municipality level (88). Private actors exist only on a small scale. HCS employees have various educational qualifications, and some are nurses at the bachelor level; however, many of HCS employees have health-related education at the high school level (auxiliary nurses), and a some are assistants without any formal health-related education (89). HCS administer PD to patients, including patients with dementia. All HCS employees, including those without formal health-related education, are allowed to administer PDs to clients from an automated drug delivery system or from a prefilled pill organizer after being certified in the control and administration of medication (theoretical and practical education). Administration of some advanced treatments are restricted to those with more education, but for most clients, all types of HCS employees perform the same tasks (89). All HCS employees were therefore included in this study. Caring for persons with dementia constitutes a huge part of HCS tasks, including administering PD to these patients. Unsafe and inappropriate uses of PD have been reported in other studies set in Norwegian HCS (90, 91). I have not found any studies investigating HCS conduct towards DS in general, nor more specifically their conduct towards clients with dementia who use DS. I have identified studies that address nurses' knowledge of and attitude about DS in general (92, 93), of which one, that addresses CAM more generally, was from Scandinavia (94). These studies show personal use of DS by the majority of nurses (92), a positive attitude towards DS (94), that nurses recommend DS to patients (92), but also that they lack of knowledge about DS (93). One study including British nurses' views about DS use in persons with dementia is discussed in Chapter 5, section 5.2 (95).

1.6.3 General practitioners (GPs)

The Norwegian primary health care system places GPs in a central role (71). All Norwegian inhabitants are entitled to a GP regardless of income, age or ethnicity (the service is based on the principle of equality). GPs are provided at the municipality level and organize and coordinate patients' clinical pathways. GPs can have a basic medical education or be specialised in general medicine.

GPs have responsibility for patients' health and safety, including writing scripts for their PD, and thus have the responsibility for these PDs being safe for patients (96). Their responsibility regarding DS is less clear, as GPs or other health care professionals are not mentioned in

"Regulation of DS" (22), nor are DS mentioned in "Regulation Relating to a Municipal Regular GP Scheme" (97). There are few studies about GPs and DS in general, and no studies from Scandinavia were identified (98-100). In one study, GPs said that they did not feel comfortable discussing DS with patients and wanted to increase their own knowledge (98). Two newer studies from Germany (99, 100) will be discussed in Chapter 5, section 5.5. There are several studies about GPs' professional caretaking of patients with dementia (101, 102), including from Norway (103, 104), one of these studies address DS (95) and will be discussed in Chapter 5, section 5.2.

1.7 Dementia and autonomy

Patient autonomy is a very strong principle in medical ethics (105). A patient has the right to make decisions about their own medical care without being influenced by the health care provider. Patients are of course free to use DS. However, to be able to make an autonomous choice, a patient should be mentally competent. Veiky state: *"[s]tandards [..] that are generally accepted for determining incompetence are based on the patient's inability to state a preference or choice, inability to understand one's situation and its consequences, and inability to reason through a consequential life decision"* (105). Everyone who has worked with patients with dementia knows that competence may be decreased, or as Hedge and Ellajosyula put it, "*[t]he assessment and question of one's capacity falls on a spectrum and varies according to the situation*" (106). However, *"[i]ncompetent (non-autonomous) patients[..] would need a surrogate decision-maker. In a non-autonomous patient, the surrogate can use either a substituted judgment standard (i.e., what the patient would wish in this circumstance and not what the surrogate would wish), or a best interests standard (i.e., what would bring the highest net benefit to the patient by weighing risks and benefits)*" (105). It is important that the person with dementia, together with his or her caregiver, gets as reliable and easily understood information as possible in order to enable them to make an informed decision.

2 Objective

I have only identified eight international studies that have investigated the prevalence of DS use by persons with dementia in the years 1995–2023 (36, 61, 62, 66, 67, 107-109). Persons with dementia do use DS, but do not always inform health care personnel about their DS use (36, 61). Although this situation imposes risks to patient safety, very little is known about the extent of the problem in Norway, as to the best of my knowledge, there are no studies from Norway or Scandinavia. Furthermore, there is virtually no information available about whether health care employees are aware of the risks of DS, and which measures the various health care professions within the Norwegian health care system take, if any, to increase safety. There is also little information about these issues from an international perspective.

2.1 Aims

The overall aim of this thesis was to generate new knowledge about DS use by home-dwelling persons with dementia and potential risks related to this use. The study aims to explore to what degree persons with dementia use DS, whether their use of DS represents a risk to them, whether this risk was acknowledged from the perspectives of the relevant primary health care personnel (Figure 5), and what actions (if any) these health care workers took to increase patient safety. The overall long-term goal for this research is to ensure safe use of DS, including herbs and composite products, for patients with dementia.

2.1.1 Specific aims of Paper 1- 4

The aims of Paper 1 were to describe the extent of DS use among home-dwelling persons with dementia in ambulatory care and to identify direct and indirect risks related to DS use.

The aims of Paper 2 were to describe the attitudes of pharmacy employees in Norway and professional practice behaviours related to the counselling and sale of DS in general, and more specifically, to persons with dementia. The study investigated to what degree pharmacy employees felt responsible for the safety of customers with dementia who purchased DS. We also wanted to investigate whether there were differences in professional practices and attitudes between pharmacists and pharmacy technicians.

The aims of Paper 3 were to describe HCS employees' professional practices, experiences with and knowledge about unsafe DS use in their clients with dementia, and their attitudes towards DS in general. We also investigated their attribution of responsibility concerning DS

use in their clients and whether there were differences in professional practice and attitudes between nurses and nurse assistants.

The aims of Paper 4 were to explore GPs' experiences with DS use by home-dwelling patients with dementia, with a focus on composite DS products without clear evidence-based recommendations for use. The study also investigated the GPs' attitudes, perceived responsibilities, perceived barriers to responsibility, and their suggestions for improvements to safeguard the use of DS by this patient group.

3 Methodology

3.1 Definition of DS

In this thesis, the definition of DS from US law is used (4), which includes herbs and various other substances. The definition is broad and cover most of the products in tablet formula that persons with dementia can use, but which fell outside the control of The Norwegian Medicines Agency. This definition is used in several, but not all, newer international literature on the subject (16, 51, 53, 54, 82, 110, 111). Complementary medicines was the term used for products sold in pharmacies in one article (112), natural remedies (further specification was made) was the term in another study (41). To explain the products of interest to the participants in Paper I they were told that we wanted to investigate: «*alternativ medisin (helsekost, kosttilskudd, naturmidler og lignende)*». In Paper 2, the Norwegian phrases "*urteprodukter, naturmedisiner, kosttilskudd eller lignende, heretter kalt naturmidler*» were used. In Paper 3 we asked for «*naturmidler*» meaning «*kosttilskudd og urtepreparater (eventuelt homeopatiske midler, probiotika m.m.*)». In paper 4 we specified that we were interested in "*kosttilskudd/naturlegemidler/urter*", In Papers 1 and 3, we specified that pure vitamin supplements that were used to treat a diagnosed deficiency were excluded, as were unprocessed edible oils, herbs used as spices, food bars, and beverages such as teas, this was also explained orally to the GP in Paper 4. These exclusions were made because the main interest was in supplements that could be confused with drugs by the persons with dementia and administered by home care services in the automated drug delivery system (in Norway often called the multidose drug dispensing system) (2). None of the informants mentioned supplements in any other form than tablets.

3.2 Study participants and design

The identified perspectives presented in Figure 5 were operationalized in four studies. A summary of the methodology used in these four studies is presented in Table 1.

3.2.1 Data from routine consultation

The following data were collected from routine consultation such as age, gender, whether the patients lived alone, whether they received help from HCS, list of PD and over-the-counter drugs (OTC) and DS, and whether the person with dementia received help with the administration of their PD. HCS or GPs were contacted in several cases to secure correct lists of PD and OTC.

Table 1 Overview of the methodologies used in the four papers included in this thesis

Paper	1	2	3	4
Perspective	User	Product	Home care	Medical
Target group	Patients, caregivers	Pharmacists, pharmacy technicians	Nurses, nurse assistants working in HCS	GPs
Study period	November 2011 – October 2013	December 2014 – March 2015	August–December 2016	February–December 2019
Recruitment	Persons with dementia diagnosis according to ICD-10 criteria referred to a Norwegian Memory clinic	All pharmacy employees in 8 municipalities in Nordland County Recruitments by assistance of intermediate manager	All home care employees in 6 municipalities in Nordland County Recruitment by assistance of intermediate manager Lottery of €91 for one participant	GPs recruited by telephone from the public GP index GPs were offered minimum compensation for lost income of €75
Exclusion criteria	No caretaker, too tired to participate	No customer contact	Long-term sick leave (>8 weeks) Working less than 40% of the full-time equivalent Temporary employment of less than six months No customer contact	Less than 6 months experience in primary health care
Feasibility pre-study (not included in results)	Five patients and caregivers	15 employees outside the study area	15 employees outside the study area	Interview with one GP
Study design	Questionnaire, cross-sectional, data from ordinary/routine patient consultation	Questionnaire, cross-sectional	Questionnaire, cross-sectional	Qualitative individual interview Questionnaire, cross-sectional
Numbers of questions in surveys	16 9 open-ended 7 dichotomous	35 2 ordinal 8 open-ended 25 multiple choice or dichotomous	31 2 ordinal 3 open-ended 26 multiple choice or dichotomous	19 2 ordinal 3 open-ended 14 multiple choice or dichotomous
Administration of questionnaire	Oral questions to patient/caregiver and answers registered by me	Digital	Digital or paper	Paper
Study outcome	DS-PD interactions Circumstances related to DS use	Professional practical conduct towards DS	Professional practical conduct towards DS	Professional practical conduct towards DS

3.2.2 Questionnaire- surveys

The research group and patient research partners designed the questionnaires used in the surveys of employees in pharmacies, HCS, and GPs, as no validated questionnaire was available that covered our research aspects. Authors HR and TG designed the questionnaire to patients/caregivers building on our knowledge from our experiences (a memory clinic and pharmacy). Additionally, the surveys build on a theoretical model of direct and indirect risk (46-48). The results from a questionnaire answered by the GPs (that will not be presented outside this dissertation) will be presented in this thesis so that actions and attitudes of various health care professionals can be compared. The questionnaire to HCS employees was originally offered in a digital version, but after request a paper version was made available.

3.2.3 Qualitative data collection and analysis

The research approach in the study with GPs was to use qualitative individual interviews to allow both descriptive and exploratory work. We learned from Papers 2 and 3 that the methods used there provided limited insight into the difficulties that health care personnel may face when responsible for persons with dementia who use DS. An interview guide was developed by the authors of Paper 4 and the patient research partners based on the aim of the study, a theoretical model of direct and indirect risks and the results from Papers 1, 2 and 3 (46-48, 113-115) and the authors and patient research partners multidisciplinary experience on the field. The interview guide was piloted to check for feasibility and thematic relevance. A purposive, diversified sample of GPs was recruited as informants to cover different groups of gender, age, native/non-native Norwegian according to their names and a rural/non-rural workplace in North-Norway.

Nine interviews took place face-to-face and five took place on the telephone. The interviews lasted from 19 to 89 minutes (average 48 minutes). Most interviews took place at the GP's office. The interviews were audiotaped and transcribed verbatim. HR, FM and KHH assessed the transcripts and decided that the study had enough informative power after 14 interviews. It should be noted that one GP who was interviewed did not answer the questionnaire. The material was analysed using systematic text condensation, a method for thematic qualitative analysis (116). The analysis followed these steps: (i) reading all the transcripts to obtain an overall impression; (ii) identifying units of meaning and coding for these units; (iii) condensing and summarizing the contents of each of the coded groups; and (iv) reconceptualising the data and making generalized descriptions and concepts. The analyses

were inspired by clinical practice, the research questions and knowledge derived from former studies (113-115), and theory about direct and indirect risk (46-48). Respondents were offered the chance to read through their own transcripts and were invited to give feedback on the first version of results.

3.2.4 Assessment of cognitive and ADL functioning

Cognitive evaluations were performed using the Mini-Mental Status Examination – Norwegian Revision (MMSE-NR) (117), and evaluations of ADL function were recorded with assistance of the caregivers using the Rapid Disability Rating Scale-2 (RDRS-2) (118). These two tests were routine assessments in the follow-up of patients at the memory clinic. The clinical diagnostics of dementia had already been made using more thorough investigations such as MRI, lumbar puncture, and neuropsychological test batteries, and in some cases, other examinations as well.

MMSE-NR screens people for difficulties in cognitive function with scores ranging from 0 to 30. A score below 24 is suggestive of cognitive problems, such as dementia, but can also be caused by other reasons. (117). Scores above 28 indicate normal function with some exceptions such as frontotemporal dementia in the initial stages of the disease (119). Persons with higher education can generally achieve higher MMSE scores even in the presence of dementia (120). The study design did not assess for educational level.

The RDRS-2 scale ranges from 21 to 84 points, where a score of 21 indicates normal ADL function, while a score of 84 indicates complete dysfunctionality (118). RDRS-2 has a question that evaluates a person's ability to take their medication correctly. However, the answer to this question was not noted specifically – only the sum total was recorded.

3.2.5 Assessment of interactions between DS and PD

Lists of individuals' PD, DS and OTC were collected and sent anonymously to the regional pharmacovigilance centre (RELIS) North Norway for assessment of DS-PD interactions. The Natural Medicines Comprehensive Database, Medline and the Norwegian RELIS database were used to identify potential clinically relevant DS-PD interactions.

3.3 Statistical analyses

Quantitative data were analysed using IBM SPSS (Statistical Package for the Social Sciences) version 22.0–28.0 (IBM Corporation, Armonk, NY, US) for Windows. The data were mostly presented as descriptive statistics such as absolute and relative frequencies, means and

standard deviations. Independent Student's t-test was applied for continuous variables and Pearson's chi-square, or Fisher's exact tests applied for categorical variables. Logistic regression was used for binary data to analyse the associations between the frequency of persons with dementia receiving assistance with DS administration and who initiated DS use in these persons. Significance level was set at five percent and was adjusted for multiple testing according to Bonferroni (121).

3.4 Ethics

The study in Paper 1 was approved by the Regional Committee for Medical and Health Research Ethics North, reference number: 2011/1705. An employee at the outpatient clinic who was not involved in patient care presented the study details and obtained written consent from each participant and caregiver before consultation and data collection.

The Regional Committee for Medical and Health Research Ethics presented no objections to the study design for Papers 2 and 3 (2014/1385) or Paper 4 (2016/1775). Because no patients were involved, the project was defined as "quality assurance". The surveys upon which Papers 2 and 3 were based did not collect personally identifiable information and were therefore not accountable to the Norwegian Data Protection Agency. All participants were given written information about the study and informed that returning the questionnaire was considered study consent.

The study in Paper 4 was approved by Norwegian Centre for Research Data (2019/357669). All informants gave written informed consent to participate and were entitled to withdraw their consent at any time. All audiotapes were deleted, and the transcripts anonymised at the end of the study. Information that could facilitate recognition was omitted.

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4 Results

4.1 Characteristics of study participants

Table 2 Characteristics of study participant

Paper		1	2	3	4
Respondents		N=151	N=105	N=231	N=14
Response rate (%)		90	52	64	One GP invited did not participate
Gender (% women)		63	89	94	50
Years of work experience (%)	0–5	Not relevant	31	40	23*
	5–15	Not relevant	37	32	31*
	>15	Not relevant	32	28	46*
Others		Mean age: 73 years Average MMSE-NR 19.6 32% lived alone Caregivers: 51% spouses 35% children	54% pharmacist 46% pharmacy technicians	34% nurses 66% nurse assistants	50% rural, 50% urban workplace 64% educated in Norway 71% born in Norway Mean practice list size: 906

*Percentages based on the 13 GPs who answered the questionnaire. Employees holding a bachelor's or master's degree in pharmacy were classified as pharmacists, while employees with other educational backgrounds were classified as pharmacy technicians. Nurse assistants includes auxiliary nurses and other health-related education of three years of upper secondary school and employees without formal education.

4.2 Comparisons across studies

Because the participants in Papers 2, 3 and 4 were given some similar or almost similar questions, their answers can be compared. Table 3 presents the beliefs about DS for pharmacy employees, HCS employees, and GPs, and their experience with risks related to DS use in persons with dementia. The question about how many HCS employees and GPs who interfered to increase the safety of persons with dementia using DS was taken from the question in which respondents were given examples of different types of interference and asked if they had interfered in these specific ways. A direct question, "have you interfered?", gave a lower response of 24% for HCS workers and 31% for GPs. The wording of the statements about awareness of harm from DS were not identical in all studies. Caregivers/persons with dementia and GPs were asked more specifically about their knowledge of PD interactions or adverse effect from DS. Employees in pharmacy and HCS

were asked if they had knowledge that DS may harm users' health. Because it is part of the job of pharmacy employees to sell DS, the questionnaire asked them specifically about unprompted recommendations.

Table 3 Health care personnel's beliefs about DS and experiences with risks related of DS use in persons with dementia

	Pharmacy employees (%) N=105	HCS employees (%) N=231	GPs (%) N=13
Believe DS could prevent or cure dementia symptoms * α			
Yes	9	10	8
No	38	13	38
Do not know	52	75	54
Agree with the statement that some DS may cause harm to users' health *			
Yes	59	58	92
No	12	6	0
Do not know	28	32	8
Been worried about patients with dementia because of their DS use α	8	46	46
Interfered to increase the safety of persons with dementia using DS *α	5	31	69
Recommended DS to patients *α	35	35	100
Use DS themselves *α	37	62	Not asked

DS: Dietary supplements, includes herbs. HCS: home care service. GP: general practitioner. Item non-respondents among employees in pharmacy* and HCS α.

Figure 6 compares the answers from employees in pharmacies, HCS and GPs to the question about who the responding health care professionals think is most responsible for the safe use of DS by persons with dementia. None of the health care professions see their own profession as most responsible. Employees in HCS and pharmacies see GPs as most responsible. GPs see HCS as most responsible. The question about attributed responsibility was ordinal: respondents were asked to rank six categories of professions according to who should be responsible. Figure 6 shows only the first ranking (i.e., what profession was seen as most responsible). Twelve percent of pharmacy employees and seven percent of HCS employees were item-non-responders, while all the GPs that answered the questionnaire (n=13), answered this question.

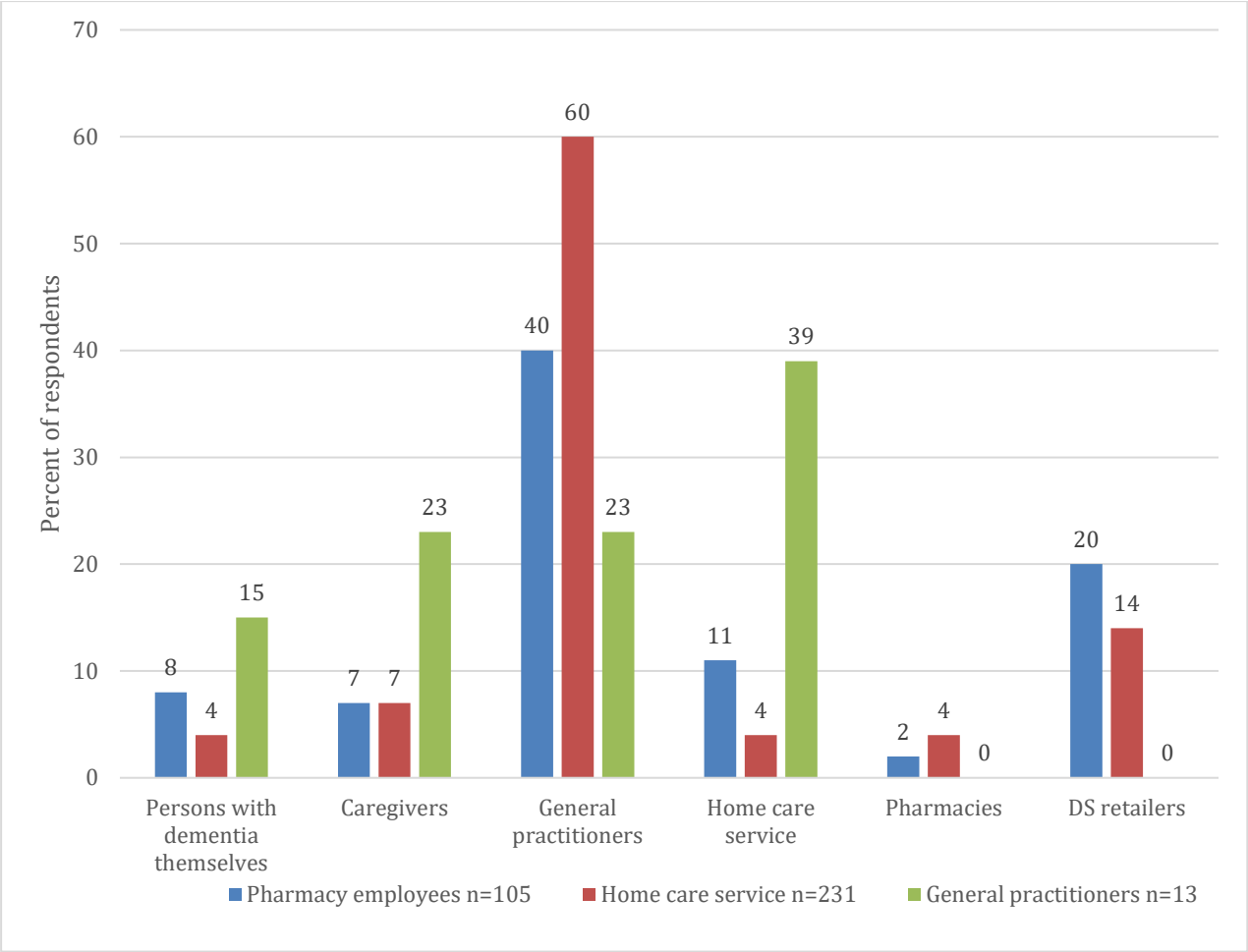

Figure 6 A comparison of who respondents thought should be responsible for the safe use of DS by persons with dementia (Papers 2, 3 and questionnaire-survey of GPs)

DS: dietary supplements

Figure 7 compares the answers from employees in pharmacies, HCS and GPs about what measures the relevant health care professionals think would best increase the safety of persons with dementia who use DS. Employees in HCS and pharmacy see increased effort from the GP as most important. The GPs see changes in laws and regulations as most important. HCS also suggested to include DS in the automated drug dispensing system. The questions about suggestions for improvements of safety were ordinal: respondents were asked to rank six categories of measures according to what would be the best way to increase patient safety. Figure 7 shows only the first ranking (i.e., what measure was seen as best). Nineteen percent of pharmacy employees and nine percent of HCS employees were item-non-responders, while all GPs that answered the questionnaire (n=13), answered this question. HCS employees and GPs were given explanation on several of the options that the pharmacy employees did not get, but the options were the same in all surveys.

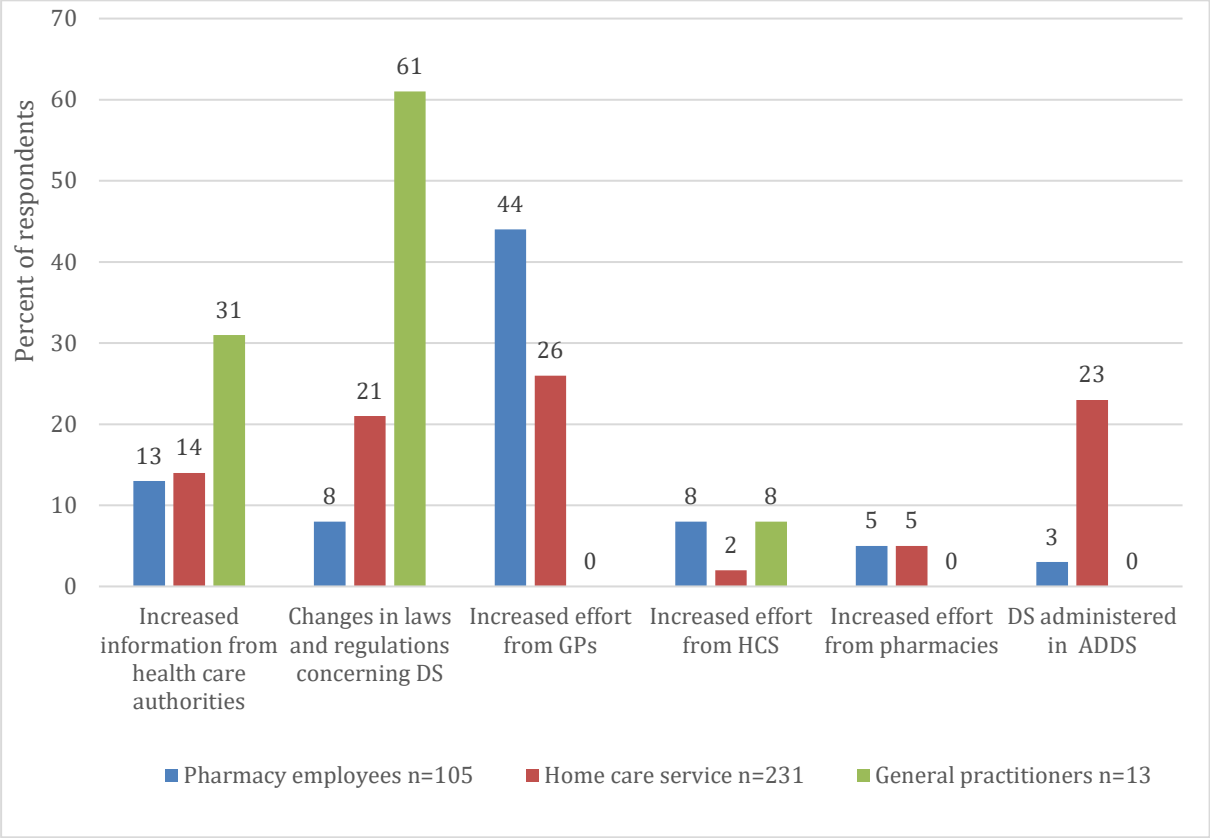

Figure 7 A comparison of what measures respondents thought would best improve the safety of persons with dementia who use DS (Papers 2, 3 and questionnaire-survey of GPs)

DS: dietary supplements. GP: general practitioner. HCS: home care service. ADDS: Automated drug dispensing system.

4.3 Results from assessment and questionnaire-survey of patients with dementia and their caregivers

The patients with dementia surveyed in Paper 1 used on average 4.6 PD a day (range 0–17) and 0.7 OTCs a day (range 0–3). Forty-six percent of patients reported use of DS, on average 1.7 DS a day (range 1–6). We found that DS users consumed on average 2.1 tablets more per day than non-users (7.2 vs. 5.1 tablets, respectively). A Potentially clinically relevant interactions between DS and PD/OTCs were detected in 11% of DS users. In four persons, these interactions involved anticoagulants, and in four persons, antihypertensives. One participant suffered from tachycardia, which could have been negatively affected by her DS use. In addition, one participant used DS that resulted in a daily intake of vitamin D, chromium, and copper above the recommended dietary intake.

Thirty-seven percent of patients received assistance administering their DS, compared to 73% who received assistance administering their PD. Living alone was associated with not receiving assistance with DS, although most persons with dementia who used PD and lived alone were assisted by HCS. Several persons who did not receive assistance with DS or PD had MMSE-NR and RDRS-2 scores indicating that it was questionable whether they were able to handle the administration of DS and PD on their own. Sixteen of the 44 persons with dementia not receiving assistance with the administration of their DS had a MMSE lower than 24 (the lowest score was 13). The highest RDRS-2 score among these patients was 45; 14 patients had a RDRS-2 score above 30. Caregivers were most frequently assisting with DS, and HCS most frequently assisted with PD. HCS were seldom involved in assisting persons with dementia with the administration of DS. In 17 cases, persons with dementia had HCS for PD, without the HCS being involved in the administration of these persons' DS.

Initiators of DS use were spouses and relatives (42%), health care personnel (14%), and DS retailers (14%). The person with dementia had initiated the use in 28% of cases. When spouses or health care personnel initiated the DS use, persons with dementia were more likely to receive assistance with the administration of the DS.

Thirty-two percent of the persons with dementia and 51% of the caregivers said they were aware that use of DS may increase a risk for adverse events and interactions with PD. Among persons with dementia who used DS, caregivers' knowledge of risk did not influence the extent to which they helped the persons with dementia administer DS.

4.4 Result from questionnaire-surveys of employees in pharmacy and home care service and GPs

4.4.1 Experience with unsafe use of DS by persons with dementia

Only eight percent of the pharmacy employees (Paper 2) had experienced unsafe use of DS by customers, but most of these (63%) had intervened (five percent of the total number of respondents). Reponses to unsafe use varied: one pharmacy employee contacted the caregiver, and four tried to inform the person with dementia about the hazards and encouraged them to contact their GPs. In comparison, 46% of employees in HCS (Paper 3) had feared that their clients may suffer harm because of unsafe use, and 31% had intervened to secure safe DS use by their clients with dementia; of these, 50% discussed the problem with a colleague, 45% consulted a GP, 41% took action to include DS in the automated drug delivery system, 27% consulted a caregiver, 17% asked a caregiver to remove the DS, and 14% consulted a

pharmacy. Six of the 13 GPs who completed the questionnaire had been worried about patients with dementia because of their DS use, and ten had intervened; of these, 46% tried to find a solution together with the caregiver, 53% talked to the patient and tried to find a solution, 23% asked pharmacy or RELIS for advice, 15% asked the caregiver to remove the DS, and 8% (one GP) added the DS in the automated drug dispensing system (unpublished data from questionnaire).

Among HCS employees (Paper 3), 59 answered the question about whether they would intervene again; of these, 83% said they would, while 17% were more uncertain. This question was not asked to pharmacy employees or GPs.

Seventy-one percent of HCS employees (Paper 3) preferred that the HCS administered DS to clients with dementia rather than have the clients administer DS to themselves. This question was not asked to pharmacy employees or GPs.

The majority of the pharmacy employees reported that their pharmacy lacked routines for handling communication problems with cognitively impaired customers (31 of 54 item respondents). Only six percent of pharmacy employees had been taught about counselling persons with dementia. More than half the pharmacy employees (53%) had experienced customers who were unable to understand important pharmaceutical information because of cognitive problems. HCS employees and GPs were not asked this question, as working with patients with dementia is a large part of the work of HCS employees, and dementia is an important subject in medical training and practice.

4.4.2 Other professional conduct related to DS

Ninety-six percent of pharmacy employees received questions about DS. Forty-eight percent of pharmacy employees confirmed that they always informed customers about potential adverse effects from DS. Sixteen percent checked regularly for DS-PD interactions, and two-thirds checked depending on the customers' health, the type of PD, or the type of DS. One-fourth regularly asked about the co-use of PD when selling DS, while only two percent asked about the co-use of DS when dispensing PD.

One-fourth of pharmacy employees reported access to independent scientific information on all or most DS sold in their pharmacy. One-third of HCS employees said that they knew where to find reliable (scientific) information about DS. Twenty-eight percent of HCS employees said that they received education on DS during their professional training, and four

percent had participated in continuous education on DS. Twenty percent of the pharmacy employes had participated in continuous education on DS (unpublished data).

Pharmacy employees who believed that DS have no negative effects did not have less thorough safety routines. However, using DS themselves was associated with recommending DS to customers. Upselling was not a common reason for recommending DS unprompted to customers – only six (six percent) of the pharmacy employees reported upselling as a reason for recommending DS. Fifteen percent reported that their pharmacy offered DS as an upselling routine (unpublished data).

4.4.3 Variations in professional behaviour at different educational levels

Educational level was correlated with professional practice to some extent. For instance, 77% of pharmacists in Paper 2 agreed that DS could harm to users' health, versus 38% of pharmacy technicians (includes six other non-pharmacists). More pharmacists (95%) than pharmacy technicians (65%) received questions about DS not sold in the pharmacy, and more pharmacists than pharmacy technicians provided information about DS not sold in their pharmacy. Moreover, more pharmacists than pharmacy technicians gave information on possible adverse effects and asked about the co-use of DS and PD, but there was no difference regarding checking for interactions. Of those who reported experience with customers with dementia who used DS incorrectly, 88% were pharmacists. Of those who reported that they intervened with what they suspected was incorrect use, 80% were pharmacists (unpublished data).

Among the education levels in HCS employees (Paper 3), there was less variation than within pharmacy employees. There were few variations between nurses and nurse assistants (nurse assistants includes all HCS employees who are not nurses and have no health-related education at bachelor level or higher), but those variations were related to interventions with clients' DS use to avoid harm to their health. More nurses than nurse assistants intervened. The modes of intervention were different: more nurses than nurse assistants discussed the problem with GPs or pharmacies, and more nurse assistants discussed the problem at work. Furthermore, more nurse assistants preferred the intervention of including the DS in the automated drug dispensing system.

4.5 Results from a qualitative study of GPs

All GPs in Paper 4 knew that DS can interact with PD, and several had experienced patients developing adverse effects from DS. The issue of patients with dementia as a vulnerable group had never been brought up as relevant related to DS use, and DS were hardly discussed at all in the available fora of medical knowledge development (medical school, medical journals, medical conferences, etc.). The professional approaches of GPs varied from avoiding discussing DS to more actively seeking information about patients' DS use and adjusting their behaviours to be informed of such use.

An important factor in the problems GPs had with keeping track of patients' DS use was the lack of appropriate tools in the electronic patient journal. The inability to register DS in the medical journal was one of the informants' most important suggestions for improvement of these patients' safety.

Even though the GPs were aware of the potential harm from these products, they experienced a lack of valid information about some DS, which made it impossible to give specific advice about the effects and safety of specific products. This lack of valid information was an important reason for why they found it difficult to take the responsibility for the safety of patients with (or without) dementia who use DS. It seemed as if the frustration that some of the GPs expressed, and for some, the reason they avoided talking about DS, was because of a weakness in the system regarding the regulation of DS. This weakness in the system involves the definition of DS as merely diet, the lack of control/regulation, and thus a lack of information and documentation about the safety and effectiveness of some DS products.

4.6 A model for direct and indirect risk associated with the use of DS among persons with dementia

Based on previous knowledge and supported by the results in Paper 1, a model for direct and indirect risks from DS use was published (Figure 8). This model was later developed further (Figure 9). The initial version of the model (Figure 8) divides the risk persons with dementia who use DS are susceptible to into direct and indirect risks. The indirect risk is divided into risk *only* relevant for persons with dementia/cognitive impairment, and risk relevant to the general population (including persons with dementia/cognitive impairment). The risk relevant to persons with cognitive impairment is divided into risk caused by the dementia symptoms, and risk caused indirectly by resulting dependency on others. The model presented in Paper 1 and Figure 8 is built on prior knowledge on direct and indirect risks (Figure 4, (46, 47).

Furthermore, the model is built on clinical knowledge about dementia symptoms that can lead to an expectation of how these symptoms can impair the safety in persons with dementia who use DS. Results from Paper 1 demonstrated that not all persons with dementia got the help they needed with the administration of DS. The direct risk from DS-PD interactions and adverse effects incorporated in the model were already known from other studies (27, 28, 34-37, 50-53), but were confirmed in Paper 1. The risks related to the treatment settings and condition of use that were incorporated in the model were from clinical practice and previous research (46, 48).

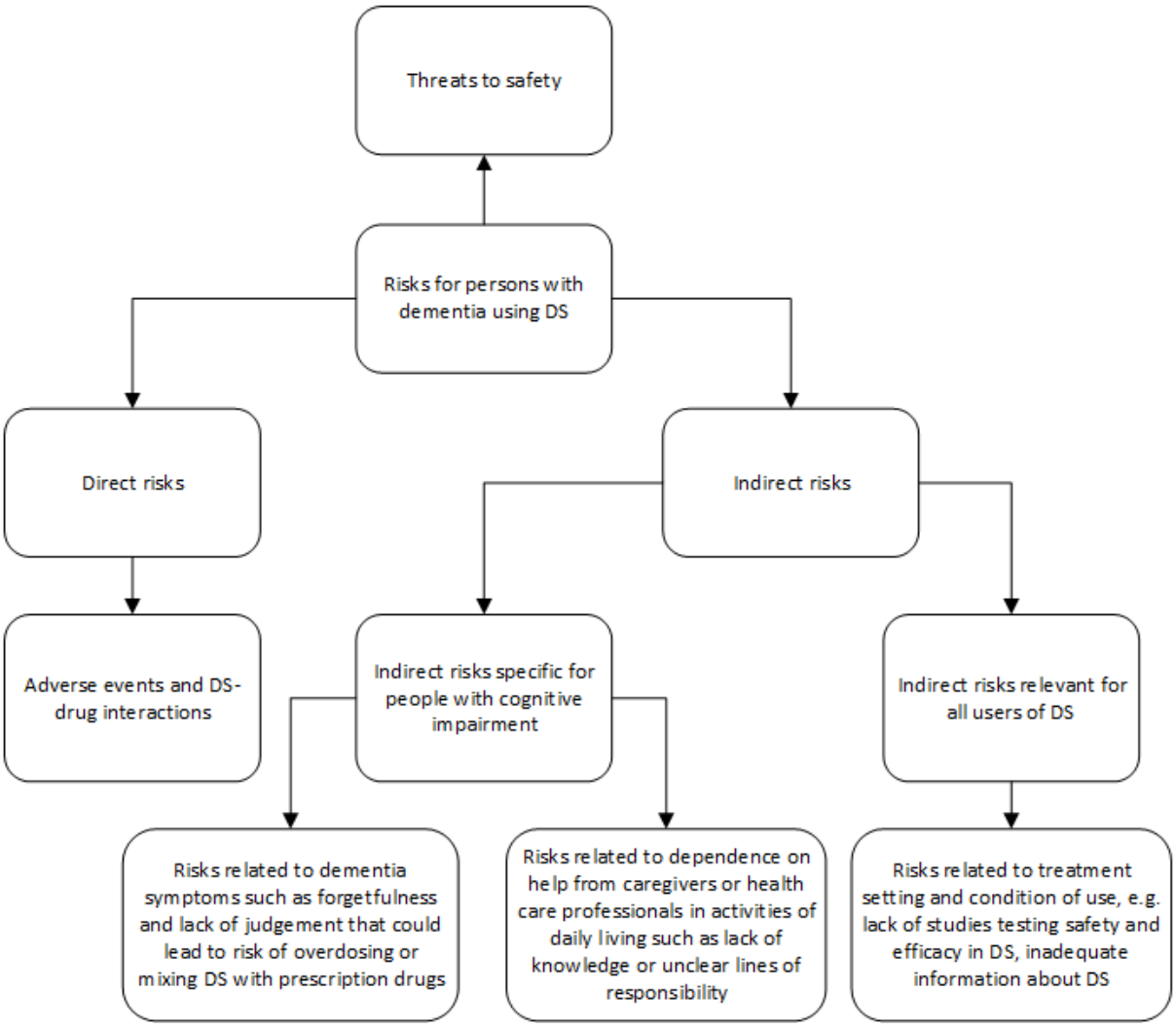

Figure 8 A model of direct and indirect risk developed from previous literature, clinical knowledge and results from Paper 1

The model presented in Paper 1 (Figure 8) did not fully include the general population. Experiences with DS use by patients without dementia was mentioned by the GPs in Paper 4.

The more developed version of this model that was made at the end of the entire project is presented in Figure 9, which includes the general population for the sake of completeness. The risk is divided into direct and indirect risk. The direct risk is divided into direct risk only relevant for persons with dementia and direct risk relevant for the general population including persons with dementia. The indirect risk is divided likewise. The direct risk is the risk from the DS itself. As mentioned, this risk was confirmed in Paper 1 and in Paper 4.

The studies included in this thesis confirmed indirect risk specific for persons with dementia who use DS because of their dementia symptoms. Papers 2, 3 and 4 demonstrated that pharmacy employees, HCS and GPs had experience with patients with dementia who used DS incorrectly. The GPs in Paper 4 mentioned examples of patients with dementia confusing DS with PD, and even replacing PD with DS. They also worried that some of their patients with dementia might be susceptible to economic exploitation.

The results from Papers 2, 3 and 4 also demonstrated risk related to dependence on others, such as lack of knowledge, lack of awareness and unclear lines of responsibility. There was no suggestion about how to help persons with dementia with the administration of their DS, as most respondents did not want to include DS in the automated drug dispensing system.

The indirect risk relevant for all users of DS, including persons with dementia, was demonstrated by the results behind this thesis. The data from Paper 4 demonstrated that differences in practice style were important in the GPs' assessment of DS. Furthermore, the GPs in Paper 4 confirmed the risk related to the condition of use known from previous studies, such as how the lack of studies testing the safety and effect of DS makes it difficult to assess DS use in patients, and how difficult it is to find reliable information about some DS. In their opinion, these limitations were mostly due to imperfections in the laws and regulations of DS. The GPs added new limitations, such as lack of time and inadequate tools. The employees in pharmacies and HCS (Papers 2 and 3 respectively) confirmed that the majority did not know where to find reliable information.

The respondents in Paper 2, 3 and 4 made a ranking on predefined suggestions for improving safety (Figure 7, and the GPs in Paper 4 discussed their own suggestions even further. Suggestions for improvements were thus included in the expanded model.

The model of direct and indirect risk presented in Figure 9 provides an overview of the direct and indirect risk related to the use of DS by persons with dementia and the general

population. It is important to note that the risk relevant to all users is enhanced in persons with dementia because of their vulnerability.

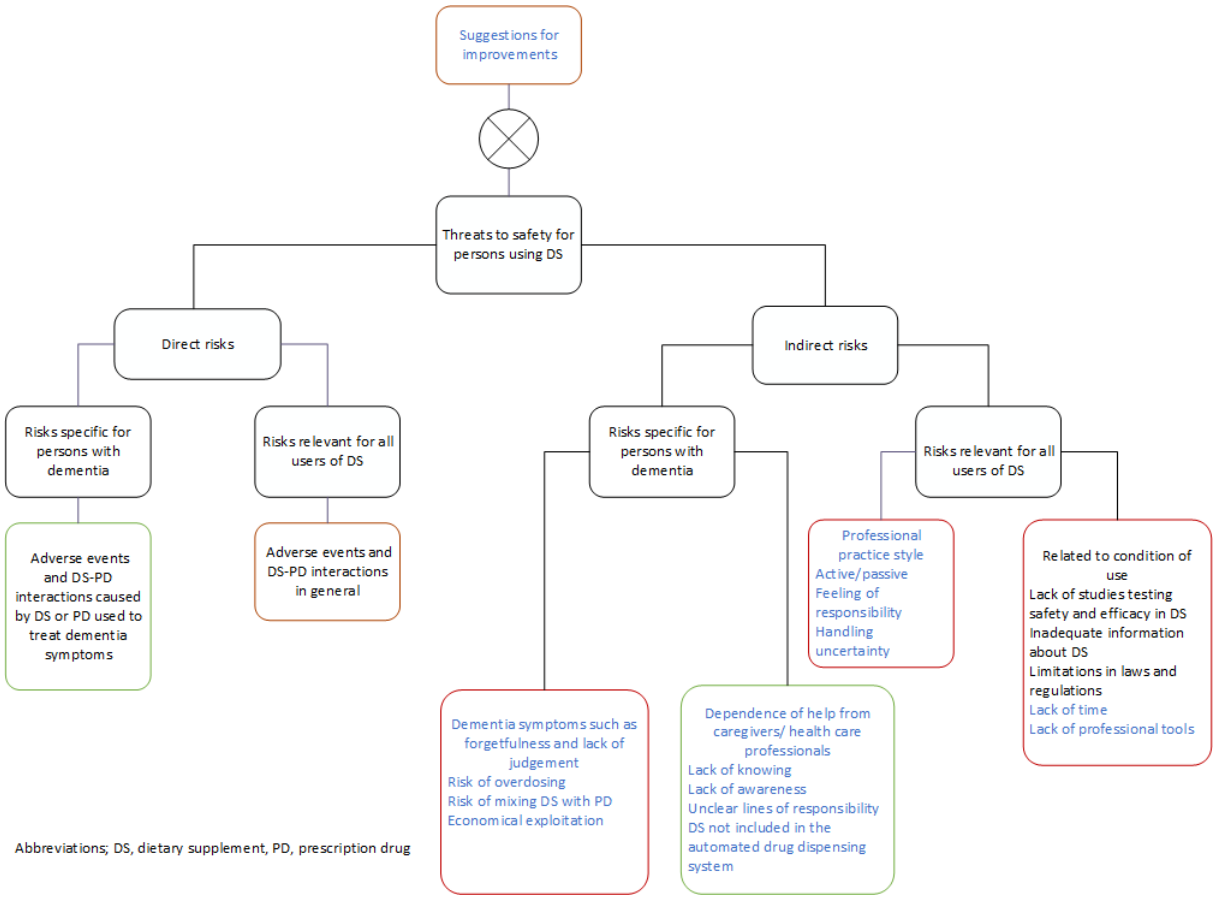

Figure 9 A model of direct and indirect risk related to the use of DS by persons with dementia and by the general population developed after all 4 studies were complete.

Green indicates findings from several of the papers; red indicates findings mostly from Paper 4; blue indicates findings originating from research presented in this thesis.

5 Discussion

5.1 DS use in patients with dementia as a clinical problem

The use of DS is common in persons with dementia. In Paper 1, we found a 46% prevalence (for comparison, DS use was reported in 57% of Australian patients with mild cognitive impairment or dementia, (62). Potential interactions between DS and PD were found in 11% of DS users (a previous study found a risk of DS-PD interaction in 33% of current DS users with dementia, (36). The results from Paper 1 demonstrated that not all the patients with dementia got sufficient help taking their DS correctly, indirect evidence for which was assessed by evaluating ADL (RDRS-2) and cognitive (MMSE-Nr) functioning for those who did not receive help. The project has demonstrated that pharmacy employees (Paper 2), HCS employees (Paper 3) and GPs (Paper 4) had all experienced unsafe use of DS by persons with dementia. The GPs (Paper 4) gave examples of safety problems caused by direct and indirect risks from DS. The overall results from this project suggest that use of DS by home-dwelling persons with dementia presents a risk to their safety.

This risk to safety is relevant for many individual people, as there are approximately 100,000 persons with dementia in Norway today (11). Based on our measure of 46% use among Norwegians with dementia, that comes to 46,000 patients who should be assessed for their DS use. More conservative estimates of DS use still result in tens of thousands of persons potentially affected.

5.2 Beliefs about DS among primary health care personnel

The majority of health care professionals who participated in the studies included in this thesis did not believe that DS can cure or ease dementia symptoms and were aware of the risks from DS. Ninety-two percent of GPs (unpublished questionnaire-survey study 4), 59% of pharmacy employees (Paper 2), and 58% of HCS employees (Paper 3) were aware of this risk. Only, approximately 10% of pharmacy employees (Paper 2), HCS employees (Paper 3) and GPs (unpublished questionnaire-survey study 4) believed DS to be effective against dementia symptoms.

Thirty-five percent of HCS employees (Paper 3) and pharmacy employees (Paper 2) had recommended DS. All GPs (unpublished questionnaire-survey study 4) had recommended some DS, everyone had recommended vitamins, several had recommended minerals and fish oils, eight percent had recommended composite compounds and eight percent herbs. The

nurses in Paper 3 had mostly recommended vitamins and minerals, while one percent had recommended herbs. The GPs had long working experiences, especially compared with HCS employees. More HCS employees with longer work experience had recommended DS than those with less experience. Like vice, longer work experience in GPs may influence the results.

Tabet et al. investigated the beliefs of 200 UK health care professionals (GPs, old age psychiatrists, and geriatric nurses) about the use of vitamin and herbal extracts by persons with dementia (95). They found that 60% of doctors (GP, old age psychiatrists) and 54% of nurses agreed or strongly agreed that vitamin and herbal extracts could result in adverse effects and interactions with PD, and that 36% of the doctors and 56% of the nurses believed that vitamin and herbal extracts could have an important role as an adjunct to other agents in treatment of dementia. In addition, 32% of doctors and 34% of nurses had recommended vitamins and herbal extracts (95). Tabet et al. did not disclose their study period, but the paper was published in 2011, so it must have been earlier than that. It is possible that beliefs about the effects of DS were more optimistic at that time, although later studies have then shown no positive effects from DS that were initially advertised as promising.

The interviews with GPs (Paper 4) showed that they had a scientific approach towards DS, and that they were interested in evidence-based information about effects and risks. This may also be the case for pharmacy employees and HCS, but they were not asked about this. None of the GPs were dismissive of patients using DS, but several expressed a certain skepticism, as exemplified by statements like "*it costs a lot and have no proven effects*." Several GPs claimed the placebo effect from DS to be beneficial for patients, especially for disorders with no medical cure or symptom relief, like dementia. Some were also open to the idea that certain DS products could have a result beyond the placebo effect. Respect was voiced for patient choice and self-determination.

To conclude, the majority of participants included in this thesis believed DS to have no beneficial effects to counteract dementia and were aware of the potential negative effects. A scientific approach toward DS were most common amongst GPs, but they were open for the placebo effect. More than one-third of HCS and pharmacy employees, and all GPs had recommended DS.

5.3 The willingness of various health care professionals to take responsibility for DS use by persons with dementia

Among health care professionals, there seems to a lack of consensus about attributed responsibility for the safety of persons with dementia who use DS. None of the central health care professions in this project seemed to feel they should have the main responsibility for these persons' safety. Employees in both pharmacy (Paper 2) and HCS (Paper 3) pointed at GPs, while GPs (Paper 4) pointed to HCS and caregivers for securing the safety of patients with dementia. More generally, GPs regarded DS use as being the patient's own responsibility. Still, there were ambiguities related to this responsibility, as GPs admitted that not all patients and caretakers understood the potential risk of using DS. After being made more aware of the risks that persons with dementia may suffer from DS, the GPs in Paper 4 were more willing to take on this responsibility. As one GP said, "*I actually feel I should take quite a large responsibility for this because it may have implications for medications I have prescribed, and overall health, but I have to admit I haven't taken that responsibility.*" Pharmacy and HCS employees were not interviewed, but it is possible that an interview (which would have forced the respondent to focus on the issue) would have affected their attributed responsibility. In practice, these primary health care personnel also refer to each other: pharmacists encouraged customers with dementia to contact their GPs, HCS consulted GPs and pharmacies, and GPs asked pharmacists for help (Chapter 4, section 4.4.1).

Why is it important to attribute responsibility? If none of the central health care professionals take on this responsibility, it is in practice left to the persons with dementia themselves, if they are not so lucky as to have a caretaker to help them. It is important to note that caregivers and especially the persons with dementia (Paper 1) were less aware of the risks than health care personnel, as only 32% of the persons with dementia and 51% of the caregivers said they were aware that use of DS may increase a general risk for adverse events and interactions with PD. This thesis has no answer to the question of who should have this responsibility but highlights the need for this question to be debated. (For discussion of the ethics relevant for health care personnel, see the upcoming section 5.7.1 in this chapter).

The GPs in Paper 4 gave several reasons that it was difficult to assume responsibility for patients with dementia who use DS, but mainly, they lacked the basis to assess the DS products because there are few or no studies on safety and effect. Similarly, an Irish qualitative study from 2020 showed that GPs felt uncomfortable prescribing DS due to lack of knowledge about DS (98). The GPs in Paper 4 also felt that the patients' electronic journals

were unsuitable for keeping track of patients' DS use. A few of the GPs felt they lacked the time to deal with their patients' DS use, although one GP pointed out that assessing the patients with dementia is not too time consuming because there are few such patients on each GP's patient list. Even this changed during the interview, there was initially little focus of the risks from DS in general, and no awareness of the extra challenges that persons with dementia may face. During the interview the GP remembered several incidents of medical issues related to DS. Patient autonomy may be another reason why health care personnel feel it is difficult to take on the responsibility, as DS use was regarded as a private matter. Some of the GPs used the word "consultants" about themselves, by which they meant that they gave advice to patients (or caregivers), and that patients (or caregivers) themselves make decisions.

In an interview with 12 Canadian community pharmacists concerning their experiences with suspected adverse effects from Herbal medicines and other natural health products (84), the respondents agreed that reporting adverse effects from Herbal medicines and other natural health products was a pharmacist's responsibility but believed that nurses and especially physicians shared this responsibility. In practice, most of the respondents left the responsibility with their customers and advised them to seek advice from their physicians. The reason they referred to physicians were that they believed physicians knew more about the patients' overall health conditions. The reasons that most pharmacists did not want to take the responsibility were a perceived lack of knowledge about Herbal medicines and other natural health products, lack of time, and uncertainty about the reporting process. There were differences within the work group due to different styles of practice. Several of the employees wanted others to take the main responsibility. There were hinders to taking responsibility and plausible reasons that responsibility was better left with others; these thoughts were shared by many of the GPs in Paper 4.

A recent review found that pharmacists experienced various barriers to fulfilling their responsibility to ensure safe use of complementary medicines through customer counselling (112). These barriers were a lack of confidence in their knowledge and skills related to complementary medicines, and not feeling comfortable in answering specific questions about complementary medicines. In addition, pharmacists reported concerns about the lack of scientific evidence for effectiveness of many complementary medicines.

Several studies have evaluated the knowledge of health care professionals about DS (77, 79, 93, 122). For example, a 2008 study (123) surveyed the knowledge of internal medicine

physicians of DS regulation and adverse effect reporting. The 335 respondents who answered the questions (response rate 22%) were recruited from a residency training program about DS. The respondents had low average baseline knowledge about DS regulatory issues and answered 59% of the survey questions correctly. Another study of 192 medical doctors in Trinidad in 2005 found that only 15% were able to identify at least one known herb-PD interaction (124).

A 2022 study among Jordanian community pharmacies found that only 37% of pharmacists were aware of the possible interactions between herbs and PD, and 96% of the participants had not come across any adverse reactions in their customers (122). This thesis has not studied the correlation between awareness of the risk from DS and the frequency with which health care employees encounter problems related to such use, and I have not found other studies exploring this issue. One may speculate, however, whether there is a connection.

Lack of awareness seems to be an obstacle in taking on responsibility. GPs had little focus on monitoring DS, despite what they knew about potential DS-PD interactions and the fact that several had experienced patients with adverse effects from DS (Paper 4). It is important to note that the GPs said that DS were hardly discussed at all in the available fora of medical knowledge development, such as medical school, medical journals and medical conferences. Similarly, few employees in HCS said that they had received education about DS either in their professional education or in continuous courses (Paper 3).

To conclude, none of the health care personnel included in the thesis wanted to take the main responsibility for the safety of patients with dementia who use DS. Few studies have investigated health care personnel's attributed responsibility for risk related to DS use. Lack of knowledge base for assessment of about DS was the most important reason given by the GPs (Paper 4) and similar reasons were given in other studies (98, 112). External factors such as lack of time and inadequate tools, and awareness and practice style are also important factors (for more discussion about practice style, see the upcoming section 5.5 in this chapter). GPs (Paper 4) said that the uncertainty about DS is not related to knowledge *per se*; rather, the uncertainty was caused by the lack of information about DS products. Lack of personal knowledge about specific DS need not be a problem; after all, GPs look up information about new PD all the time. It is only when one forgets to check (awareness) or when information is lacking or unreliable that patient safety is threatened (125).

5.4 Variation in professional conduct among different educational levels

There was some noticeable variation among employees at the same workplace but with different levels of education, for instance between pharmacists and pharmacy technicians and to a lesser degree between nurses and nurse assistants (see Chapter 4, section 4.4.3). Some of the differences were clearly related to different tasks and responsibilities at work (126). More nurses than nurse assistants and more pharmacists than pharmacy technicians had intervened with what they thought was unsafe use of DS by clients/customers with dementia. As only one pharmacy technician had intervened, one cannot generalise about intervention in pharmacy technicians, but there was a difference in how nurses and nurse assistants intervened. The variation may result from different expectations towards different professions and different responsibilities at work. Nurses made more contacts outside HCS, and nurse assistants discussed the problem at work, potentially involving nurses or intermediate managers (the type of fellow workers consulted was not specified).

Some differences may be due to different levels of knowledge. One example of different attitude that may be explained by different educational levels and comprehensiveness of that education is that 77% of pharmacists agreed that DS could cause harm to users' health, while only 38% of pharmacy technicians agreed with that statement. The variations between nurses and nurse assistants were less prominent, which might be explained by the fact that the actual work done by nurses and nurse assistants in HCS are similar in many cases (89).

I have found only one paper discussing variations between pharmacists (n=27) and pharmacy technicians (non-pharmacists)(n=25) in the way they treat DS (85) (and no paper discussing variations between nurses and nurse assistants in HCS). The relevant study was an observational study in Phoenix, US, in which the investigators visited 52 pharmacies, health food stores and grocery stores with internal or associated pharmacies selling herbal weight loss supplements (June 2008–January 2009). The observations were made by pharmacy students pretending to be customers with various health conditions (such as heart disease or pregnancy) picking up weight loss supplements, and the retailers did not know that this was part of a study. Ninety-two percent of the non-pharmacists recommended specific weight loss products, while only 22% of the pharmacists did. Only 39% of the pharmacists stated that all herbal weight loss were safe, versus 96% of the non-pharmacists, when in fact some of the products had health issues. This study is not totally comparable to Norwegian pharmacies as it included health food stores.

One inference of the observed differences in practice is that it is important to educate pharmacy technicians about DS, because persons with dementia are as likely to meet a pharmacy technician as they are to meet a pharmacist when buying DS in the pharmacy. Similarly, persons with dementia are as likely to come into contact a nurse assistant as a nurse when receiving services from HCS, so educating the nurse assistants is as important as educating the nurses.

5.5 Practice styles among GPs

Paper 4 detected different practice styles among the GPs. One difference was whether the GPs assumed an active or passive approach to DS use by their patients. Even though all informants indicated that questions about DS seldom came up, some discussed DS with patients more frequently than others, and these GPs adjusted their behaviour so that they could be informed about their patients' DS use. Other GPs limited their professional involvement with DS to answering questions about DS if their patients asked, and one GP refused to even answer questions about DS because he could not find scientific documentation about these products. Djuv et al. found that only a quarter of Norwegian patients recruited from a GP's office disclosed their use of herbs to their GP (127). Several studies have shown that the most common reason for non-disclosure of DS use is that health care personnel do not ask (128, 129). A GP's practice style affects patients (130), and clinical decision making varies between medical doctors even in comparable situations (131), which is also true about prescription of DS, for instance for treatment of borderline low values of vitamin B12 (26). Not all physicians follow practice guidelines (132), which means that sometimes certain medical tasks are not done, such as insufficient collection on information from histories and medical examinations (44).

One conceivable explanation about why GPs have various approaches to DS (for which they lack reliable information) is about how they perceive and react to professional uncertainty. Uncertainty in the medical context was first studied by Fox in the 1950s (133) and it is known to affect medical practice (131). Definitions of uncertainty vary, but most agree that uncertainty is a subjective, cognitive experience that is relevant for all people (134). According to Han et al. (134), the defining feature of uncertainty is the lack of knowledge about some aspect of reality and the subjective perception of one's own ignorance. Two main dimensions of uncertainty have been identified as source uncertainty (e.g., incomplete information or inadequate understanding) and issue uncertainty (e.g., the outcomes or

situation to which a given uncertainty applies). Source uncertainty is relevant to DS monitoring. When the likelihood of risk is unknown, lack of knowledge tends to promote pessimistic appraisals of risk as well as avoidance of decision-making (134). One could imagine that this is the case with DS: the risk of use is often not known, or there is only unreliable data about risks. Several of the GPs in Paper 4 expressed professional uncertainty related to DS monitoring because of the lack of reliable information about risks. One GP said specifically that he did not want to deal with DS because no reliable information existed, while others also said that they disliked dealing with DS. One therefore cannot exclude the possibility that uncertainty, caused by a system that allows DS, without reliable information about safety and effect, to be sold, affected the practice style of the studied GPs. GPs reacted differently to this ambiguity, however. One GP pointed out that it is more important to her that patients whose DS use is not monitored by a GP might face increased health risks. One cannot generalise from qualitative studies, and practice style was not evaluated for pharmacy or HCS employees. The mechanism of how uncertainty can affect clinical practice is, however, general, and there is a possibility this mechanism can affect other health care professionals too.

Another explanation for the different professional approaches towards DS is a different value balance between evidence-based medicine and patient experiences. In this perspective, the use of DS is self-management and patient empowerment (135). How these values are balanced can differ among health care professionals, although the medical training generally values evidence-based medicine more highly (136), and the overall impression of the GPs in Paper 4 was that they all followed evidence-based medicine. However, some of the GPs emphasised patient experience and tradition. The GP who followed-up DS use most thoroughly mentioned several limitations to evidence-based medicine, the most obvious of which is that persons with dementia are generally excluded from clinical trials.

Some workers in medicine have suggested that evidence-based medicine can have its shortcomings. For example, the GP in the previous paragraph who followed-up DS use said that the influence from pharmaceutical companies can be a problem for science, and others have also expressed this concern, pointing out for instance that evidence-based recommendations based on clinical trials sponsored by pharmaceutical companies can be less trustworthy, because economic interest can tamper with interpretation of results (137, 138). Jureidini and MC Henry said that "*industry suppresses negative trial results, fails to report adverse effects, and does not share raw data with the academic research community*" (137).

Another criticism of evidence-based medicine is that an almost exclusive focus on drugs and devices, both of which can earn money, leaves vast areas of health care in an evidence vacuum (139).

On the other hand, with some exceptions (e.g., vitamin supplements for deficiencies), DS generally falls outside evidence-based medicine. In a German qualitative study, GPs (n=20) who practiced CAM therapy expressed a strong focus on helping the individual patient, a strong belief in one's own clinical experience; and appreciation for the placebo effect (100). The GPs in Paper 4 also supported the placebo effect of DS, and some were open to the idea that some DS may have genuine positive effects even if there is currently no scientific proof of that. A qualitative study of 13 young German GPs found that these doctors frequently expressed doubts about the specific effects of CAM over placebo, but nevertheless CAM were considered helpful in clinical practice (99). These GPs had no reservations about herbal medicines and used them for minor illness as a first-line low-intensity therapy (after first having established that conventional treatment was not needed at that time). This was done to avoid potentially harmful conventional treatments and to comply with patient preferences (99). Fear of adverse effects from herbs were not mentioned in the German study. All GPs in Paper 4 were aware of the possibility of adverse effects from DS, but one GP said that if the patients do not notice any adverse effect, potential adverse effects are not so important. These results demonstrate that one cannot assume that all health care personnel have a strictly scientific approach towards DS.

5.6 Possible application of the model of direct and indirect risk

Based on the research presented in this dissertation, a model of direct and indirect risk from the use of DS by persons with dementia was developed (see Chapter 4, section 4.6). The direct risks from DS, as well as some parts of indirect risks such as flaws in laws and regulations concerning DS and lack of studies and documentation, have already been discussed in medical literature (16, 39). I did not identify any studies about the indirect risks caused by the vulnerability of persons with dementia either because of their dementia symptoms, or because of their dependence of others. However, similar indirect risks have been demonstrated related to PD use (64, 65), and at least one study has addressed practice style related to assessment of DS (26).

The GPs in Paper 4 had not thought about all aspects of indirect risk in this patient group, but remembered relevant situations when examples were discussed. This observation indicates

that not all aspects of indirect risk from DS are taken into consideration by GPs in their clinical decision making. In particular, the risk of confusion between DS and PD and the increased risk of making mistakes with the administration of both DS and PD should be taken into account. The degree of adherence generally declines with increasing number of tablets to be taken (140), and in Paper 1 this number increased by 2,1 in DS users.

The risk model derived from this thesis could be useful for assessing the risk situation. What the GPs in Paper 4 remembered from medical school was only the direct risks from DS, and few HCS employees said that they had received education on DS. It is therefore important to include assessment of indirect risks in the medical training for all health care personnel working with persons with dementia whose use of DS could be an issue. The training should install awareness of the vulnerability of these patients due to their cognitive dysfunction. This vulnerability may lead to mistakes with both DS and PD, and forgetting the reasons that those DS and PD are being used. Also, their vulnerability to persuasion and economical exploitation, and their potential inability to have sound scepticism towards advertising, is important. Cognitive decline often diminishes judgement and the ability to have an overview of a situation. The GPs in Paper 4 had experience with this type of vulnerability in their clinical practices. From my own clinical experience and the patient research partners' personal experiences, there is a despair involved in this vulnerability that also includes the caregivers. These patients have a progressive condition affecting their memories, personalities, and abilities to cope with everyday life, and there is currently no cure, all of which make the patients, and maybe especially the caregivers, eager to find hope by trying different remedies that in one way or another advertise better memory for the users (for more discussion about the ethics involved, see the next section 5.7).

The model of direct and indirect risk may be useful in education of health care professionals when it comes to increasing safety for the persons with dementia who use DS. The subject of indirect risk could be raised several places in the curriculum, in the geriatric section, in the section about PD, in a special section on CAM, if there is one, or if there are specific lectures on ethical dilemmas. Few studies debate the effect of educational interventions on DS. One small US study from 2003 concluded that live, case-based tutorials appear effective for introducing herbal medicine into residency curricula (141).

The model may also be useful for health care authorities/politicians who are trying to plan a better structure for our health care system.

The model of direct and indirect risk from DS is transferable to all persons who are dependent on others due to mental incapacities, either temporarily because they are children, or permanently because of dementia, cognitive impairment from other brain diseases or injuries, or because of developmental disabilities.

5.7 Ethical considerations

5.7.1 Professional ethics

Dietary supplements have an ambiguous position in medical practice because they are consumed as both a part of the diet and as medicine. In Norway, responsibility for enforcing regulations about DS is placed on the Norwegian Food Safety Authority, indicating that these products are generally considered more like food than medicine. On the other hand, people often use DS for health and wellness (15) or for specific conditions, such as dementia (61). Some DS have been found to contain illegal PD (53, 63) and others are known to interact pharmacologically with PD (36, 37, 55). DS is something the patients take at their own discretion, so are they something that health care professionals are expected to monitor? One could say that DS are on the borderline between the patient's concern and the health care professional's responsibility. The dilemma about who bears ultimate responsibility becomes especially clear if a patient is deprived of his or her full capacity for responsibility and reasoning, as is the case for patients with dementia. Do health care professionals have a moral obligation to safeguard their patients with dementia from harm from DS use? For health care professionals who sell or recommend DS, this moral demand is more significant.

Every profession represented in this thesis has its own codes of ethics adopted by its representative union (142-146). DS are not mentioned specifically in any of these codes, nor are they mentioned in the code of ethics for pharmacists nor pharmacy technicians (of course both professions sell both PD and DS, and PD is mentioned specifically in their codes). DS is not mentioned specifically in "Act of 2 July 1999 No. 64 Relating to Health Personnel" (147). Any responsibility for DS must therefore be covered by the claim of "responsible conduct" applicable to all health care personnel (147).

Upselling of DS takes place in pharmacies, although issues about upselling were not an important part of pharmacy employees' professional conduct (Paper 2). In cases of recommendations to customers with dementia, pharmacy employees have a huge moral responsibility, and this responsibility should be highlighted in their education. Pharmacists

themselves have discussed this dual role, especially the ethical conflict associated with the profit-motive associated with sales of natural health products and DS in the absence of scientific evidence of beneficial effects (81, 82). In 2018, Popattia et al. published a systematic review of 58 articles discussing this theme (112). This review did not identify any explicit normative advice in the existing literature regarding the responsibilities of pharmacists selling complementary medicines. In a review from 2017, Ung et al. listed the following major responsibilities for pharmacists towards customers who use traditional medicine/complementary medicine: to acknowledge the use; to be knowledgeable about traditional medicine/complementary medicine; to ensure safe use of traditional medicine/complementary medicine; to document the use of traditional medicine/complementary medicine; to report adverse drug reactions related to traditional medicine/complementary medicine; to educate about traditional medicine/complementary medicine; and to collaborate with other health care professionals about traditional medicine/complementary medicine (148). I have not found any articles that debate ethical conduct of pharmacy technicians who also sell DS. The closest that their code of ethics comes to discussing this issue is the professional requirement to "keep professionally up-to-date and give the best professional advice to customers" (142). This thesis has not studied the ethics of the sale of DS.

Health care personnel can recommend DS, and the GPs in Paper 4 agreed that use of DS was a GP's responsibility if that GP had recommended the DS. In Paper 1, DS were used by 70 patients with dementia, and 14% of those uses had been recommended by health care personnel. Thirty-five percent of employees in pharmacy and in HCS said that they had recommended DS; because it is part of the job of pharmacy employees to sell DS, the survey asked specifically about unprompted recommendations. All GPs who completed their surveys had recommended DS. This thesis does not assess how many of the recommendation were evidence-based.

The code of ethics for medical doctors was last revised in 2021, and it has an official English translation, in contrast to the codes of ethics for the other relevant primary health care professionals included in this thesis (143). To avoid mistranslations of ethical codes, I will therefore use this official translation of the code of ethics for doctors for examples (the codes for pharmacists and nurses have similar paragraphs). The following paragraphs under general provisions are of interest. §1 "*A doctor shall protect human health.*" This is a general statement and will also apply to the conduct of protecting health from harm caused by DS. §2

"*A doctor shall safeguard the interests and integrity of the individual patient. Patients must be treated with caring and respect.*" A possible interpretation of this paragraph could be that each patient can use DS if they believe doing so is best for them, but the doctor needs to inform them and try to avoid harm. §9 contains a stronger moral demand than what is specified in the other health care professionals' codes of ethics: "*A doctor must not use or recommend methods which lack foundations in scientific research or sufficient medical experience. A doctor must not allow him- or herself to be pressed into using medical methods which he or she regards as professionally incorrect*." §9 can be applied to the GPs' discussion about including DS in the automatic drug dispensing system. If they believe a treatment is incorrect or if they have too little information to judge whether the treatment is correct or not, and more crucially, whether it is safe or not, they should not stand behind the treatment.

The previous section (Chapter 5, section 5.5) discussed the differences in how GPs value patient experience versus reliable scientific evidence (c.f. Paper 4). For instance, are feelings like hope, or phenomena like the placebo effect, sometimes more important than scientific evidence? Probably, many patients will think so. There are articles in medical ethics arguing for doctors to embrace the placebo effect (149), and as a GP in Paper 4 said, "*If people believe in it and it actually works for them, why run it down as long as it's not dangerous?*" So, it is important to establish whether the products are dangerous or not, and to give advice regarding to the safety aspect. Unfortunately, this information is not always available, creating an ethical dilemma for health care professionals. Patient autonomy is also important to discuss in the context of medical professional ethics (as discussed in Chapter 1, section 1.7).

The fundamental principles of modern medical ethics are beneficence, nonmaleficence, autonomy, and justice (105). The first two can be traced back to the time of Hippocrates and can be summarised as the familiar "*to help and do no harm*", while the latter two evolved more recently. One can use these principles to evaluate a situation in which a person with dementia wants to use a specific DS, without evidence for its effects and safety. In this case, the ethical accounting will not add up. One can choose patient autonomy as most important factor (that is, that patients should use whatever DS that they want), but there is no information that can ensure beneficence or nonmaleficence (that is, there is no information on safety and effect), how can a health care professional conduct ethical practice under these circumstances? This thesis does not answer this question, but it is an important question to

raise. Health care professionals need a sufficient framework to be able to live up to the moral standards of their ethical codes.

5.7.2 The participation of persons with dementia in research

There are several ethical aspects pertaining to the inclusion of persons with dementia as study participants. An important question to ask is what do persons with dementia themselves think about participating in surveys? Few studies have addressed this question, but Black et al. found that "*[t]he most common reason to participate in dementia studies were the desire, or at least hope, that the study would help the person with dementia in some way*. [...] *The second most common reasons mentioned were altruistic, e.g. 'to contribute,'[…] or "to help others in the future*'" (150). Participants in studies must give their informed consent. Scherer et al. argued "*[t]hree criteria must be met for a consent to be valid. The first" criteria, "knowledge, requires that the consenter is given sufficient information to make a decision knowingly. Secondly, the consenter must be competent to make the decision",* [...] *and understand the consequences of his or her choice. "Lastly, the consent must be provided voluntarily and absent of any coercive influence*" (151). As Pratt asserted in the textbook *The Perspectives of People with Dementia: Research Methods and Motivations*, there is no way of judging whether anyone, with or without dementia, is 100% informed about a study, and the goal should therefore be to try to ensure maximally informed consent (152). Black et al. found that persons with dementia wanted their caregiver to aid them in decision-making regarding research participation (150). Pratt also recommended including caregivers in the recruitment process to increase a researcher's confidence in that the person with dementia had given consent knowingly and willingly (152).

The most important issue is whether a person with dementia fully understands what type of research they have been asked to participate in, that is, they can give an informed consent. This issue is most important in studies involving treatment and procedures, but nevertheless, the study design of Paper 1 took this issue into consideration. Only patients who brought a caregiver capable of communication were included in order to ensure that even the caretaker, who knew the person with dementia well could evaluate if a participation in the study was in the study person's best interest.

There was also a danger that the participants with dementia felt obliged to participate because the data sampling were done in the outpatient clinic when they came for a regular follow up. A mixed researcher/health care provider role can be discussed in terms of ethics. It is

important for a patient to not feel pressured to participate in a study. For this study, an employee at the outpatient clinic who was not involved in patient care presented the study details and obtained written consent from each participant and caregiver before consultation and data collection. It was clearly written and stated orally that participating would not affect consultation in any way.

The questions to the patients/caregivers were given orally and I wrote down the answers. This method deprived the informants their anonymity, but in this case, the principle of ensuring that the patient/caregiver understood the questions was judged to be more important. It was equally important that the person with dementia's voice should be heard, and that the caregiver should not be the only one answering the questions. In case of differences in answer between caregivers and patients, or if they both reported uncertainties, I asked them to check at home and contact us later by telephone. When there was persistent disagreement/uncertainty, the answers were left blank.

5.8 Methodological considerations

Papers 1, 2 and 3 are based on quantitative research methods, which are discussed in the next three sections, while Paper 4 is based on qualitative methods and is discussed separately.

5.8.1 Statistical power

Our surveys had relatively small sample sizes of 151, 105 and 231 individuals in Papers 1, 2 and 3 respectively. Small sample sizes increase the risk of type II error, that is, false negatives. Bonferroni correction was applied as a multiple-comparison correction to minimize type I error rate (false positives). This method is used when several dependent or independent statistical tests are performed simultaneously, which also increases the risk of type II error (121). There may, have been associations that were not detectable in these three papers. For instance, there could have been differences between educational levels in practical professional conduct towards DS that the method was unable to detect. However, what is most important for each individual patient is the professional conduct from the primary health care professional that he or she meets, regardless of educational level.

5.8.2 Internal validity

Internal validity refers to how valid the study results are for the actual study population. The internal validity would be threatened by systematic error such as selection bias, information bias and confounding errors in measurement.

The results in this thesis are mainly descriptive, and selection bias is therefore not of such relevance when it comes to internal validity. However, selection bias may influence the external validity and is discussed in section 5.8.3.

Self-report implies some level of subjectivity and a risk of over- or underreporting of various phenomena, either of which could result in information bias. In the studies included in this thesis, overreporting is not considered a big problem. The patients with dementia included in Paper 1 could have underreported DS use due to memory problems. On the other hand, one could not totally exclude that they might have reported DS use that had in fact ceased. Caregivers were included in the study to minimise this bias. The health care professionals could underreport the significance of DS use among their patients with dementia simply by being unaware of the use. Because the included primary health care professionals had little focus on this topic before participating in the study (c.f. GPs response in Paper 4), there may have been more incidents with unsafe use of DS by customers/clients/patients with dementia than the responders remembered or had experienced (or remembered that they had experienced).

The theme of the thesis has been little studied, and it was necessary to make new questionnaires specifically for this research purpose. Feasibility pre-studies were performed using five, 15 and 15 informants in Papers 1, 2 and 3 respectively to ensure face validity. How a questionnaire is composed can have some influence on its internal validity, including factors like the type of question (open ended or closed), how the questions are phrased, response alternatives (free text, response boxes, etc.) and complexity of the introductory text. Some of the questions had higher proportion of item non-responders, particularly the two ordinal questions in Papers 2 and 3. These were the questions about who has responsibility for safe use of DS by persons with dementia, and the question for suggestions for improvements of the safety. These are questions that would represent the informants' opinions because there are no "correct" answers. The questions may have been difficult to answer because they might simply have been on a topic that the informants had not thought about before. One can therefore speculate whether these questions may have been better addressed in a qualitative study or with open-ended questions. The word "dementia" was not defined in the information forms nor questionnaires used in this thesis. Dementia is a well-known term in general use, so I do not think that the lack of a medical definition influenced the respondents' answers significantly. The term DS was defined in the information form, and although some participants may have interpretated the term differently than others, slightly different

definitions of DS should have very little influence on the main results, that is worries about Ds use in patients with dementia and interventions to increase patients' safety. It could influence the answer about recommendation of DS. Some respondents may have included DS used for established vitamin deficiencies, others not. The recommendation of DS is not the most important aspect of this thesis as most DS used by persons with dementia are not recommended by health care personnel.

Due to the descriptive nature of the studies, potential confounding factors were not assessed. The statistical comparisons must be interpreted accordingly, and no causal inferences should be made.

5.8.3 External validity

External validity refers to the degree to which the study results apply to similar individuals/situations outside the study population, that is, whether the results are generalizable to a broader population. Differences in health care systems between regions or countries can challenge generalizability. The study populations in Papers 1, 2 and 3 were restricted to Nordland County in Norway, the study population in Paper 4 to North Norway. Differences within Norway, for instance between counties, are assumed to be small. The Norwegian and other Scandinavian health care systems are fairly homogeneous and there are not huge differences in the populations (153). Generalizability beyond Scandinavia is more uncertain, and I have not found studies from other parts of the world that explore similar topics and can confirm or refute generalizability. The question about health care professionals' caretaking of persons with dementia who use DS is important in an international context and further studies would be welcomed. The population of patients with dementia in Paper 1 were similar in several respect to the participants in a Dutch study that examined the effectiveness of post-diagnosis dementia treatment and coordination of care by memory clinics compared with GPs (101).

External validity can be increased by using broad inclusion criteria that result in a study population that closely resembles the source population, that is response representativeness. Cook et al. pointed out after conducting a meta-analysis of web or Internet-based surveys that "*[r]esponse representativeness is more important than response rate in research based on surveys*" (154). In Paper 1, we tried to include all persons with dementia and their caregivers that visited a memory clinic within the specialised health care system. The only exclusion criterion was severe communication problems with the caregivers. A few patients who were

very old or tired refused to participate, as the strain was too much for them. Patients with dementia who had been diagnosed and assessed in general practice were not included. These patients are stipulated to be older than those attending a memory clinic. The population of patients with dementia included in this thesis may therefore be younger and in better health than the general population of patients with dementia, although the difference is not thought to be large. In Papers 2 and 3, the aim was to have a representative sample of employees by trying to include all employees working in pharmacies or HCS in selected rural and non-rural Norwegian municipalities from where the patients with dementia in Paper 1 originated. Paper 3 excluded employees working less than 40% of the full-time equivalent or very short employment time. There is high employee turnover in HCS and the excluded employees with little experience were assumed to be less representative when it comes to noticing safety risks to clients. Even with this precaution, the employees in HCS had much shorter work experience than employees in pharmacies and GPs. Among the pharmacy and HCS employees in Papers 2 and 3, it cannot be ruled out that responders had higher level of interest in DS than non-responders. However, the relatively high response rates should ensure that the responders are representative of the source population. In Paper 4, GPs were chosen from the public GP index with the intention of representing a diversity of Norwegian GPs. The GPs in Paper 4 participated in a small questionnaire survey in addition to the interview. Because only one of the invited GPs declined to participate in the study, and of the GPs who gave interviews, only one declined to participate in the questionnaire-survey, the group can be considered representative.

5.8.3.1 Response rate.

The response rate was 90%, 52% and 64% in Papers 1, 2 and 3 respectively. A low response rate increases the risk of nonresponse bias. For comparison, a review found an average response rate of 58% in 350 randomly chosen postal surveys of health care professionals published between 1996 and 2005 (155). More recent surveys of different Norwegian health care professionals gave response rates from 29-68% (156-161).

Our design did not provide any information about the non-responders in Papers 2 and 3. One can infer that pharmacy technicians had a lower response rate than pharmacists in Paper 2 for the following reason. Our study population comprised 32% employees with master's degrees, 22% with bachelor's degrees, and 46% technicians (including others), while the national distribution in pharmacies by December 2017 was 25% with master's degrees, 19% with bachelor's degrees, and 56% technicians (including others) (162).The difference between the

study population and the normal distribution in pharmacies is not large. I have not found any national data about the distribution of educational levels in the various health care professionals working in HCS. The intermediate managers who were my contact persons for data collection in Paper 3 (and Paper 2) were not asked for information on the different types of health care professionals. They only provided the total number of employees in each unit. It is therefore not possible to stipulate other differences between responders and non-responders.

In sum, the response rates in the studies included in this thesis is considered acceptable and the risk of nonresponse bias is probably low.

5.8.4 The qualitative study of GPs

The interviews with the GPs in Paper 4 were conducted either face-to-face or over the telephone. I obtained just as rich, high-quality data in telephone interviews as in the face-to-face interviews. Telephone interviews may not pick up all non-verbal information. However, information about contextual data, facial expressions, and body language were not used because the method of analysis was based on the transcripts.

It is important to consider how the preconceptions of the analytic team may have influenced the results and the interpretative validity of the study. I had previous knowledge about and clinical experience with patients and caregivers, and their views on DS use. This knowledge was a strength in planning and conducting the study but may have led to preconceptions about what the results would be. The multidisciplinary background of the research team contributed to the quality and relevance of the interview questions and the interpretation of the results. The advantage of having several people involved in an analytic process is that it increases the trustworthiness of the findings. See Supplementary material 2, Paper 4 for a list of the authors' relevant preconceptions. To further enhance credibility, in addition to investigator triangulation, method triangulation and member check was applied as described in Paper 4 (163). The effort made to select a purposive sample was successful and ensured transferability.

6 Conclusion

The use of DS by patients with dementia may challenge patient safety. DS use is common in persons with dementia. The potential risk for DS-PD interaction is a threat. Not all persons with dementia who need help with the administration of DS (and PD) receive this help. The project has demonstrated that pharmacy employees, HCS employees and GPs had experienced unsafe use of DS by persons with dementia. Assessment of DS use is relevant for the 100,000 Norwegian patients with dementia.

The majority of the health care personnel included in this thesis were aware of the limitations of DS to help improve symptoms of dementia and were aware of potential negative effects. GPs had a scientific approach and were most interested in evidence-based information about effects and risks. None of the GPs were dismissive of patients using DS, but several expressed a certain skepticism. The placebo effect from taking DS was judged to be beneficial for patients, and a few of the GPs were open to the idea that certain DS products could have results beyond the placebo effect even when studies documenting this are currently lacking. Respect was voiced for patient choice and self-determination.

There was some difference in the attitudes and/or professional conduct of pharmacists and pharmacy technicians, and a lesser degree of difference in the attitudes and professional conduct of nurses and nurse assistants. Some of the differences were clearly related to different tasks and responsibilities at work, which would explain why there are more differences among pharmacy employees, as pharmacists and pharmacy technicians can have quite different responsibilities. In contrast, nurse and nurse assistants in HCS tend to perform similar work, which might account for their more similar attitudes and/or professional conduct. A difference in education could explain why 77% of pharmacists agreed that DS could cause harm to the health of users, while only 38% of pharmacy technicians agreed with that statement. The pharmacists had more thorough routines for dispensing DS, as more pharmacists than pharmacy technicians provided information about possible adverse effects and asked about the co-use of DS and PD, which could result from either (or both) different knowledge and different responsibility.

None of the health care personnel included in the thesis wanted to take the main responsibility for the safety of patients with dementia who use DS. Lack of awareness and lack of knowledge about DS are the most commonly identified barrier. The problem is probably not

just lack of knowledge, but lack of available information about the safety and effect of DS. External factors such as lack of time and inadequate tools are also important factors. Different practice styles were detected among the GPs. Some GPs discussed DS with patients more frequently than others, and these GPs adjusted their behaviour so that they were informed about DS use in their patients. Two possible reasons for the difference in how actively GPs approached DS use by their patients appeared during the interviews. Several GPs expressed professional uncertainty related to DS monitoring because of the lack of reliable information about risks of DS, and difference in handling this feeling of uncertainty may explain some of the differences in practice styles. The different professional approaches towards DS could also be caused by different value balances between evidence-based medicine and the experience of patients, including patient empowerment.

Based on the research presented in this dissertation, a model of direct and indirect risk from the use of DS was developed. This model demonstrates the direct and indirect risks from DS use specifically relevant for persons with dementia, and the risks relevant for all DS users. It is important to note that persons with dementia are extra vulnerable to the risks relevant for all users because of their cognitive deficiency. These risks are due to external factors such as lack of regulation of DS, different practice styles of health care personnel, and the risks of adverse effects and DS-PD interactions. Dependency on help for safe administration and judgment about which products to use, makes patients with dementia vulnerable to unclear lines of responsibility, and to the lack of awareness of and knowledge about the problem on the part of health care professionals. The issue of care taking of persons with dementia who use DS challenges professional ethics. Health care professionals need a sufficient framework to be able to live up to the moral standards of their ethical codes, and the (lack of) regulation of DS deprives them of this framework.

6.1 Clinical implications

Patients want heath care personnel to be knowledgeable about DS and take responsibility for their DS use (83, 164). The following recommendations on professional practical conduct towards DS can be given to GPs based on the research presented here and supported by Ashar and Rowland-Seymour's 2008 recommendations for physicians (111) and Ung et al.'s 2017 recommendations for pharmacists (148).

1) Inquire whether the patients use DS, preferably in a non-judgmental way (c.f. Paper 4). In the case of patients with dementia, it is preferable to make this inquiry when a caretaker is present to ensure correct answers.

2) Evaluate the DS, which includes identifying the exact ingredients in the DS (if possible) and the risks and effects of these as far as it is possible. Regional pharmacovigilance centres can have additional information (c.f. Paper 4).

3) Discuss regulatory issues surrounding DS with patients so that patients and their caretakers understand that there can be much less information about DS products than PD (c.f. Paper 4).

4) Discuss the available safety and efficacy data with the patients, and in case of patients with dementia, include their caregivers (c.f. Paper 4).

5) Monitor clinically for adverse events and therapeutic response in collaboration with home care services, if relevant.

6) Monitor for DS-DS interaction and DS-PD interactions

7) Seek help or collaboration with other relevant health care professionals.

8) Report suspected adverse events to the regional pharmacovigilance centre.

9) Document the conversation about DS in the patients' journals and be sure to include which DS the patients are using.

10) In the case of patients with dementia, also ensure correct use and administration of DS, if the use is to be continued (c.f. Papers 3 and 4).

11) Bear in mind the risk to patients with dementia of economic exploitation (c.f. Paper 4).

12) Make sure that either the person with dementia him-/herself, and preferably also a caregiver (because the patient may forget the information you give him or her), has understood the information available about each relevant DS.

Several points in these recommendations are applicable for employees in pharmacy and HCS as well. All health care professionals can inquire about use, and report suspected adverse events to RELIS. HCS employees can document conversations about DS with cognitively impaired clients/patients in their journals. Pharmacists can also inform and discuss the safety

of DS with their customers, and they can document their conversation in the pharmacy electronic system. Seeking help or collaboration with other relevant health care professionals are relevant for all types of health care employees.

Concerning safe administration of DS to patients with dementia, recall that most of the GPs (Paper 4) and pharmacy employees (Paper 2) did not want DS without valid information about safety, efficacy and content to be delivered in the automated drug delivery system. Employees in HCS, especially nurse assistants (Paper 3), were more willing to include DS. However, one of the intermediate managers in the largest HCS unit included in Paper 3 said that this unit had stopped delivery of DS to clients in the automated drug delivery system or in pre-filled tablet dispensers after incidents with repeated syncopes caused by a DS that HCS initially though was harmless (personal communication). This project did not evaluate the motives of pharmacists or HCS employees for wanting or not wanting to include DS in the automated drug delivery system. For GPs, the reason for not wanting to include was difficulties in evaluating safety. The reason given for including DS was to avoid mistakes in administration. Nevertheless, one GP reported to take the initiative to include DS in the automated drug delivery system to reduce the likelihood of mistakes in administration by patients with dementia. The Norwegian Directorate of Health stated in an official declaration that DS can be included in the automatic drug delivery system, but the issue is discussed no further (165). The GPs had no suggestion for a safe method to administer DS to patients with dementia (Paper 4). This is a topic that needs to be addressed.

A systematic collaboration between the relevant professions in order to safeguard DS use by patients with dementia would be a huge improvement, but a clarification of each profession's responsibilities is necessary. GPs and employees in HCS and pharmacies are all health care professionals who as part of their job can discover DS use by persons with dementia. As patients do not always disclose DS use (61, 66, 129), the health care professionals need to ask to be informed. The results from Paper 2 indicate that pharmacy employees detect unsafe use of DS in clients less frequently than GPs or HCS employees. Pharmacy employees also indicated that they had little training in handling customers with dementia, which has been shown previously (86, 166). Norwegian pharmacy employees have no other health information about their customers than the PD currently in use, and sometimes the indications for PD use. There was little difference between GPs and HCS employees in the percentage who had been worried about DS use by persons with dementia, but more GPs reported that they had intervened. This difference might be explained by the fact that the GPs had worked

longer (Table 2). The pharmacy employees' limited education about dementia and limited knowledge about their customers' health conditions is important when it comes to responsibility. Their moral responsibility when it comes to sale, and especially upselling of DS, is discussed in Chapter 5, section 5.7.1.

The results from the papers that comprise this thesis indicate that GPs, HCS and pharmacy employees presently collaborate about patients with dementia with a potentially unsafe use of DS, but in an unsystematic fashion by seeking help from each other (Chapter 4, section 4.4.1). Furthermore, the GPs in Paper 4 said that most conversations about DS were prompted by an inquiry from the patient, relatives or HCS. Several of the GPs took (or would take if needed) the initiative to removed harmful products with the help of relatives or HCS. Several GPs had been contacted by pharmacists and warned of interactions between DS and PD in specific patients.

Integrated information about DS in patients' medical journals would provide the opportunity for automatic data analyses of potential interactions between DS and PD. It would also remind GPs of patients' DS use, and thus increase a GP's feeling of responsibility. Several of the Pharmacy employees, HCS-employees and GPs had experienced or feared that DS caused harm to their patients either by adverse effects or interactions, so monitoring DS use is relevant. It is also important that information is shared among different levels in health care service (information transfer at hospital admission), and having the relevant DS registered in the patient's journal would facilitate this transfer.

It is important to increase the awareness about the risk from DS use, especially in vulnerable patients such as patients with dementia. The GPs in Paper 4 implied that the DS seldom came up in patient consultations. In contrast, in a large observational study of GPs (1477 patients-consultations made by102 GPs) set in California, DS was mentioned in one-fourth of consultations (110), which makes it possible to question whether it is true that use of DS in Norway is discussed seldomly, as the GPs in Paper 4 implied, or if awareness of the matter should be increased.

Valid information about every marketed DS needs to be available if the product is to be used safely. Such is not the case at present. Attention must be drawn towards the complex organizational and system-level mechanisms responsible for creating and maintaining a situation where DS are in a grey area between food and medicine, which allows unclear rules

about monitoring and less firm demands for regulation of sale. For instance, a recent study performed for the Norwegian Food Safety Authorities found that nine out of ten DS claimed a health benefit (illegally) (23). These matters are for the health authorities and beyond the scope of health care professionals.

The Norwegian health authorities represented by the Norwegian Directorate of Health recommend that DS not be used for dementia symptoms because of the lack of documented effect (167). This recommendation was published in November 2019 and updated May 2022. This recommendation was not mentioned by the GPs in Paper 4. This recommendation addresses mainly the lack of effect of DS for dementia symptoms; however, health care personnel are advised to keep track of such DS use because *the use is often initiated by the patients themselves and it is important to know due to the risk for interaction with PD* (167). This recommendation is important, and if it is adhered to, will facilitate a PD-DS reconciliation in patients with dementia who use DS, thereby increasing patient safety. With the phrase "PD-DS reconciliation" I mean a PD reconciliation (168) that includes DS (128), see page 51.

To ensure information about safety, efficiency and correct content for all marketed DS requires changes in the regulations of DS. The results from this project and others demonstrate the need for regulations that secure the demand for studies on safety for all DS in sale in Norway. The need for better regulation of has been debated by others internationally (16, 39). A clarification of the responsibilities held by various health care personnel, especially their responsibilities for patients with dementia or other vulnerable patient groups that use DS is also needed. Even if the laws and regulations concerning DS is different in different countries, the claim for better regulation is universal, illustrated by an article from 2022 that addresses issues with DS from the perspective of the US (169).

6.2 Future perspectives

The long-term goal of this research is to ensure safe use of DS, including herbs and composite products, for patients with dementia.

The long-term measures needed to minimize risk are:

- Increasing awareness of potential risks from DS, including herbs and composite products, in patients with dementia, including the patients themselves, their primary caregivers, relevant health care personnel, and health care politicians.

The results from my studies demonstrate use of DS by persons with dementia, potential DS-PD interactions in these patients, and a lack of help with the administration of DS. Several patients, caregivers and employees in pharmacy and HCS were not aware of the risk from this use. I have not studied the awareness of this risk in health care politicians/authorities, but I think it unlikely that they are more aware than health care personnel. Because health care politicians/authorities are essential in setting the frame that make it possible to secure the use (c.f. Paper 4), their awareness of and knowledge about the situation are of the highest importance.

- Developing a clear structure of responsibility.

The results demonstrate that, at present, no single group of health care professionals feels responsible for these patients' safety, although all groups reported having experience with unsafe DS use by persons with dementia. The GPs gave several reasons why it was difficult for them to take on this responsibility. Increased information from health care authorities and improved laws and regulations concerning DS were put forward as important measures to improve the safety for persons with dementia who use DS in addition to increased effort from GPs (Chapter 4, Figure 7). The health care authority should set the structure of responsibility but with input from health care personnel.

- Providing independent and unbiased information about adverse effects and interactions as a knowledge base for patients and their caregivers and facilitating informed choices in dialogue with competent health care personnel.

For health care professionals to be able to provide independent and unbiased information about adverse effects and interactions as a knowledge basis for patients and their caregivers, availability of reliable information about the content, safety and effect of every DS sold in Norway is a necessary prerequisite. Only health care politicians and authorities have the power to demand that this information be available.

Another important aspect is the practice styles of health care personnel. Some of the GPs had conversations about DS with their patients often, other hardly ever. GPs who learned more about their patients' DS use subsequently adopted their practice styles so that they would be more likely to be informed about such use. The most important way to be informed about patient use is simply by asking.

- Ensure sufficient documentation in patient journals in primary and specialized health care, as well as documentation in HCS journal system.

A system for integrating DS in the patients' electronical journals was one of the most important suggestions for improvement given by the GPs in Paper 4.

6.3 Need for further studies

As caretaking for persons with dementia who use DS has rarely been studied, I see the need for more research. My own and other studies have shown a potential for DS-PD interactions in patients with dementia who use DS (36, 113), but studies investigating the incidence of actual clinical harm in these patients are lacking. Observational studies of health care personnel's caretaking of persons with dementia who use DS is also important so that actual clinical practice can be documented. Earlier, I referred to a large Californian observational study in which it was found that DS was mentioned in one-fourth of GPs consultations (110). If a similar study was performed in a Norwegian setting, would the results be similar? It would also be important to explore the caretakers' or patients' thoughts about who should be responsible for the safe use of DS by persons with dementia, their experience with unsafe use, and their suggestions for safer use.

Practice styles affect patients. Although this issue was touched upon by the GPs in Paper 4, further exploring this theme for HCS and pharmacy employees (and more thoroughly for GPs) would be interesting. It would also be interesting to see whether the Norwegian Health Directorate's official recommendation about not giving DS to persons with dementia is known among GPs and other medical doctors, and whether this recommendation has been adopted into practice. The studies included in this thesis should also be replicated in other geographical areas, preferably in other countries, to check the generalizability of the findings.

Paper I

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RESEARCH ARTICLE Open Access

Direct and indirect risk associated with the use of dietary supplements among persons with dementia in a Norwegian memory clinic

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Abstract

Background: The use of dietary supplements (DS) is common among persons with dementia. Direct risks associated with DS use include adverse events and DS-drug interactions. A direct risk is a risk caused by the treatment itself. Indirect risks are related to the treatment setting, such as the conditions of use, and not to the treatment itself. Because dementia symptoms may reduce a person's ability to cope with the administration of DS, the use of DS may pose a threat to safety as an indirect risk. The aim of this study was to describe the extent of DS use among persons with dementia in ambulatory care and to identify some relevant direct and indirect risks related to DS use.

Methods: We conducted a survey among 151 persons with dementia attending an outpatient memory clinic in Northern Norway. Study measurements included: the participants' characteristics, cognitive functioning, functioning in the activities of daily living (ADL), and the use of DS and prescription drugs (PD). We assessed direct risks by evaluating potential DS-drug interactions and indirect risks by evaluating the conditions under which it was used.

Results: Forty-six percent (n = 70) of the persons with dementia used DS. Ninety-seven percent (n = 147) used PD. We found potentially clinically relevant DS-drug interactions representing a direct risk in eight persons with dementia (11% of users). While only 36% (n = 26) of the participants received assistance with the administration of DS, 73% (n = 106) received assistance with the administration of PD. Persons with dementia living alone were at risk of not receiving assistance, as home care service seldom was involved in DS administration. Data indicated that assistance with DS administration was not provided for all persons with dementia in need, representing an indirect risk to these persons. Only one-third of the persons with dementia and half of the caregivers were aware of the general risks of adverse events and interactions associated with the use of DS.

Conclusions: Persons with dementia use DS frequently, yet DS use may be associated with direct and indirect risks to patient safety as potentially clinically relevant interactions were discovered and DS intake often was unsupervised.

Keywords: Patient safety, Dementia, Dietary supplements, Risk management, Direct risk, Indirect risk, Drug interactions, Caregivers, Home care services, Cross-sectional survey

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Background

Dementia is a general term for progressive diseases that lead to loss of mental abilities interfering with and causing problems in the activities of daily living (ADL). Alzheimer's disease is the most common form of dementia, and memory problems are the most common symptom [1]. Persons affected by dementia become increasingly dependent on assistance throughout the course of the disease. Because a considerable number of single persons with dementia continue to live by themselves for quite some time, they become increasingly dependent on home care services. Today, only symptomatic treatment is available for Alzheimer's disease [1], resulting in a search for alternative treatments by persons with dementia and their caregivers. Several dietary supplements (DS) on the market claim to improve memory problems, but the scientific evidence is sparse [2–5]. Prevalence estimates of DS use in persons with dementia range from 27% to 58% [6–10]. The variation in estimates could be due to heterogeneity in study design, including the number of participants, the time period of interest and the types of DS studied.

"Is this Dietary Supplement that my spouse is using, safe? Can he take it together with his prescription drugs?" Medical doctors often receive these types of questions and they rarely have straightforward answers. Living with persons with dementia can be quite challenging, and caregivers often find themselves unable to control the situation [11]. For example, one daughter found half-empty pillboxes containing dietary supplements (DS), prescription drugs (PD) and over the counter (OTC) drugs all around her mother's apartment, even inside the microwave oven. Similar examples are well known among caregivers of persons with dementia and these types of questions and worries prompted the conduct of this study. DS are often labeled as "natural" and are therefore regarded as safe products by many consumers. DS can nonetheless cause harm through adverse events [12, 13], and even lethal cases have occurred [14, 15]. Their potential to interact with PD is also of concern [16, 17].

A direct risk is a risk related to the treatment itself such as adverse events and DS-drug interactions [18, 19]. Moreover, there are other threats to patient safety from DS use, such as variability in quality and content; for example, adulterants in the form of pharmaceuticals have been found [20, 21]. Another concern is the profound lack of studies documenting safety, tolerability, and efficacy [22]. Another safety issue is a striking lack of reliable information about DS-drug interactions [23, 24]. This, together with the risk of overdosing or forgetting to take the daily dose of treatment, poses a considerable threat to patient safety. Factors which are not directly related to the DS itself, are often referred to as "indirect risk factors." By definition, indirect risks are risks related to the treatment setting, instead of the treatment itself [18, 19]. Indirect risks are often caused by acts of omission and can include obtaining insufficient information about the patients' medical history, inadequacies in diagnostic testing, as well as persons not receiving needed drugs or not receiving adequate help with the administration of their drugs [25]. Indirect risks from the use of complementary and alternative medicine (CAM) in general can also include delayed diagnosis and a lack of awareness among CAM practitioners of the therapeutic limitations of CAM [19, 26].

With regard to persons with dementia, disease-related cognitive problems may increase the indirect risks from DS usage (Fig. 1).

Forgetfulness and impaired judgment may lead to erroneous use of DS (or PD and OTC); for instance, persons with dementia may forget that they have already taken their daily dose of tablets, or they use several DS with the same ingredients. Moreover, persons with dementia may confuse DS with PD, leading to errors in the administration of both. Loss of initiative can prevent persons with dementia from discussing DS use with their family physician or from obtaining reliable information about DS at the pharmacy or on the internet. Their reduced capability to identify and express their own signs and symptoms can prevent persons with dementia, especially in the advanced stages of the disease, from disclosing actual adverse events of DS and PD. Moreover, studies report that few persons with dementia disclose their use of DS to health care personnel [6–8]. This indirect risk situation is particularly threatening because several indirect risk factors may lead to overdosing; which invariably increases direct risks such as increased toxicity.

The degree to which persons with dementia are exposed to indirect risks related to the use of DS is currently unknown. The lack of awareness and knowledge about risks from DS among caregivers and health care professionals, represent an indirect risk to the persons with dementia [27]. This is also the case of indistinct lines of responsibility. In particular, little is known about the involvement of home care services in administering and dispensing DS to persons with dementia who still live in their homes. However, home care services visit persons with dementia in their homes, and can therefore, potentially, be the part of the healthcare system that has the best possibilities to safeguard those who have decided to use DS. Indirect risks related to health care personnel's professional conduct may be an accessible window for intervention within the risk structure of DS use in persons with dementia.

The aim of this study was to describe the extent of DS use among persons with dementia in ambulatory care

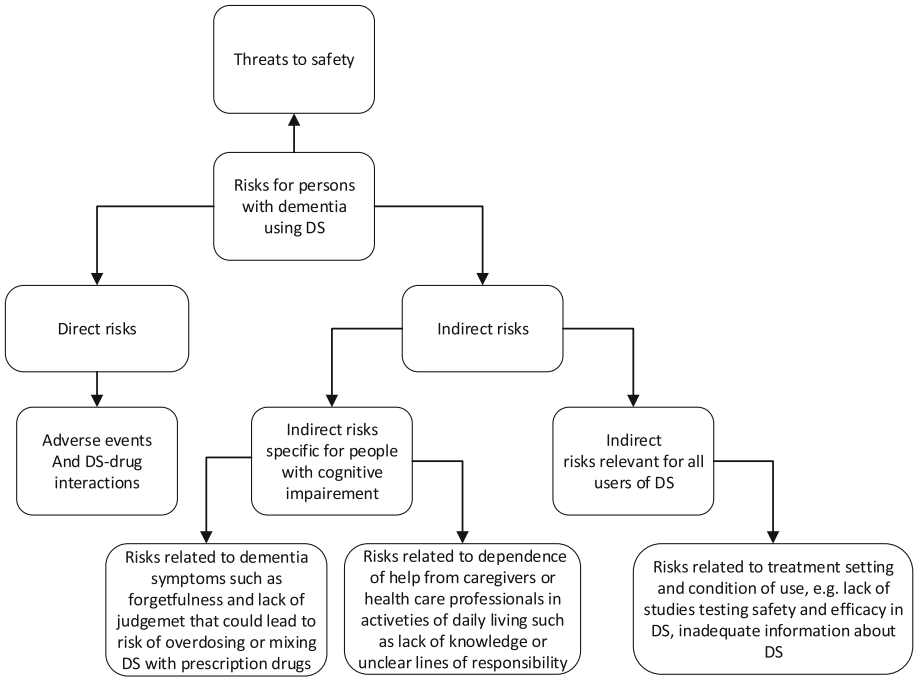

Fig. 1 Risks related to use of dietary supplements in persons with dementia. *Abbreviation*: *DS*, dietary supplements

and to identify direct and indirect risks related to DS use. More specifically, we wanted to investigate whether persons with dementia received assistance with the administration of DS and PD and relate this to vulnerability factors in these persons.

Methods

Study population

We conducted a questionnaire-based survey of persons with dementia attending an outpatient memory clinic in North Norway from November 2011 to end of October 2013. We included all consecutive patients who met the ICD-10 criteria for dementia and who visited a neurologist (HR) for a regular neurological follow-up. To ensure reliable responses, only persons with dementia who were accompanied by a caregiver, who could supply information, were included. If the person with dementia brought several caregivers, the one closest to the person with dementia was defined as the main caregiver. For two persons who brought no relatives, health care professionals familiar with the persons were defined as caregivers. We excluded four persons with dementia because of severe communication problems with their caregivers. The caregivers were not assessed, but the communication problems were judged to be caused by cognitive impairment, most likely in combination with profound hearing loss, which was not properly compensated by a hearing aid. The numbers of patient visits to the clinic before inclusion varied, as did the type of dementia.

Survey development and implementation

The study was initiated after several caregivers had raised concerns about DS-drug interactions and about incorrect use of DS by their relatives with dementia. Therefore, these topics were our main concern. HR and TG constructed the questionnaire based on previous studies and on their experience from clinical practice at a memory clinic and from a drug information center, respectively. We strived for simple wording and open-ended questions. The feasibility of the instrument was tested on five persons with dementia prior to the start of the study. Some parts of the current survey were part of the routine consultation such as age, gender, whether the patients lived alone, whether they received help from homecare, MMSE-NR and RDRS-2, list of PD and OTC and whether the person with dementia received help with the administration of PD. Twelve additional questions were designed exclusively for this survey. The patient/caregiver received altogether 16 questions, nine open-ended and seven yes/no questions. Seven of these questions are not included in this publication because the content of data would exceed the scope of one article. These data will be published later. All participants were asked about their current use of DS, and users were further asked to specify the product names and where they had procured their DS (pharmacy, merchandiser/retailer of dietary supplements, grocery store, internet or telephone sale, direct from CAM therapist). We also asked who had initiated the use (patient themselves, spouse,

other relatives, health care personnel, retailers), and who secured correct administration (patient themselves, spouse or relatives, home care service). We asked all persons with dementia and all caregivers if they knew that dietary supplements might have potential negative effects such as adverse events and interactions with prescription drugs. This was a general question and not related specifically to the DS used by some of the participants.

It was important for us to involve the persons with dementia themselves as much as possible. We therefore designed the questionnaire as a structured face-to-face interview where both the person with dementia and his or her caregiver were present during the interview. The interviews were performed by HR. If the participants did not understand the questions as they were read out, additional explanations were given. The definition of DS (e.g., that it includes herbs, vitamins, minerals and other compounds, or a mixture of different ingredients) was explained to all participants. They were also given examples of common brand names of DS during the interview. A non-judgmental, open attitude toward the use of DS was maintained during the interview. In most cases, both the persons with dementia and the caregivers provided the answers, but in cases of severe dementia, it was mostly the caregivers who answered the questions. If persons with dementia and caregivers provided divergent answers or if they both reported uncertainty, we asked them to check at home and contact us later by telephone. When there was persistent disagreement/uncertainty, the answers were left blank. The response was oral and the answers were written down and categorized.

Cognitive assessment

All persons with dementia were assessed using the Mini-Mental Status Examination-Norwegian Revision (MMSE-NR) [28, 29], and, with the assistance of the caregivers, using the Rapid Disability Rating Scale-2 (RDRS-2) [30]. The aim was to collect up-to-date information about persons with dementias' cognitive- and ADL functions. The RDRS-2 scale ranges from 21 to 84 points; a score of 21 indicate normal ADL function, while a score of 84 indicates complete dysfunctionality. MMSE-NR screens people for difficulties in cognitive function with scores ranging from 0 to 30. A score below 24 is suggestive of cognitive problems, such as in dementia, but can also be caused by other reasons; values in the range of 25–27 might represent early stages of dementia. Scores above 28 indicate normal function with some exceptions such as frontotemporal dementia in the initial stages of the disease [31]. Persons with higher education could achieve higher MMSE scores even in the presence of dementia [32]. We did not assess for educational level.

Direct risk assessment

Direct risk of DS is harm caused by the products themselves. In this study, we assessed only DS-drug interactions and not adverse events. Lists of individual persons' PD, DS and OTC were collected and sent anonymously to the Regional Pharmacovigilance Center North Norway (RELIS North Norway) for assessment of DS-drug interactions. The Natural Medicines Comprehensive Database, Medline and the Norwegian RELIS database were used to identify potential clinically relevant DS-drug interactions. Due to time constraints during the interview, we made no assessment of potential clinical correlations from potential DS-drug interactions. The survey took place in an outpatient clinic setting and it was too time consuming to assess DS–drug interactions during the consultation. As several of the participants had travelled quite a distance to get to the clinic, we did not include another patient visit in the survey. Our outpatient clinic covers a wide geographical area including several ferry routes, with the longest traveling distance of nearly 400 km. The memory clinic contacted the home care service or the family physician in most cases to obtain an updated list of the persons with dementia's PD and OTC.

Indirect risk assessment

Indirect risks from DS use are related to the condition of use. In this study, we investigated to what degree persons with dementia received assistance administering DS, in general and according to their cognitive function. We also investigated the knowledge of risks, and whether knowledge of risks influenced the use of DS, or help with administering DS.

Definition of dietary supplements

We used the definition of DS from the Dietary Supplement Health and Education Act of 1994 paragraph 3a [33]. The definition states that a DS is a product containing one or more of the following: "a vitamin, a mineral, an herb or other botanical, an amino acid, or a dietary substance for use by man to supplement the diet by increasing the total dietary intake; or a concentrate, metabolite, constituent, extract, or combination of these ingredients." We excluded pure vitamin supplements that were used to treat a diagnosed deficiency. We also excluded untreated edible oils, herbs used as spices, food bars and beverages such as teas. This was because our main interest was in supplements that could be confused with drugs by the persons with dementia and administered by home care services. None of the participants reported using supplements in other administration forms than tablets.

Ethics

The study was approved by the Regional Committee for Medical and Health Research Ethics North, reference number: 2011/1705. An employee at the outpatient clinic, who was not involved in patient care, presented the study details and obtained written consent from each participant and caregiver before consultation and data collection.

Statistics

Data were analyzed using IBM SPSS (Statistical Package for the Social Sciences) version 22.0 (IBM Corporation, Armonk, NY, US) for Windows. We present descriptive statistics such as absolute and relative frequencies, means and standard deviations. We applied an independent Student's t-test for continuous variables and Pearson's chi-square or Fisher's exact tests for categorical variables. We used logistic regression for binary data to analyze the associations between the frequency of persons with dementia receiving assistance with DS administration and the initiators of DS use in these persons. Significance level was set at 5% and was adjusted for multiple testing according to Bonferroni.

Results

Use of DS

We included 151 persons with dementia, mean age was 73.3 years (range 20–90), average MMSE-NR was 19.6 (range 0–29). The youngest participant had genetically and clinically verified Juvenile Huntington's disease. The person with MMSE-NR score of 29 had the diagnosis frontotemporal dementia. Sixty-three percent were women and 32% lived alone. All responders were of Scandinavian heritage. The caregivers were mostly spouses (51%) or children (35%), and more seldom other relatives, friends or health care professionals (14%). Three persons declined to join the study. Twelve other persons were excluded for different reasons (e.g. HR judged the persons with dementia as being too exhausted). The overall response rate was 90%.

Seventy persons with dementia (46%) reported the use of DS. On average, they used 1.7 DS (range 1–6). Fish oils were the most commonly used DS (40 persons, 57%), followed by various mixed herbal supplements (29 persons, 41%) and vitamin and mineral supplements (28 persons, 40%). Thirty-two (46%) of the users consumed more than one DS product.

As Table 1 shows, the users and non-users of DS were similar with regard to age, gender, living conditions, and use of PD in general and dementia drugs in particular. Even though users of DS showed less severe reduction in cognitive function measured by MMSR-NR and a trend towards better ADL functioning measured by RDRS-2 compared with non-DS-users, both groups showed clear signs of cognitive impairment.

In most cases, the persons with dementia did not initiate the use of DS. In 20 cases (29%) the persons with dementia took the initiative themselves, while in 15 cases (22%) the spouse took the initiative, in 14 cases (20%) other relatives, in 10 cases (14%) health care personnel, and in 10 cases (14%) DS-retailers took the initiative. Data were missing from one participant.

Persons with dementia had purchased DS on the internet or through telephone sale in 26 cases (37%), at pharmacies in 25 cases (36%), at DS-retailers in 16 cases (23%), and at grocery stores in 13 cases (19%). Some persons had purchased their DS at several places.

Table 1 Comparison between users and non-users of dietary supplements

Persons with dementia's characteristics	Users of DS		Non-Users of DS			Total population	
	n = 70		*n* = 81		*p*-value	*n* = 151	
Age, year (mean (±SD))	72.7	(11.2)	73.7	(9.8)	0.547	73.3	(10.4)
Women (n (%))	49.0	(70.0)	46.0	(56.8)	0.094	95.0	(62.9)
Living alone (n (%))	23.0	(32.9)	25.0	(30.9)	0.793	48.0	(31.8)
Home care services (n (%))	31.0	(44.3)	33.0	(40.7)	0.660	64.0	(42.4)
Numbers of PD (mean (±SD))	4.7	(3.4)	4.4	(2.6)	0.582	4.6	(3.0)
Persons using dementia drugs (n (%))	29.0	(41.4)	41.0	(50.6)	0.259	70.0	(46.4)
Numbers of OTC *(mean (±SD))	0.8	(0.8)	0.7	(0.7)	0.334	0.7	(0.7)
MMSE-NR score (mean (±SD))	21.7	(4.5)	17.8	(6.3)	**<0.001**	19.6	(5.8)
RDRS-2 score (mean (±SD))	34.5	(8.8)	38.5	(11.5)	0.019	36.7	(10.5)

Abbreviations: *DS* dietary supplements, *SD* standard deviation, *PD* prescription drug, *OTC* over-the-counter drug, *MMSE-NR* Mini Mental State Examination-Norwegian Revision, *RDRS-2* Rapid Disability Rating Scale-2

*Data are missing from two persons

The RDRS-2 scale range from 21 to 84, where a score of 21 points indicates normal function in activities of daily living and a score of 84 points indicate complete dysfunctionality. The MSEE-NR scale range from zero to 30, where 30 points indicate normal cognitive function. Statistics are independent Student's t-test for continuous variables such as age, numbers of PD and OTC, MMSE-NR and RDRS-2. Statistics are Pearson's chi-square or Fisher's exact tests for categorical variables such as gender, living alone, receiving help from home care service and using dementia drugs. Bonferroni adjusted α was 0.05 / 9 resulting in $\alpha < 0.006$. Significant comparisons after adjustment are printed bold

In three cases (4%), a relative provided the DS for free. Two of these relatives were DS retailers.

Direct risks related to use of DS

Of the 147 persons with dementia who used PD, two of these only used vitamin B12 injections every third month. On average, the persons used 4.6 PD (range 0–17) and 0.7 OTCs (range 0–3). We identified potentially clinically relevant interactions between DS and PD/OTCs in eight persons (11%). In four persons these interactions involved anticoagulants, and in four persons antihypertensives. *Boswellia serrata, Vaccinium macrocarpon* and omega-3 could possibly interact with warfarin. Atenolol was combined with lutein, *Camellia sinensis*, *Bacopa monnieri, Capsicum annum, Crocus sativus* and procyanidolic oligomers. Amlodipine was combined with astaxanthin, *Panax ginseng, Punica granatum,* lutein and *Boswellia serrate*. Metoprolol was combined with pomegranate, *Cordyceps sinensis* and *Panax ginseng.* One participant suffered from tachycardia, which could have been negatively affected by her DS use. She used a DS (in tablet formulation) containing *Camellia sinensis* among several other ingredients. *Camellia sinensis* contains high amounts of caffeine and also theophylline [34], which may lead to tachycardia. At the same time, this person used a beta-blocker for her tachycardia. In this case we recommended that the use of that particular DS was ended. In addition, one participant used DS causing a daily intake of vitamin D, chromium and copper above the recommended dietary intake, RDI [35, 36].

Indirect risks related to use of DS

Only 26 out of 70 persons with dementia (37%) received assistance administering their DS, compared to 106 persons out of 145 (73%) who received assistance administering their PD. Two persons in the PD group did not depend on daily assistance, as their only medications were vitamin B12 injections every third month. Living alone was associated with not receiving assistance with DS; this was not the case for persons with dementia who used PD (Table 2). Persons with dementia who received assistance with PD had lower MMSE-NR scores and higher RDRS-2 scores as an indication of more advanced dementia. After the Bonferroni correction, this difference was no longer statistically significant for MMSE-NR score in participants who received assistance with DS, although there was a significant difference in their RDRS-2 score.

Several persons who did not receive assistance with DS and PD had MMSE-NR and RDRS-2 scores indicating that it was questionable whether they were able to handle the administration of DS and PD on their own. The lowest MMSE-NR score was 13 in both groups, and the highest RDRS-2 score was 45 in participants who did not receive assistance with the administration of DS, and 39 in participants who did not receive assistance with PD. Fifty percent of the 44 persons with dementia who administered their DS themselves had MMSE scores below 24 points. Fifty-seven percent of the 39 persons with dementia who administered their PD themselves had MMSE scores below 24 points.

Table 2 Characteristics of adults with dementia receiving assistance with dietary supplements or prescription drugs

	Assistance with DS		No assistance with DS			Assistance with PD		No assistance with PD		
Numbers of persons with dementia	*n* = 26		*n* = 44		*p*-value	*n* = 106**		*n* = 39**		*p*-value
Age, year (mean (±SD))	76.8	(8.1)	70.3	(12.1)	0.017	74.5	(10.9)	70.4	(8.9)	0.040
Women (n (%))	16.0	(61.5)	33.0	(75.0)	0.235	65.0	(61.3)	27.0	(69.2)	0.380
Living alone (n (%))	3.0	(11.5)	20.0	(45.5)	**0.004**	35.0	(33.0)	10.0	(25.6)	0.394
Home care services (n (%))	14.0	(53.8)	17.0	(38.6)	0.216	64.0	(60.4)	0.0	-	**<0.001**
Numbers of PD (mean (±SD))	5.5	(2.9)	4.3	(3.7)	0.161	5.4	(2.9)	3.0	(2.4)	**<0.001**
Persons using dementia drugs (n (%))	12.0	(46.2)	17.0	(38.6)	0.537	54.0	(50.9)	16.0	(41.0)	0.289
Numbers of OTC (mean (±SD))*	0.7	(0.8)	0.8	(0.8)	0.604	0.7	0.7	1.0	0.7	0.047
MMSE-NR (mean (±SD))	20.1	(4.2)	22.6	(4.5)	0.021	18.5	(6.1)	22.4	(4.2)	**<0.001**
RDRS-2 (mean (±SD))	38.9	(9.5)	32.0	(7.3)	**0.001**	40.2	(10.0)	27.7	(5.3)	**0.001**

Abbreviations: DS dietary supplements, *PD* prescription drug, *SD* standard deviation, *OTC* over-the-counter drug, *MMSE-NR* Mini Mental State Examination-Norwegian Revision, *RDRS-2* Rapid Disability Rating Scale-2

*Data are missing from two participants

**Six respondents did not use PD regularly. Four respondents used no PD. Two respondents, who used only vitamin B12 injection, were not included in the 145 respondents that used PD, as they were independent on daily assistance

Note that the RDRS-2 scale range from 21 to 84, where a score of 21 points indicates normal function in activities of daily living and a score of 84 points indicate complete dysfunctionality. The MSEE-NR scale range from zero to 30, where 30 points indicate normal cognitive function

Statistics are independent Student's t-test for continuous variables such as age, numbers of PD and OTC, MMSE-NR and RDRS-2. Statistics are Pearson's chi-square or Fisher's exact tests for categorical variables such as gender, living alone, receiving help from home care service and using dementia drugs. Bonferroni adjusted α was 0.05/9 resulting in $\alpha \leq 0.006$. Significant comparisons after adjustment are printed bold

Two out of twelve persons with dementia who used anticoagulants did not receive assistance with drug administration. Both were in an early stage of dementia as measured by MMSE-NR and RDRS-2 (lowest MMSE-NR score was 20, highest RDRS-2 score was 30). One of these persons also used digoxin, three antihypertensives and a DS containing *Boswellia serrata*, astaxanthin and omega-3-fatty acid.

Caregivers were most frequently assisting with DS, and home care services with PD. Home care services were seldom involved in assisting persons with dementia with the administration of DS (Fig. 2). In 17 cases, persons with dementia received home care services for PD, without the home care service being involved in the administration of these persons' DS (Table 2). A direct comparison between those who received help with the administration of DS and those who received help with the administration of PD can not be made because of overlap between those two populations.

Spouses and other relatives were the most frequent initiators of DS use. There was a relationship between who initiated use and receiving assistance with DS. When spouses or health care personnel initiated DS use, persons with dementia were more likely to receive assistance with the administration of the DS (Table 3).

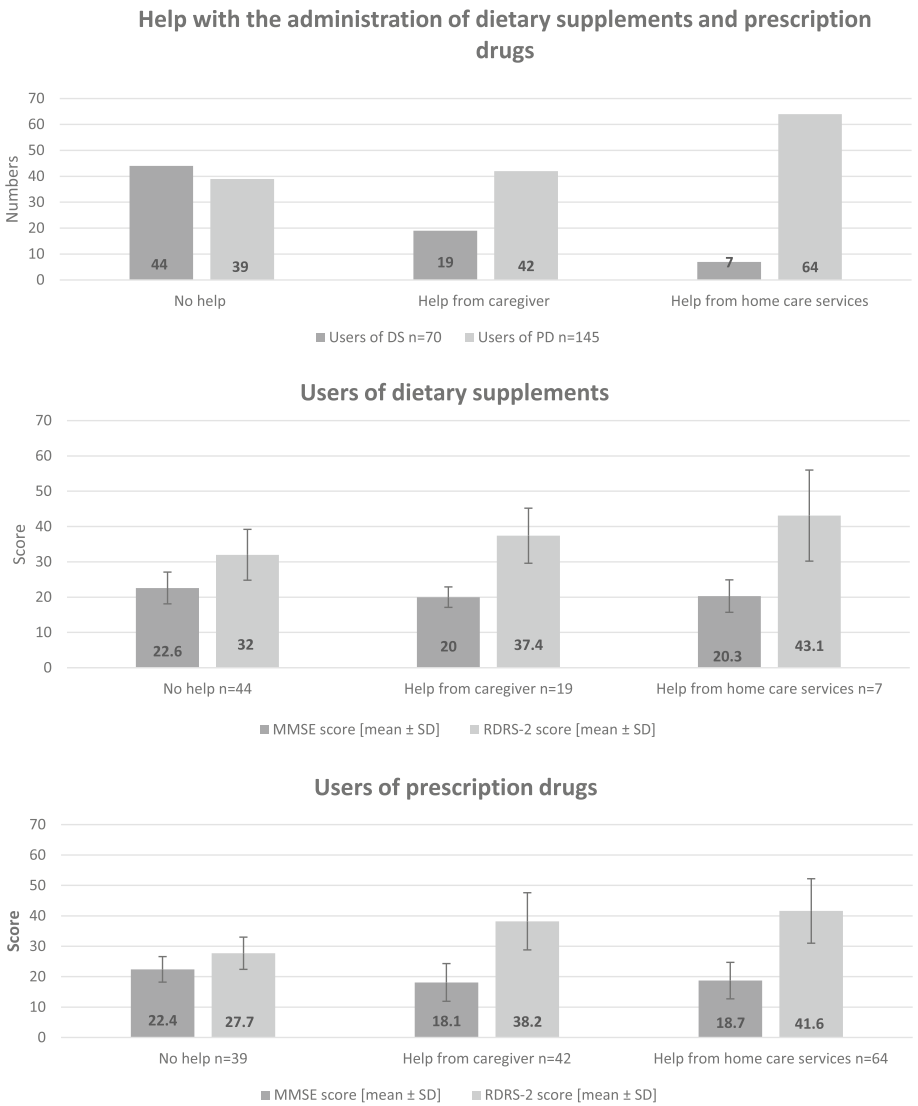

Fig. 2 Assistance with administration of dietary supplements and prescription drugs related to function. *Abbrevation*: *DS*, dietary supplements; *PD*, prescription drugs; *ADL*, activities of daily living; *MMSE-NR*, Mini Mental State Examination-Norwegian Revision; *RDRS-2*, Rapid Disability Rating Scale-2; *SD*, standard deviation. Two persons with dementia, who used only vitamin B12 injection, were not included in the 145 persons that used PD, as they were not dependent of daily assistance. Note that Fig. 2 demonstrate descriptive data. The RDRS-2 scale range from 21 to 84, where a score of 21 points indicates normal function in activities of daily living and a score of 84 points indicate complete dysfunctionality. The MSEE-NR scale range from zero to 30, where 30 points indicate normal cognitive function

Table 3 The relationship between assistance with DS administration and who initiated the use of DS calculated by logistic regression analysis

Initiator of DS use	Receiving assistance with DS					
	Yes	No	Total	*p*-value	OR	95% CI
Persons with dementia themselves	4	16	20	0.50	Ref	Ref
Spouses	10	5	15	**<0.01**	6.40	1.47–27.83
Other relatives	2	12	14	0.50	0.53	0.09–3.24
Health care personnel	8	2	10	**<0.01**	12.80	2.02–81.12
Retailers	1	9	10	0.38	0.04	0.04–3.54
Total	25	44	69*			

Abbreviations: DS dietary supplements, *OR* odds ratio, *CI* confidence interval
*Data are missing from one participant. Statistics are logistic regression for binary outcome
Significant results are printed in bold. We used an alpha level of 0.05 to evaluate statistical significance

Awareness of risk

Forty-eight persons with dementia (32%) and 77 caregivers (51%) said they were aware that use of DS might increase a general risk for adverse events and interactions with PD. Data were missing from four participants. Participants' DS use did not differ depending on knowledge of risk among caregivers and persons with dementia. In the 78 cases where caregivers knew about the risk for adverse events or DS-drug interactions, 35 persons with dementia used DS (44%); in the 69 cases where caregivers were not aware, 33 (48%) used DS (p = 0.720, Pearson's χ^2 0.129, df 1). Among persons with dementia who used DS, caregivers' knowledge of risk did not influence help with administration of DS. If caregivers knew about the risk for adverse events or DS-drug interactions, 16 out of 35 (46%) users of DS received help with the administration; if caregivers were not aware, 10 out of 33 (30%) users of DS received help with the administration, (p = 0.19, Pearson's χ^2 1.708, df 1).

Discussion

The use of DS was common among persons with dementia. With regard to direct risks, only a minority of the persons with dementia were aware of the potential risk of adverse events and/or interactions from DS. Although only few persons with dementia used combinations suggesting clinically relevant DS-drug interactions, the ones we found were potentially harmful.

The persons with dementia did not receive the same degree of assistance with their DS as with their PD. Two thirds of the persons received assistance with the administration of their PD, while only one third received assistance with the administration of DS. Additionally, home care services were minimally involved in DS monitoring.

Use of DS

No previous studies have addressed the use of DS in persons with dementia in a Norwegian setting, but the estimated prevalence of DS use among Norwegians in general ranges from 44% to 74% [37, 38]. Almost half of the persons with dementia in the current study reported the use of DS, which is consistent with studies on persons with dementia from Canada, Germany, India and the US [6–10] and also consistent with the use of DS in the general Norwegian population [38].

The only difference between users of DS and non-users were signs of better cognitive function in users. The higher frequency of DS use among persons with less advanced dementia, indicated by higher MMSE-NR and a trend towards lower RDRS-2 scores, is in line with previous research [9]. Our cross-sectional analysis does not allow for causal interpretations. Possible explanations for the result could be that some DS actually slow down cognitive decline (although not scientifically documented), or that people with dementia tend to stop using DS as the disease progresses or a combination of both. Reasons for discontinuing a DS could be that persons with dementia stop buying it because of increased forgetfulness or loss of initiative. Other reasons might be increasing reluctance to take DS or tablets in general, or that the persons with dementia and their caregivers lose faith in DS, if the effect that they hoped for fails.

Direct risks of DS use

The direct risks caused by potentially clinically relevant DS-drug interactions in 11% in the DS users gives reason for concern. The concurrent use of several similar DS products, such as several fish oils by some of the persons with dementia, in combination with anticoagulants, should be mentioned. Although a risk of increased bleeding from taking omega-3-fatty-acid supplements has been suggested, excessive bleeding due to inhibition of platelet function has not been demonstrated in clinical studies [39]. The clinical importance of combining omega-3-fatty acids and drugs that increase the risk of bleeding (e.g., anticoagulants and aspirin) is debated. Several of the participants used more than one product

containing vitamin D, and the total intake exceeded the RDI of this vitamin. The clinical relevance of this, however, is uncertain because the given RDI of vitamin D is an estimate which is well below toxic amounts [36]. Nevertheless, extra caution should be taken in persons with dementia, as they may be more susceptible to overdosing because they may not take their DS as intended.

Other studies have reported potentially clinically relevant DS-drug interactions in 10–40% of DS users [10, 38, 40]. As the types of DS and the types of drugs used by different populations could vary over time, a direct comparison between studies is difficult. As DS are regulated differently than PD, several factors lead to lack of knowledge about potential interaction between DS and drugs. Pharmacovigilance challenges regarding DS include lack of studies documenting safety and tolerability, and underreporting of suspected adverse events [22].

Indirect risks of DS use

Not surprisingly, persons with dementia who had higher RDRS-2, and lower MMSE-NR scores received more assistance with the administration of PD. Assistance with DS was related to higher RDRS-2 score, but not to lower scores in the MMSE-NR. Persons with dementia received less assistance when it came to the administration of DS compared to PD. The persons with dementia who used DS had slightly better cognitive functioning than non-users, and we cannot exclude that this could have affected how much assistance these persons received. The differences in the cognitive test scores were rather small, but statistically and clinically relevant [41]. However, better cognitive functioning cannot be the sole explanation, as some of these persons received assistance with PD but not with DS. Several studies have set an MMSE score below 24 as a threshold for persons who could have trouble with self-administration of drugs [42, 43]. Although both MMSE-NR scores and RDRS-2 scores are rough estimates, the scores of the persons with dementia who did not receive assistance with the administration of DS or PD indicate that several of these persons were in need of assistance. The fact that probably most of the persons with dementia were in need of assistance with both DS and PD/OTC, and a relatively large proportion of the participants did not receive this assistance, is, in our opinion, the key message from this study.

Persons with dementia living alone are at a particular risk of not receiving assistance with DS, as home care services seldom assisted these persons with DS even though they frequently assisted with PD. We found that when health care personnel were the initiators, more persons with dementia received assistance administering DS. This suggests that health care personnel's lack of awareness of persons with dementias' DS use is a key factor in why assistance is not given.

Studies have reported that users of DS rarely inform health care personnel about their use [6–8, 38]. A likely reason for this is the belief that the supplements are harmless [44]. Most of the persons with dementia and half of the caregivers in the current study were unaware that DS might cause adverse events and DS-drug interactions. Caregivers' knowledge of the risks of adverse events and DS-drug interactions did not influence patient's use of DS or assistance with the administration of DS. We have not investigated the reasons for actions or omissions on the part of persons with dementia or their caregivers. It is possible that caregivers believe the benefits from DS outweigh the disadvantages, and that the potential risk of DS use is too small to necessitate precautions. Optimistic bias, the belief that one is less likely than one's peer to suffer harm, can also lead to the denial of risks [45].

Inadequate adherence to the administration of DS, PD and OTC challenge patient safety and requires risk management [46]. The degree of adherence generally declines with increasing number of tablets to be taken [46]. We found that DS users consumed on average 2.1 tablets more per day than non-users (7.2 vs. 5.1 tablets, respectively). Adherence might therefore be a safety issue of special concern among DS users.

Although this study focused on DS, it is important to keep in mind that PD might cause far more damage than DS when taken incorrectly [47]. It is of concern that two participants who used anticoagulants, one of them also digoxin, lacked assistance with the administration of their PD.

In this study, more than one third of the persons with dementia bought their DS at pharmacies. Pharmacy employees possess knowledge of DS and can inform and advise persons with dementia and their caregivers. Nonetheless, the majority purchased their DS outside of the traditional health care service and could therefore not expect any guidance.

Strengths and limitations of the study

The participation rate in the study was high (90%). All participants were included prospectively and consecutively from an unselected dementia population, with a minimum set of exclusion criteria, to reduce selection bias and maintain external validity. The dementia population in this study was comparable to dementia populations in other studies with regard to age, gender distribution and level of cognitive function [48]. Our study population is different from populations in studies done in more ethnically diverse countries, by being ethnically homogeneous. This is not due to selection, but to a high degree of ethnic homogeneity in the elderly

age groups in our geographic region [49]. Moreover, our findings are not necessarily generalizable to persons with dementia who were never referred to specialized health care, and persons with dementia who do not have a caregiver, as these groups were not included in our study. The participants were recruited from a Norwegian outpatient clinic and the results should be interpreted on the background of the particularities of the Norwegian healthcare system. However, the general problem of direct and indirect risks associated with DS use in persons with dementia will probably be relevant in other health care structures as well.

The study measurements included clinical assessment as well as face-to-face interviews. When it comes to clinical assessment, we assessed ADL function by the RDRS-2 scale, because this scale was part of the routine assessment in the memory clinic. The fact that this scale rarely is used in research is a limitation of our study. Thus, RDRS-2 scale gives a description of ADL function without giving us the opportunity to compare our results to other studies. As some of the drug lists were unreconciled, our approach of contacting home care services and family physicians ensured data quality. Some underreporting of DS use may have occurred, and our reported prevalence of use is therefore a conservative estimate. Furthermore, our study population was small, even though comparable to earlier prevalence studies.

Practical implications

Persons with dementia are particularly vulnerable, as the dementia symptoms reduce their ability to take care of themselves. It is therefore important to take any increased direct or indirect risk seriously. Health care personnel and family physicians in particular, should be aware that around half of the persons with dementia use DS. Particular emphasis should be placed on persons with dementia who live alone and persons with dementia in earlier disease stages, as these subgroups could be less likely to receive assistance with the administration of DS. Another concern is co-use of DS, anticoagulants, and other drugs with a narrow therapeutic window, in which DS-drug interactions may have serious clinical consequences.

Caregivers of persons with dementia living alone might buy and initiate the use of DS without being able to assist in their administration or to be able to ensure safe use. It may therefore be advisable for family physicians and home care services to discuss DS with caregivers, particularly when the persons with dementia live alone.

In order to ensure patient safety, we suggest formalizing the assistance provided by the health care services related to DS. Conduction of risk assessment including evaluation of DS-drug interaction should, in our opinion, be mandatory. Both pharmacists and family physicians are qualified to take on the assignment. Distinct lines of responsibility, pointed out by health authorities, would probably increase patient safety. If the use of DS is safe and to be continued, health care personnel should secure assistance with DS administration for persons with dementia in need of assistance. As we observed, there is a lack of knowledge of the potential risks concerning DS use among persons with dementia and their caregivers, thus we suggest that more information is made available to the public about DS.

Conclusions

The use of dietary supplements was common in the dementia population studied and several sources of direct and indirect risks were identified. The sources of the increased risk give reason for concern, and might also be relevant to other groups of vulnerable persons with mental or functional challenges, such as old age frailty, intellectual disability or severe mental illness.

Abbreviations

ADL: Activities of daily living; CAM: Complementary and alternative medicine; CI: Confidence interval; DS: Dietary supplements; MMSE-NR: Mini Mental State Examination-Norwegian Revision; OR: Odds ratio; OTC: Over-the-counter drugs; PD: Prescription drugs; RDI: Recommended dietary intakes; RDRS-2: Rapid Disability Rating Scale −2; RELIS: Regional pharmacovigilance center; SD: Standard deviation

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Authors'contributions

All authors have contributed to the design and content of the article and approved the final manuscript. TG is responsible for the interaction analysis. HR is responsible for the collection of data.

Authors' information

Hilde Risvoll is a senior consultant and a specialist in neurology. The persons with dementia who participated in this study were recruited from the memory clinic where she works. Trude Giverhaug is pharmacist, PhD, head of the Regional medicines information & pharmacovigilance centre of North Norway. Kjell H. Halvorsen and Marit Waaseth are pharmacists and associate professors in clinical pharmacy and pharmacoepidemiology, respectively. Frauke Musial is head of research in the Norwegian National Research Center for Complementary and Alternative Medicine, and Professor for Healthcare Research-Alternative Treatment.

Competing interests

The authors declare that they have no competing interests.

Consent for publication

Not applicable.

Ethics approval and consent to participate
The study was approved by the Regional Committee for Medical and Health Research Ethics North. Reference number: 2011/1705.

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References

1. Winblad B, Amouyel P, Andrieu S, Ballard C, Brayne C, Brodaty H, et al. Defeating Alzheimer's disease and other dementias: a priority for European science and society. Lancet Neurol. 2016;15(5):455–532. doi:10.1016/s1474-4422(16)00062-4.
2. Sydenham E, Dangour AD, Lim WS. Omega 3 fatty acid for the prevention of cognitive decline and dementia. Cochrane Database Syst Rev. 2012;6:Cd005379. doi:10.1002/14651858.CD005379.pub3.
3. Persson T, Popescu BO, Cedazo-Minguez A. Oxidative stress in Alzheimer's disease: why did antioxidant therapy fail? Oxidative Med Cell Longev. 2014;2014:427318. doi:10.1155/2014/427318.
4. Obermann KR, Morris JC, Roe CM. Exploration of 100 commonly used drugs and supplements on cognition in older adults. Alzheimers Dement. 2013;9(6):724–32. doi:10.1016/j.jalz.2012.12.002.
5. Birks J, Grimley Evans J. *Ginkgo biloba* for cognitive impairment and dementia. Cochrane Database Syst Rev. 2009;1:Cd003120. doi:10.1002/14651858.CD003120.pub3.
6. Dhikav V, Anand KS. Complementary and alternative medicine usage among Alzheimer's disease patients. Int Psychogeriatr. 2012;24(8):1361–2. doi:10.1017/s1041610212000427.
7. Hogan DB, Ebly EM. Complementary medicine use in a dementia clinic population. Alzheimer Dis Assoc Disord. 1996;10(2):63–7. doi:10.1097/00002093-199601020-00002.
8. Landin J, Frolich L, Schwarz S. Use of alternative therapies in patients with dementia and mild cognitive impairment: a prospective, controlled study. International Journal of Geriatric Psychiatry. 2008;23(11):1163–5. doi:10.1002/gps.2046.
9. Coleman LM, Fowler LL, Williams ME. Use of unproven therapies by people with Alzheimer's disease. J Am Geriatr Soc. 1995;43(7):747–50. doi:10.1111/j.1532-5415.1995.tb07043.x.
10. Dergal JM, Gold JL, Laxer DA, Lee MS, Binns MA, Lanctot KL, et al. Potential interactions between herbal medicines and conventional drug therapies used by older adults attending a memory clinic. Drugs Aging. 2002;19(11):879–86. doi:10.2165/00002512-200219110-00005.
11. Laporte Uribe F, Heinrich S, Wolf-Ostermann K, Schmidt S, Thyrian JR, Schafer-Walkmann S, et al. Caregiver burden assessed in dementia care networks in Germany: findings from the DemNet-D study baseline. Aging Ment Health. 2016:1–12. doi:10.1080/13607863.2016.1181713.
12. Bunchorntavakul C, Reddy KR. Review article: herbal and dietary supplement hepatotoxicity. Aliment Pharmacol Ther. 2013;37(1):3–17. doi:10.1111/apt.12109.
13. Ernst E. Harmless herbs? A review of the recent literature. Am J Med. 1998;104(2):170–8. doi:10.1016/s0002-9343(97)00397-5.
14. Kupiec T, Raj V. Fatal seizures due to potential herb-drug interactions with *Ginkgo biloba*. J Anal Toxicol. 2005;29(7):755–8. doi:10.1093/jat/29.7.755.
15. Chan TY. Contributory factors in herb-induced fatal aconite poisoning. Forensic Sci Int. 2012;223(1–3):40–3. doi:10.1016/j.forsciint.2012.10.009.
16. Shalansky S, Lynd L, Richardson K, Ingaszewski A, Kerr C. Risk of warfarin-related bleeding events and supratherapeutic international normalized ratios associated with complementary and alternative medicine: a longitudinal analysis. Pharmacotherapy. 2007;27(9):1237–47. doi:10.1592/phco.27.9.1237.
17. Hu Z, Yang X, Ho PC, Chan SY, Heng PW, Chan E, et al. Herb-drug interactions: a literature review. Drugs. 2005;65(9):1239–82. doi:10.2165/00003495-200565090-00005.
18. Wardle JL, Adams J. Indirect and non-health risks associated with complementary and alternative medicine use: An integrative review. European Journal of Integrative Medicine. 2014;6(4):409–22. doi:10.1016/j.eujim.2014.01.001.
19. Stub T, Salamonsen A, Kristoffersen A, Musial F. How to handle worsening of condition during treatment - risk assessment in homeopathic practice. Forsch Komplementmed. 2015;22(1):30–5. doi:10.1159/000377644.
20. Chan K. Some aspects of toxic contaminants in herbal medicines. Chemosphere. 2003;52(9):1361–71. doi:10.1016/s0045-6535(03)00471-5.
21. Vaclavik L, Krynitsky AJ, Rader JI. Mass spectrometric analysis of pharmaceutical adulterants in products labeled as botanical dietary supplements or herbal remedies: a review. Anal Bioanal Chem. 2014;406(27):6767–90. doi:10.1007/s00216-014-8159-z.
22. Shaw D, Ladds G, Duez P, Wiliamson E, Chan K. Pharmacovigilance of herbal medicine. J Ethnopharmacol. 2012;140(3):513–8. doi:10.1016/j.jep.2012.01.051.
23. Owens C, Baergen R, Puckett D. Online sources of herbal product information. Am J Med. 2014;127(2):109–15. doi:10.1016/j.amjmed.2013.09.016.
24. Raynor DK, Dickinson R, Knapp P, Long AF, Nicolson DJ. Buyer beware? Does the information provided with herbal products available over the counter enable safe use? BMC Med. 2011;9:94. doi:10.1186/1741-7015-9-94.
25. Hayward RA, Asch SM, Hogan MM, Hofer TP, Kerr EA. Sins of omission: getting too little medical care may be the greatest threat to patient safety. J Gen Intern Med. 2005;20(8):686–91. doi:10.1111/j.1525-1497.2005.0152.x.
26. Ernst E. Complementary medicine: its hidden risks. Diabetes Care. 2001;24(8):1486–8. doi:10.2337/diacare.24.8.1486.
27. Kemper KJ, Gardiner P, Gobble J, Woods C. Expertise about herbs and dietary supplements among diverse health professionals. BMC Complement Altern Med. 2006;6:15. doi:10.1186/1472-6882-6-15.
28. Folstein MF, Folstein SE, McHugh PR. "Mini-mental state". A practical method for grading the cognitive state of patients for the clinician. J Psychiatr Res. 1975;12(3):189–98. doi:10.1002/(sici)1099-1166(199805)13:5<285::aid-gps753>3.3.co;2-m.
29. Strobel C, Engedal K: MMSE-NR2 (MMS - norsk revisjon) (article in Norwegian language). Available at: file:///C:/Users/uin/Downloads/Manual%20MMSE-NR.pdf Assessed: 10 May 2016.
30. Linn MW, Linn BS. The rapid disability rating scale-2. J Am Geriatr Soc. 1982;30(6):378–82. doi:10.1111/j.1532-5415.1982.tb02835.x.
31. Krueger CE, Bird AC, Growdon ME, Jang JY, Miller BL, Kramer JH. Conflict monitoring in early frontotemporal dementia. Neurology. 2009;73(5):349–55. doi:10.1212/WNL.0b013e3181b04b24.
32. Crum RM, Anthony JC, Bassett SS, Folstein MF. Population-based norms for the Mini-Mental State Examination by age and educational level. JAMA. 1993;269(18):2386–91. doi:10.1001/jama.269.18.2386.
33. U.S. Department of Health & Human Services. Dietary Supplement Health and Education Act of 1994. Public Law No. 103–417. Paragraph 3a. In: Health NIo, vol. 2016. U.S.: Department of Health & Human Services; National Institute of Health; 1994.
34. Khurshid Z, Zafar MS, Zohaib S, Najeeb S, Naseem M. Green Tea (*Camellia sinensis*): Chemistry and Oral Health. Open Dent J. 2016;10:166–73. doi:10.2174/1874210601610010166.
35. Inrstitute of Medicine Panel on M. Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium, and Zinc. Washington D.C.: National Academies Press (US); 2001. p. 197–257. doi:10.17226/10026.
36. Vieth R. Vitamin D toxicity, policy, and science. J Bone Miner Res. 2007;22(Suppl 2):V64–8. doi:10.1359/jbmr.07s221.
37. Waaseth M, Nakling M, Bakken K, Grimsgaard S. Use of dietary supplements and medication among postmenopausal women with vasomotor symptoms. Climacteric. 2010;13(6):585–93. doi:10.3109/13697130903480714.
38. Djuv A, Nilsen OG, Steinsbekk A. The co-use of conventional drugs and herbs among patients in Norwegian general practice: a cross-sectional study. BMC Complement Altern Med. 2013;13:295. doi:10.1186/1472-6882-13-295.
39. Wachira JK, Larson MK, Harris WS: n-3 Fatty acids affect haemostasis but do not increase the risk of bleeding: clinical observations and mechanistic insights. Br J Nutr. 2014; 111(9):1652-1662. doi:10.1017/s000711451300425x.
40. Bush TM, Rayburn KS, Holloway SW, Sanchez-Yamamoto DS, Allen BL, Lam T et al: Adverse interactions between herbal and dietary substances and prescription medications: a clinical survey. Altern Ther Health Med. 2007;13(2):30-35. Retrieved from http://search.proquest.com/docview/204836174?accountid=26469.

41. Stein J, Luppa M, Maier W, Wagner M, Wolfsgruber S, Scherer M, Kohler M, Eisele M, Weyerer S, Werle J et al: Assessing cognitive changes in the elderly: reliable change indices for the Mini-Mental State Examination. Acta Psychiatr Scand. 2012;126(3):208-218.
42. Sinclair AJ, Girling AJ, Bayer AJ: Cognitive dysfunction in older subjects with diabetes mellitus: impact on diabetes self-management and use of care services. All Wales Research into Elderly (AWARE) Study. Diabetes Res Clin Pract. 2000;50(3):203-12. doi:10.1016/S0168-8227(00)00195-9.
43. Gellad WF, Grenard JL, Marcum ZA: A systematic review of barriers to medication adherence in the elderly: looking beyond cost and regimen complexity. Am J Geriatr Pharmacother. 2011; 9(1):11-23. doi:10.1016/j.amjopharm.2011.02.004.
44. Awad A, Al-Shaye D: Public awareness, patterns of use and attitudes toward natural health products in Kuwait: a cross-sectional survey. BMC Complement Altern Med. 2014;14:105. doi:10.1186/1472-6882-14-105.
45. Weinstein ND, Klein WM. Resistance of personal risk perceptions to debiasing interventions. Health Psychol. 1995;14(2):132-40. doi:10.1037/0278-6133.14.2.132.
46. Maher RL, Hanlon J, Hajjar ER: Clinical consequences of polypharmacy in elderly. Expert Opin Drug Saf. 2014;13(1):57-65. doi:10.1517/14740338.2013.827660.
47. Stocks SJ, Kontopantelis E, Akbarov A, Rodgers S, Avery AJ, Ashcroft DM. Examining variations in prescribing safety in UK general practice: cross sectional study using the Clinical Practice Research Datalink. BMJ. 2015;351. doi:10.1136/bmj.h5501.
48. Meeuwsen EJ, Melis RJ, Van Der Aa GC, Goluke-Willemse GA, De Leest BJ, Van Raak FH et al. Effectiveness of dementia follow-up care by memory clinics or general practitioners: randomised controlled trial. BMJ. 2012;344:e3086. doi:10.1136/bmj.e3086.
49. Henriksen K, Østby L, Ellingsen D: Immigration and immigrants 2010. Available at http://www.ssb.no/a/english/publikasjoner/pdf/sa122/sa122_en.pdf. Accessed 1 May 2017.

Paper II

BMC Complementary and Alternative Medicine

RESEARCH ARTICLE Open Access

Pharmacy employees' involvement in safeguarding persons with dementia who use dietary supplements: Results from a survey of Norwegian pharmacies

Hilde Risvoll[1,2,3*], Frauke Musial[1], Kjell H. Halvorsen[4], Trude Giverhaug[5] and Marit Waaseth[4]

Abstract

Background: Community-dwelling persons with dementia commonly use dietary supplements (DS), often without receiving help with the administration. Patient safety is a concern, as DS-drug interactions and adverse events are potential complications. Since many persons with dementia buy their DS in pharmacies, we investigated Norwegian pharmacy employees' attitudes and professional practice behaviors related to DS.

Methods: We conducted a survey in eight Norwegian municipalities of pharmacy employees involved in the sale of DS. The questionnaire covered demographics and investigated attitudes toward DS, professional practice behaviors related to the sale of DS, experiences with customers with dementia, and perceived and attributed responsibilities with regard to patient safety.

Results: One hundred and five employees responded (response rate: 52%). Most employees regarded general practitioners (GPs) as primarily responsible for safeguarding the use of DS by persons with dementia and rated themselves less responsible. Thirty-seven percent of the employees reported personal use of DS (past or current use). Nine percent considered some of the DS to have symptomatic or prophylactic effects against dementia. Forty-eight percent confirmed that they informed customers about potential adverse events; 42% indicated that they did this sometimes. Sixteen percent checked regularly for DS-drug interactions, and two-thirds checked depending on the customers' health, the type of drug or the type of DS. One-quarter regularly asked about the co-use of prescription drugs (PD) when selling DS, while only 2% asked about the co-use of DS when dispensing PD. Only 25% reported access to independent scientific information on all or most DS sold in their pharmacy. Eight percent had experienced unsafe use of DS by persons with dementia. Six percent had been taught about counselling persons with dementia. Education level influenced professional practice behavior to some extent.

Conclusion: Pharmacy employees do not see themselves as primarily responsible for the safe use of DS by persons with dementia. Moreover, they have limited experience with the unsafe use of DS by these persons. There is potential for improvement regarding tools and educational interventions for pharmacy employees to provide sufficient help to persons with dementia who use DS.

Keywords: Pharmacy, Dietary supplements, Dementia, Patient safety, Risk management, Professional practice behavior, Attitude, Attributed responsibility, Cross-sectional survey

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Background

Dietary supplements (DS) include vitamins, minerals, herbs, amino acids and dietary substances [1]. DS are widely used in the general population [2, 3], often for maintaining or improving health [4]. Considered natural and safe by many, DS can nevertheless compromise patient safety through interactions with prescription drugs (PD) and by causing direct adverse events [5, 6]. Fatal events have been reported [7].

Dementia is a general term for progressive diseases that affect mental abilities and cause problems in activities of daily living (ADL). The majority of persons with dementia have Alzheimer's disease, with memory problems as the most common symptom [8]. Several DS claim to protect against cognitive decline and dementia, such as omega-3 fatty acids and antioxidants like Vitamin E and Vitamin C, but the scientific evidence is sparse [9, 10]. DS is commonly used by community-dwelling persons with dementia, and studies report a prevalence of 50% [11, 12]. Potentially clinically relevant interactions between DS and PD have been reported in 11–33% of persons with dementia who use DS [6, 12]. Due to reduced cognitive function, persons with dementia are at risk of misdosing or confusing DS with PD or vice versa, imposing additional risks on this particular patient group. Another concern is that two-thirds of persons with dementia using DS receive no help with their DS, even though most of them receive help with administering their PD [12].

General practitioners (GPs) have the responsibility for patients' health and safety, including their PD [13]. Their responsibility regarding DS is less clear [4]. Patient autonomy is a very strong principle within medical ethics [14], thus patients may freely choose to use DS. However, persons with dementia are often incapable of safeguarding their own use of DS [12]. They may have difficulties in making an informed choice about the use and administration of DS. When patients are not able to take responsibility, who should then be responsible? Should the responsibility rest with the DS retailers who are not a part of the traditional health-care system (hereafter denoted DS retailers), patients' caregivers, or health-care personnel (e.g., GPs, the home care service or pharmacy employees)? If no one accepts this responsibility, the patient him- or herself will be left responsible. The caregiver might take the initiative for the DS use [12], and can additionally help the patient administer the DS and communicate with the health-care system. Caregivers are an important unpaid care resource [15] but are not expected to have knowledge regarding PD or DS. Furthermore, the DS-retailers should be responsible for giving correct information about the DS content [16], but are not expected to possess knowledge on dementia. We identified GPs, pharmacy employees and the home care service (nurses and nurse assistants) as relevant to this responsibility. These health-care professionals are authorized to work with PD, and the safety of DS use is closely connected to the PD used. We have restricted our research interest to primary health care because it is the backbone of the Norwegian health care system. Furthermore, several patients with late-onset dementia, are diagnosed at the primary health care level and might not have any contact with the specialist health care system.

In Norway, as in several other Western countries, caring for older adults is now in many cases maintained by professional health-care workers, i.e., the home care service, and not by relatives or next of kin. According to Statistics Norway, more than 73% of Norwegian women aged 80 years and older live alone, while 31% of Norwegians (men and women) between 67 and 79 years old live alone [17]. At present, health-care personnel are seldom aware of, or involved in, patients' DS use [2, 5, 11]. Health-care personnel are obliged to ensure that their patients with cognitive impairments avoid harmful use of PD, but whether health care personnel should also be obliged to take responsibility for the safe use of DS has not, to our knowledge, been addressed previously.

As most pharmacies trade a variety of DS, pharmacy employees are often involved in the sale of DS, [18, 19]. Pharmacists often receive questions about DS from customers, but they neither routinely inquire about DS use, nor monitor or document DS use [20]. Previous publications have revealed room for improvement regarding pharmacists' knowledge of DS [20, 21]. Most studies regarding pharmacy employees' experiences with sale/counselling of DS have included only pharmacists as informants. However, employees with other types of educational backgrounds commonly sell DS. We identified only one study in the English language that included pharmacy technicians [22]. Employees with other educational backgrounds than pharmacists account for half of the employees in Norwegian pharmacies [23].

We have previously documented that one-third of persons with dementia recruited from a Norwegian outpatient memory clinic bought their DS in pharmacies [12]. There is a paucity of information about pharmacy employees' experiences in counselling persons with dementia as part of their daily routine [24]. Even less is known about their experiences counselling persons with dementia or their caregivers about DS. Thus, it is important to explore how pharmacy employees could assist in risk management of DS use in older adults, either by direct counselling or in collaboration with GPs and home care services.

The aim of this study was to describe Norwegian pharmacy employees' attitudes and professional practice behaviors related to the counselling and sale of DS in

general and, more specifically, to persons with dementia. We also investigated to which degree pharmacy employees felt responsible for the safety of customers with dementia buying DS.

Methods

Study population and recruitment

We conducted a cross-sectional survey from December 2014 to March 2015. All pharmacy employees in eight municipalities in Northern Norway were invited to participate. There were 23 pharmacies in this geographical area (one hospital pharmacy and 22 community pharmacies). All but one pharmacy agreed to participate; see Fig. 1 in Result section. The eight municipalities were chosen because they provide the source population for the memory clinic where our research group recently conducted a study of the use of DS by persons with dementia [12]. The present study and further studies among other health-care personnel (GPs and home care service employees) were therefore conducted in the same geographical area.

Employees holding a bachelor's (three years) or master's (five years) degree in pharmacy were classified as pharmacists, while employees with other educational backgrounds (e.g., upper secondary school) were classified as pharmacy technicians. We excluded employees without customer contact as part of their daily work. The master's degree is equivalent to the pharmacist degree across Europe, while the pharmacy bachelor normally qualifies for work as a dispensing pharmacist in community pharmacies. Two of the respondents stated in the open-ended question that they were nurses. Nurses have valuable knowledge that can be used as a resource in pharmacies. In this study, we wanted to

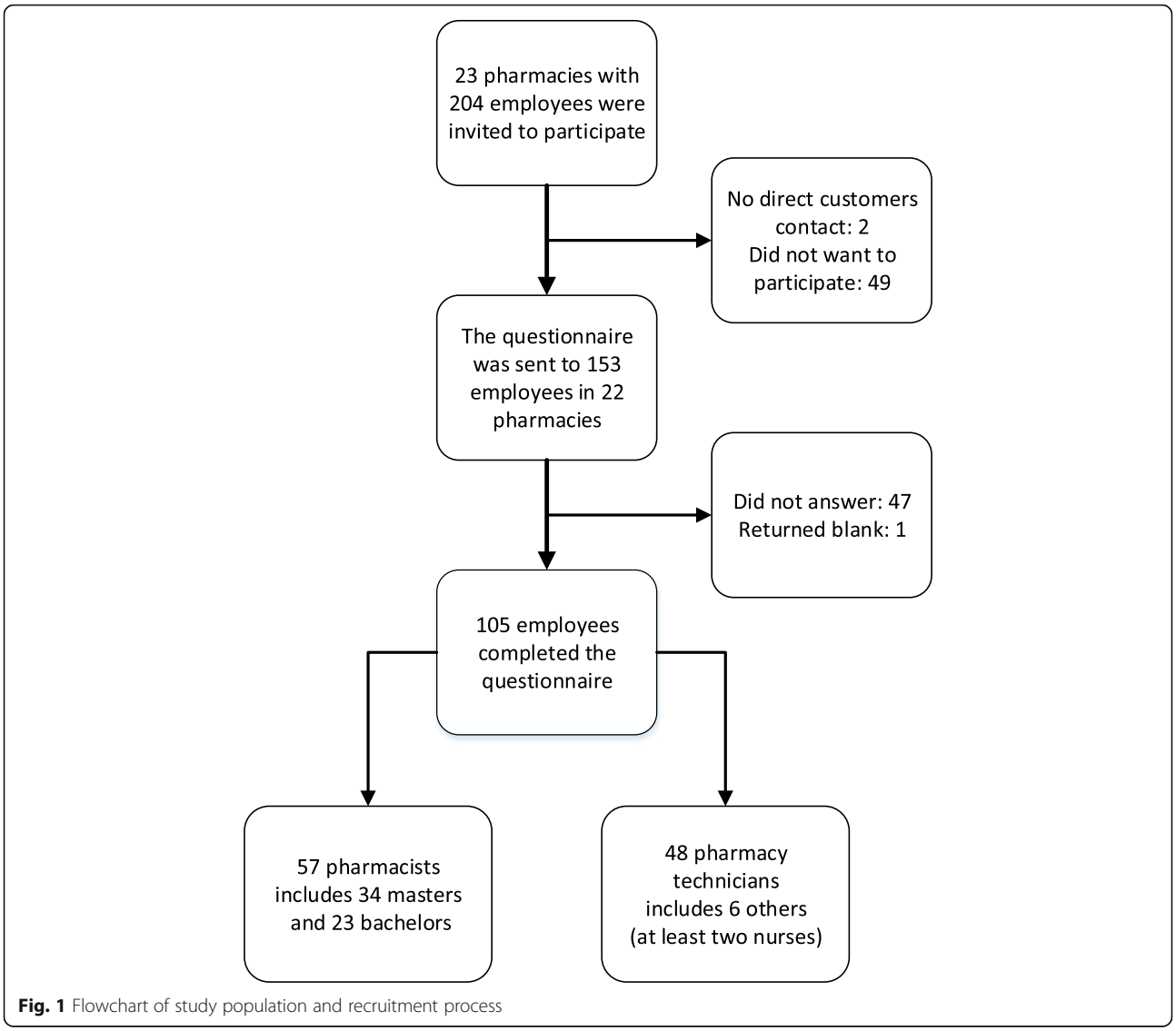

Fig. 1 Flowchart of study population and recruitment process

ascertain whether there were differences between pharmacists and other employees because we anticipated pharmacists to possess a greater knowledge level regarding adverse events from PD and DS, as well as interactions. Because nurses are not expected to possess the same level of knowledge as pharmacists about these topics, we chose to classify them as pharmacy technicians. In Norway, all health-care personnel are professionals, as they need to apply and receive accreditation from the health authorities. Pharmacy technicians have a vocational qualification after education and practical training and, as front shop staff in the pharmacy, can provide all services, except independently dispensing PD. For instance, they can ask customers about their use of DS. However, they are trained to consult a pharmacist whenever they feel unqualified to solve a problem.

In this study, the home care service is defined as a public well-fare system available to all inhabitants in need, and the backbone of the day-to-day care of community-dwelling people in need of help with medication or ADL-support. When a person needs help with his or her PD, an interdisciplinary collaboration between the pharmacy/pharmacist, GP, and home care service is needed. Pharmacy employees therefore have daily contact with home care service employees and are well acquainted with this service.

Study information and an electronic questionnaire (Questback formula, Questback AS, Oslo, Norway) were sent by e-mail to pharmacy employees. To increase the response rate, we sent three reminder e-mails to all participants. Questback was set up such that respondents could not submit more than one questionnaire. The pharmacy managers informed their employees of the survey and provided the e-mail addresses of all employees who met the inclusion criteria (i.e., in which only employees with customer contact were invited to participate). The number of eligible employees reported by the managers was used to calculate the response rate. Figure 1 provides an overview of the study population and the recruitment process.

Questionnaire

No validated questionnaire was available that covered our research aspects. Therefore, we designed a questionnaire specifically for this study. As part of this process, we evaluated previous studies and consulted relevant multidisciplinary experts (see acknowledgements). We conducted a feasibility study with fifteen pharmacists and pharmacy technicians to investigate the relevance and readability of the questions and to evaluate the length of the questionnaire. The final version took 10–20 min to complete and covered 35 items, see Additional file 1 for a translated verion of the questionaire. For the present study, we included a subset of items grouped in the following five domains:

1. Study population (gender, education and years of professional experience);
2. Attitudes toward DS (personal DS use, beliefs about positive and negative effects of DS, recommending DS to customers unprompted);
3. Attribution of responsibility for the safety of persons with dementia using DS and suggestions for safety improvement. The employees were asked to rank the following options addressing the question "Where should the responsibility for the safe use of DS by persons with dementia be placed?": patients themselves, caregivers, GPs, home care services, pharmacies, or DS retailers. DS retailers could be employees in health food stores, internet retailers, complementary and alternative medicine therapists, or others. We also asked the respondents to rank the following suggestions on how to ensure correct and safe use of DS by persons with dementia: information from health authorities to the general population, changes in laws and regulations concerning DS, increased effort from GPs (ask all patients about use of DS and check for adverse events and interactions), increased effort from home care services (convey information about the use of DS to GPs or pharmacists), increased effort from pharmacies (check for interactions between DS and PD for all customers who buy DS, inform GPs when interactions are identified), or DS delivery in multidose drug-dispensing systems together with PD. The multidose drug-dispensing system was not explained further as pharmacy employees are familiar with this system and its implications. The multidose dispensing-system is similar to the Automated Medication Dispensing Systems and is commonly used for PD in Scandinavian countries [25]. A computer-controlled robot system dispenses each patient's drugs into disposable bags. All drugs intended for one dosing occasion are gathered in one dose unit bag labeled with patient data, drug contents, and the date and time for intake. To deliver DS through the multidose drug-dispensing system, the use of DS would be identified by the health-care system, and both the GP and pharmacist would be responsible for checking for interactions and judgement on safety. It would also facilitate the distribution and administration of DS, thereby avoiding overdoses and other consequences of user error.

The questions about attributed responsibilities and suggestions for improvements of safety were ordinal. Respondents were asked to rank the six categories, resulting in a ranking scale from 1 to 6. We merged priorities

2–4 into a medium-level responsibility category, and priorities 5–6 into a least-responsible category. We were mainly interested in to whom the respondents assigned the most responsibility or what they believed would be the best intervention. For this reason we did not merge priorities 1 and 2. We believe unclear lines of responsibility is an obstacle to the safe care of persons with dementia who use DS. Therefore, we wanted to determine where pharmacy employees placed this responsibility and, additionally, where they placed themselves. In imminent studies that are already designed, we plan to ask caregivers, GPs, and employees in home care service about their opinion on this same matter.

4. Professional practice behaviors related to the sale of DS (questions about DS, where to find independent scientific information about DS, informing customers about potential adverse events from DS, asking about PD use when selling DS and vice versa, checking for interactions between DS and PD (including methods for checking), and willingness to answer questions about DS not bought in the pharmacy)
5. Professional experience with persons with dementia in general and related to DS in particular (education on counselling persons with dementia, experience with persons with dementia who are unable to understand important pharmaceutical information, routines for handling communication problems with customers with dementia, experience with unsafe use of DS among persons with dementia, and routines for handling customers with dementia who use DS unsafely).

Five of the questions in the subset used in this study were open-ended questions (which DS products they believe have positive effects against dementia, routines for handling communication problems, routines for handling unsafe DS use by customers with dementia, in which context they have received education on counselling persons with dementia, and methods for checking for interactions between DS and PD), two were ordinal (attributed responsibility, suggestions for improvement of safety), and the remainder were dichotomous or multiple-choice questions. It was not possible to add free text in the questionnaire except for the open-ended questions.

Ethics

The Regional Committee for Medical and Health Research Ethics presented no objections to the study design (2014/1385). As no patients were included, the project was defined as "quality assurance". The survey did not collect personally identifiable information and therefore was not accountable to the Norwegian Data Protection Agency. All participants were given written information about the study and informed that submitting the questionnaire was considered to be study consent.

Statistics

We used IBM SPSS (Statistical Package for the Social Sciences) version 23.0 (IBM Corp., Armonk, NY, US) for the statistical analyses. Data are presented as absolute and relative frequencies. We used Pearson's chi-square test or Fisher's exact test for categorical data. P values < 0.05 were considered statistically significant.

Results

Study population

One hundred and five persons, 11% men ($n = 12$) and 89% women ($n = 93$), answered the questionnaire, resulting in a response rate of 52%. Of these respondents, 54% were pharmacists, and 46% were pharmacy technicians, see Fig. 1. Four percent had 0–1 year ($n = 4$), 27% had 1–5 years ($n = 28$), 37% had 6–15 years ($n = 39$), and 32% had more than 16 years ($n = 34$) of professional experience.

Attitudes toward DS

In total, 37% of the respondents (n = 39) reported that they currently used or had previously used some type of DS. Nine percent ($n = 9$) believed that some DS might have symptomatic or prophylactic effects against dementia. The following DS were reported to be effective by the 10 respondents who answered this open-ended question (descending order of frequency): omega-3-fatty acids, *Ginkgo biloba*, folic acid, vitamin E, vitamin B, vitamin C, flavonoids, lecithin, cranberries, garlic and ginger. Fifty-nine percent of the respondents ($n = 62$) agreed that DS could have potentially harmful effects on users' health, and more pharmacists than pharmacy technicians agreed with this statement (Table 1). There were no other differences between the pharmacists and pharmacy technicians in attitudes toward DS.

Pharmacy employees who used DS themselves more often recommended DS to customers unprompted (54% of users ($n = 21$) vs. 23% of nonusers ($n = 15$), $p = 0.002$). Of the 35% ($n = 37$) who recommended DS unprompted to customers, 73% ($n = 27$) did so because they believed that DS have documented beneficial effects, and 49% ($n = 18$) because they believed that DS could cure or give symptomatic relief. Twenty-seven percent ($n = 10$) recommended DS because they felt the customers wanted to buy DS, 16% ($n = 6$) due to the pharmacy's upselling policy and 3% (n = 1) because they believed that the products did no

Table 1 Pharmacists' and pharmacy technicians' attitudes toward dietary supplements

	Pharmacist		Pharmacy technicians		Total		*p*-value[a]
	n = 57		*n* = 48		*n* = 105		
	n	%	n	%	n	%	
Personal use of DS (past or current)[b]	25	44	14	29	39	37	0.131
Believe DS have effects against dementia[b, c]	5	9	4	8	9	9	0.172
Agrees that DS can cause harm to health[b, c]	44	77	18	38	62	59	**< 0.001**
Recommend DS to customers unprompted[d]	21	37	16	33	37	35	0.369

DS Dietary supplements. Pharmacists include employees with a bachelor's or master's degree in pharmacy. Pharmacy technicians include employees with other educational backgrounds, mainly pharmacy technicians (upper secondary school). [a]Fisher's exact test; [b]Data are missing for one employee. [c]The categories tested were yes, no and do not know. [d]Data are missing for two persons. Significant comparisons are printed in bold

harm. Of the 63% ($n = 66$) who never recommended DS unprompted, 62% ($n = 41$) reported insufficient knowledge of DS, 62% (n = 41) feared interactions with PD, 42% ($n = 28$) feared adverse events, and 20% ($n = 13$) did not believe DS to have positive effects (it was possible to choose more than one reason). Two respondents did not answer the question about whether they recommended DS.

Attributed responsibility

When asked to rank the six options, the majority of the respondents stated that GPs should be responsible for ensuring the safe use of DS by persons with dementia (Fig. 2). They assigned themselves a medium level of responsibility, followed by home care services and caregivers. Only 2% (n = 2) indicated that pharmacies should bear the greatest responsibility. Patients themselves and their caregivers were considered to bear the least responsibility.

Sixty-two percent ($n = 65$) of the pharmacy employees chose GPs, while 36% ($n = 38$) chose pharmacies when answering the following question: "Do you think GPs or pharmacies should be responsible for routinely checking for interactions between DS and PD in persons with dementia who use DS?" Two respondents did not answer this question.

Most employees gave the highest priority to increased effort from GPs when asked to rank several options addressing the question "Which option is best to ensure the correct and safe use of DS by persons with dementia?" (Fig. 3). Increased effort from home care services and pharmacies were ranked approximately equally at medium priority.

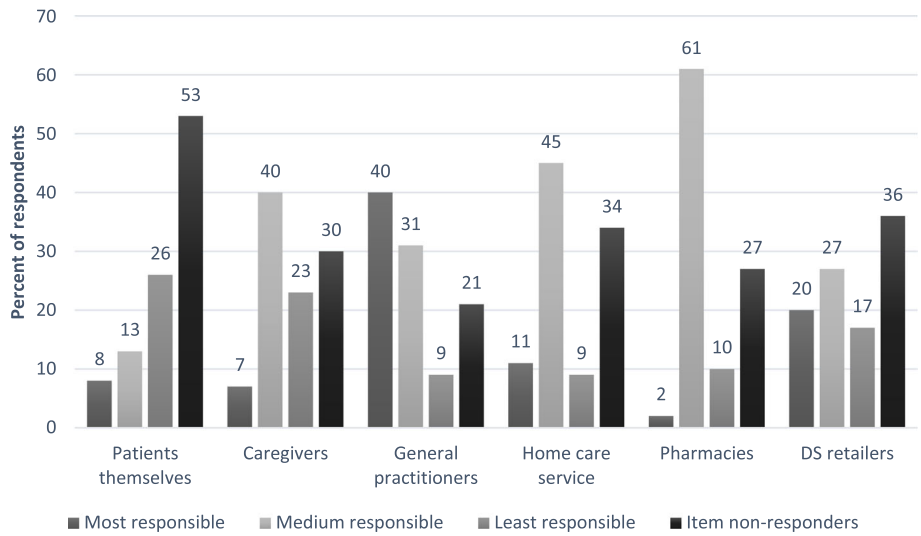

Fig. 2 The employees' ranking of responsibility for the safety of persons with dementia who use dietary supplements. The employees were given six options addressing the question "Where should the responsibility for the safe use of DS by persons with dementia be placed?" Respondents were asked to rank the six categories, resulting in a ranking scale from 1 to 6. We merged priorities 2–4 into a medium-level responsibility category and priorities 5–6 into a least-responsible category. DS retailers could be employees in health food stores, internet merchandisers, complementary and alternative medicine therapists, or others

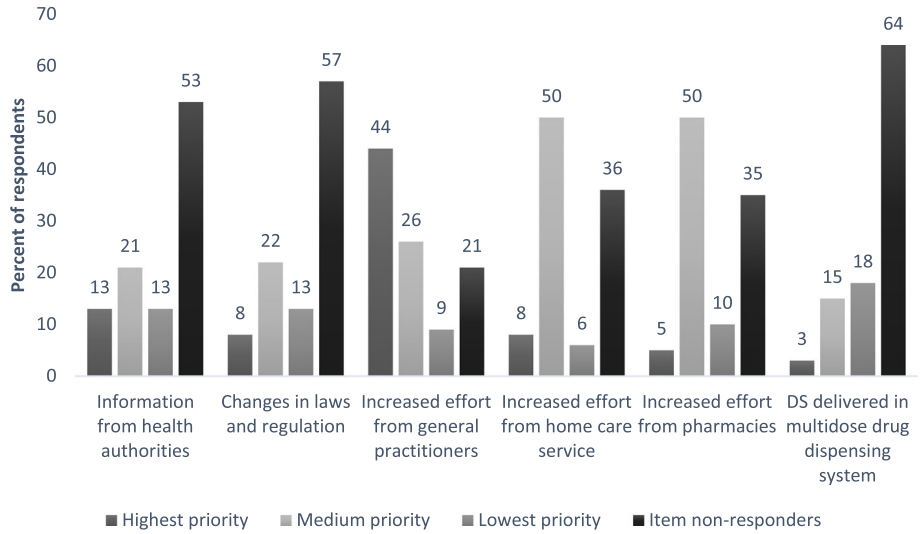

Fig. 3 Pharmacy employees' opinions on how to improve the safety of persons with dementia who use dietary supplements. DS, dietary supplements. The employees were given six alternatives on how to ensure the correct and safe use of DS. Respondents were asked to rank the six categories resulting in a ranking scale from 1 to 6. We merged priorities 2–4 into a medium-level priority category and priorities 5–6 into a lowest-priority category

Professional practice behaviors

Questions about DS and the availability of independent scientific information on DS

Most employees (96%, $n = 101$) had received questions about DS from customers in the pharmacy, including 11% ($n = 11$) daily and 39% ($n = 41$) weekly. Two of the respondents did not answer this question. There were no differences between pharmacists and pharmacy technicians. Eighty-one percent ($n = 85$) had been asked to provide information about DS-products not sold in their pharmacy. One respondents did not answer this question. More pharmacists than pharmacy technicians received questions about DS not sold in the pharmacy (95% against 65%, $p < 0.001$). Twenty-seven percent ($n = 28$) would answer the question about DS not sold in the pharmacies. Eleven of the respondents did not answer this question. More pharmacists than pharmacy technicians provided information about DS not sold in their pharmacy ($\chi^2 = 10.784$ (2), $p = 0.005$)*. Five percent of respondents reported access to independent scientific information on all DS sold in their pharmacy, 20% had information on most products, and 30% had information on a few products. Forty-two percent did not have such information available. Three of the respondents did not answer this question. There was no difference between pharmacists and pharmacy technicians.

General safety procedures related to DS

Ninety percent of the pharmacy employees provided information on possible adverse events, including interactions (48% confirmed that they informed customers about potential adverse events, including interactions; 42% indicated that they did this sometimes). Additionally, 82% checked for interactions at least sometimes, while 16% did this as a routine (Table 2). More pharmacists than pharmacy technicians provided information on possible adverse events and asked about the co-use of DS and PD, but there was no difference in checking for interactions. A minority of the respondents (14 pharmacy technicians and 25 pharmacists) answered the question about which sources they used to check for interactions. Among pharmacy technicians, five asked pharmacists to perform the interaction analysis, five analyzed it themselves with the help of various Norwegian databases, and four sometimes checked themselves and sometimes asked a pharmacist to check. Most pharmacists used various internet sources, mainly webpages organized by official health authorities, e.g., relis.no (the official web page of the Norwegian Pharmacovigilance centers. These centers are run by Norwegian Health Authorities. Relis.no answers questions about adverse events and interactions from PD and DS). One pharmacists used only the product-dependent medication information leaflet. We found no difference in safety procedures depending on the employees' attitudes toward DS. Believing that DS have no negative effects was not associated with less thorough safety routines, specifically, performing interaction analyses ($p = 0.328$), asking about the co-use of DS when dispensing PD ($p = 0.374$), asking about the co-use of PD when selling DS ($\chi^2 = 3.86(6)$, $p = 0.526$)* and informing about adverse events including interactions ($p = 0.344$). Statistics were performed using Fisher's exact test and chi square

Table 2 Pharmacy employees' professional practice behaviors related to dietary supplements

	Pharmacists n = 57		Pharmacy technicians n = 48		Total n = 105		*p*-value
	n	%	n	%	n	%	
Give information on adverse events and possible interactions[a, b]							**0.022**
Yes	30	53	21	44	51	48	
Sometimes	26	46	18	38	44	42	
No	1	2	8	17	9	9	
Ask customers about PD use when selling DS[a, b]							**0.021**
Always	15	26	11	23	26	25	
Sometimes[c]	41	72	28	58	69	66	
Depending on the customers' health	9	16	0	0	9	9	
Depending on the type of DS	32	56	28	58	60	57	
Never	1	2	8	17	9	8	
Ask customers about DS use when dispensing PD[a, d]							**0.002**
Always	0	0	2	4	2	2	
Sometimes	32	56	12	25	44	42	
Never	24	42	33	69	57	54	
Routinely check for interactions between DS and PD[e, f]							0.409
Always	7	12	10	21	17	16	
Sometimes[f]	40	70	28	58	68	65	
In certain patients groups	12	21	3	6	15	14	
For certain DS	34	60	18	38	52	50	
For certain PD	16	28	17	35	33	31	
Never	10	18	7	15	17	16	

DS dietary supplements, *PD* prescription drugs
Pharmacists include employees with bachelor's or master's degree in pharmacy. Pharmacy technicians include employees with other educational backgrounds, mainly pharmacy technicians (upper secondary school)
[a]Statistics are from Fisher's exact test. The answers always, sometimes and never are included
[b]Data for one employee are missing
[c]Respondents who confirmed that they asked customers about PD when selling *DS* depending on the customers' health or depending on the type of DS were merged into the category "Sometimes"
[d] Data for two employees are missing
e Data for three employees are missing
[f]Statistics are from the chi-square test
[g]It was possible to give more than one answer to this question. Respondents who confirmed that they checked for interactions in one or more of the following cases: certain patient groups, for certain DS or for certain PD, were merged into the category "Sometimes"
Significant comparisons are printed in bold

test*. The same categories were tested as in Table 2 (that is, yes, no, and sometimes).

Professional experience with customers with dementia, both in general and related to DS

Fifty-three percent ($n = 56$) had experienced customers who were unable to understand important pharmaceutical information because of cognitive problems; 26% ($n = 27$) were uncertain, while 21% ($n = 22$) had never been in this situation. More pharmacists than pharmacy technicians had experienced this situation ($\chi^2 = 9.685(2)$, $p = 0.008$)*. The open-ended question about routines for handling communication problems was answered by 54 respondents, of which 31 reported that their pharmacy lacked routines to handle this type of communication problem. The respondents mentioned the following three interventions (in decreasing frequency): making contact with the caregiver/GP/home care service, oral or written information given to the person with dementia, and taking the initiative for the client/person with dementia to have his or her medication dispensed by the home care service in the multi-drug-dispensing system (mentioned only by two respondents). Ten of the 31 respondents who stated that their pharmacy lacked a routine, mentioned interventions that had taken place in their pharmacy. Six percent of the employees had received education on counselling persons with dementia. Three respondents did not answer this question. When asked in which context the respondents had received dementia education, only six respondents who had received such

education answered this question, two of whom had received this training during nursing education and one during five years of employment at a dementia department of a nursing home. The rest stated that they received this education during their professional education without further specification.

Eight percent ($n = 8$) of the employees (seven pharmacists and one pharmacy technicians) had experienced persons with dementia with unsafe use of DS. When asked "How do you act professionally when you discover such a problem", only five respondents answered the question, one contacted the caregivers, and the others tried to inform the persons with dementia more thoroughly about the hazards and encouraged them to contact their GPs. Statistics were performed using chi square test*.

Discussion

Interpretation of the results

This study revealed that the pharmacy employees had a rather conservative attitude toward the use of DS. A minority of the respondents (9%) believed DS to be effective against dementia; a majority (59%) agreed that DS could cause harm. One-third of the respondents (37%) were DS users themselves. We have not found other studies addressing the question of the effectiveness of DS against dementia, but the proportion of pharmacists who agree with the general statement that most DS/herbs/natural products are clinically effective has been found to vary from 19 to 48% [20, 26]. Our results regarding perceived health risks are in line with those of a systematic review reporting that 50% of pharmacists believed DS to have potentially harmful effects [20]. Interestingly, even though some employees did not think that DS could have negative effects, this attitude did not seem to influence their counselling or safety procedures.

Previous studies have reported past or current DS use by 53–66% of pharmacists [26–28]. In line with the results of other studies, our results confirm that personnel who use DS themselves more often recommend DS to their customers [26, 27] possibly due to a generally more positive attitude toward DS among self-users [27]. Other studies have suggested that 40–91% of pharmacists recommend DS to customers [20, 26, 27]. These studies do not specify whether the recommendations were unprompted or resulted from customers' requests, except in one study where 38% of the pharmacists recommended DS unprompted [26], which is comparable to our findings (35%). The most common reason for recommending DS among our respondents was an assumed documented effect. The most common reasons for not recommending were lack of knowledge of DS and fear of interactions between DS and PD, in line with the results of a previous qualitative study [29]. We find it reassuring that upselling was an uncommon reason for recommending DS.

Studies have identified potentially clinically relevant interactions between DS and PD in persons with dementia [6, 12]. Together with a lack of help with DS administration [12], these interactions indicates that at least some persons with dementia might be exposed to health risk (e.g., overdose and adverse effects) because of their DS use. Previous studies have highlighted the need for pharmacists to routinely document, monitor and inquire about customers' use of DS [20]. Our results showed that pharmacy employees perceive themselves and home care service employees as contributors to safeguarding the use of DS by persons with dementia, but pharmacy employees suggest that GPs should be the main responsible care-taker in maintaining patient safety. Eight percent had experienced unsafe use of DS among customers with dementia. This finding might indicate that unsafe use is an infrequent problem, or that pharmacy employees do not possess the means necessary to identify such problems. Necessary means would include knowledge of dementia and resources for proper counselling, including routines for identifying problematic use.

First, pharmacy employees might have limited knowledge of dementia. Studies investigating general knowledge of dementia among pharmacists and final year pharmacy students have indicated potential for improvements in knowledge of risk factors, caregiving issues and the pharmacological management of Alzheimer's disease [30]. We did not measure the level of knowledge of dementia as such but did notice that the respondents stated that they had not been educated on counselling persons with dementia.

Second, our study suggests a lack of resources and routines for counselling persons with dementia on their use of DS. Norwegian pharmacies do not have access to medical records, which limits the possibility of identifying users' dementia disease. Even if employees are aware of customers' cognitive problems, they are unlikely to have knowledge on DS use and the conditions of such use unless they specifically ask about it. As the majority of persons with dementia buy their DS from health food shops or on the internet [12], it is difficult to intercept their DS use at the pharmacy. Additionally, as impaired insight is a common feature of dementia, the persons themselves might say the use is unproblematic when in fact it is not. Not being fully informed about DS use makes interaction analyses uncertain. Our results suggest shortcomings in employees' safety routines, as only 2% routinely asked about the co-use of DS when dispensing PD and only a minority would provide information about DS bought outside the pharmacy. Moreover, as shown by others, pharmacy employees lack independent scientific information on most of the DS

sold in their pharmacies [26], which may influence their motivation to take on the responsibility [19]. Formulating legislation to clarify the legal and professional role of pharmacists with respect to DS could make it easier to take on the responsibility [31].

Our results suggest that pharmacy technicians have less stringent procedures than pharmacists, as they inquire about the co-use of DS and PD less often. They also inform patients less often about side effects and about DS-products not sold in the pharmacy. This fact is important, as pharmacy technicians receive questions about DS as often as pharmacists. Persons with dementia and their caregivers are more likely to purchase DS from a pharmacy technician than from a pharmacist because there are as many pharmacy technicians as pharmacists in Norwegian pharmacies, and pharmacy technicians sell more over-the-counter products while pharmacists work more with prescriptions. The difference in professional practice behaviors between pharmacists and pharmacy technicians demonstrated here and in one other study [22] might be explained by higher knowledge level regarding PD and DS among pharmacists due to different education levels. It could also reflect a more strongly perceived professional responsibility among pharmacists to give evidence-based advice [32]. Only a minority of pharmacy technicians agreed with the statement that DS can cause harm to health. We have not, as mentioned earlier, shown any connection between this belief and the presence of less strict safety routines.

Compared with increased effort from health personnel, the remaining measures suggested to ensure safe use of DS by persons with dementia were less popular. These included changes in laws and regulations, information from health authorities and dispensing DS in a multi-dose drug-dispensing system (drug-dispensing system). Few respondents were positive toward including DS in a drug-dispensing system. One explanation could be that the employees do not consider the reconciliation of DS to be feasible, either due to a lack of studies testing DS safety [33], lack of independent scientific information [34], or other reasons. In addition, some products, such as transparent tablets, large tablets, oral lyophilisates, tablets with a short shelf-life and tablets that cannot be stored at room temperature, are excluded from the drug-dispensing system because of technical limitations (Annette Vik Jøsendal, Apotek 1, personal communication). However, this is true for PD as well as DS.

As mentioned earlier, only a minority of pharmacy employees considered actions outside the primary health-care system to be important. Changes in laws and regulations could enforce control over the content of DS products and regulate both DS retailers' and health-care personnel's professional conduct more thoroughly, including the provision of clear lines of responsibility. However, enforcement would also require increased resources. Information campaigns from health authorities might be less effective due to difficulties in reaching persons with dementia.

Methodological considerations

We included pharmacy employees using minimal exclusion criteria to maintain external validity. The response rate was adequate compared with those in similar studies [20], but the limited number of respondents may weaken the study power and generalizability. The study population is representative of the Norwegian setting in terms of the gender distribution [23]. However, employees with a pharmacy degree were overrepresented. Our study population comprised 32% master's degrees, 22% bachelor's degrees, and 46% technicians (including others), while the national distribution is (by Des 2017) 25% master's degrees, 19% bachelor's degrees, and 56% pharmacy technicians (including others) [23]. Our demographic findings are comparable to those of other surveys among Norwegian pharmacy employees performed in different geographical areas [35, 36]. Considering this potential limitation, the study findings may be generalizable to pharmacy employees in other countries with similar health-care systems, pharmacies and education programs, particularly Swedish and Finnish pharmacies, which also employ bachelor pharmacists [37]. Few studies have evaluated the use of DS by the Norwegian general population, but available data indicate higher use among Scandinavian women than in women from southern Europe [38]. A report from the Norwegian Food Authority found that 500 Norwegian respondents use an average of 3.7 DS. As an average for the Nordic countries, the respondents used 3.6 different products [39]. We believe, however, that the question regarding pharmacy employees' professional conduct and responsibility toward customers with dementia who buy DS is relevant from a global perspective.

Even though we provided written information stating how we defined DS of interest, we cannot determine if the definition was clear to all employees. Similarly, we do not know if all employees shared a common interpretation of the word dementia, since we did not give a specific definition.

Few respondents answered the question on how the safety of persons with dementia who use DS could be improved. The reason could be that they disagreed with the need for improvement, and this answer should have been included as a possible response. Another reason could be that they found the ranking difficult. Further specification of the options "Information from health authorities to the general population", and "Changes in laws and regulations concerning DS" should also have

been provided for clarity, such as "Information from health authorities to the general population about DS" and "Changes in laws and regulations concerning DS (indicates increased control of the DS content, such as increased testing for toxic effects, because DS currently has less strict safety routines than PD). Further specification might have increased the response rate to these questions and increased the certainty of the respondents about their answers. Regarding the option "increased effort from the home care service", we could also have been more specific. A suggested specification regarding this question could have been, "If the home care service discovers unsafe use of DS by persons with dementia, they should convey this information to the GP or pharmacy". The question about work length, used to describe the study-population, had wording that might have led to uncertainty among respondents who had worked exactly 16 years. The response rate to this question was 100%, so this uncertainty did not stop respondents from answering. Twenty-nine percent of the pharmacy technicians answered that they routinely informed patients/customers about DS when dispensing PD. This question should have been posed to pharmacists only, as both dispensing PD and asking about co-use of other products are the pharmacist's duties after the technician has prepared the prescription. Based on our experience from pharmacy practice, we believe that communication about co-use would have taken place in close cooperation with a pharmacist. We also think the proportion who answered yes was very high in both groups; two technicians even said they always asked, which suggests some level of "eager to please" bias. The question "Do you supply information on adverse events from DS including possible interactions?" was provided with the options yes, no, and sometimes. A further specification concerning when to answer yes or sometimes was not provided, which could have led to inconsistent responses. However, when the option yes is provided as a different response to sometimes, it implies a regular intervention. The response rate was 99% to this question, as one respondent did not answer. The main difference between pharmacists and pharmacy technicians was that more pharmacy technicians answered no to this question.

The study design made it necessary for the participants to answer electronically. This could have induced some obstacles to participation; however, it was possible to answer by using the pharmacy's computer, so it was not necessary to possess a personal computer to participate.

Implications and future research

Currently, there is a focus on dementia-friendly pharmacies and the special needs of persons with cognitive problems [40]. We recommend clearly defined routines to handle communication problems and to make existing routines known to all employees. The focus on safe sale of DS in general should be improved. Frequent assessments of potential interactions and routine inquiries about DS, whether or not they are bought in the pharmacy, are needed, as well as adequate independent scientific information on all products sold in the pharmacy. If pharmacies were to initiate actions to improve these measures, a longitudinal study of the effect of such an intervention would be recommended.

We believe that multidisciplinary collaboration among pharmacists, GPs, home care service employees and caregivers can ensure the safe use of DS by persons who are incapable of handling the use themselves due to dementia. First, the use needs to be identified. Second, it is important to assess interactions between DS and PD and potential adverse reactions. Third, the team needs to consider the health benefits of using DS and recommend use or discontinuation. If use is to be continued, it is important to plan for safe administration, for instance administration by the home care service. In all steps, the involvement of the patients or caregivers is recommended.

Conclusion

The pharmacy employees showed a conservative attitude toward DS in general and had limited experience with problematic DS use among persons with dementia. They did not rate themselves as primarily responsible for the safety of persons with dementia who use DS. Contributing factors to this view may be the lack of independent scientific information on DS product, limited information on customers' medical conditions and limited knowledge on how to communicate with persons with dementia. The roles and responsibilities concerning the safety of persons with dementia using DS need to be clearly defined. We suggest collaborations between the pharmacy and the GP that preferably include home care services and caregivers.

Additional file

Additional files 1: Questionnaire. Translated questionnaire answered by the respondents. (DOCX 52 kb)

Abbreviations

ADL: Activities of daily living; DS: Dietary supplement; GP: General practitioner; PD: Prescription drug

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Authors' contributions

HR was responsible for the collection and analysis of data. She also contributed to the design of the questionnaire, the interpretation of the data, the writing and the approval of the manuscript, and is responsible for the research idea. FM contributed to the research idea, the design of the questionnaire, the interpretation of the data, the writing and the approval of the manuscript. KHH contributed to the analyses of the data. He also contributed to the design of the questionnaire, the interpretation of the data, the writing and the approval of the manuscript. TG contributed to the design of the questionnaire, the interpretation of the data, the writing and the approval of the manuscript. MW contributed to the design of the questionnaire, the interpretation of the data, the writing of the manuscript and had the main responsibility for the approval of the manuscript. HR, FM, KHH, TG and MW contributed significantly to the work, read and approved the manuscript, attested to the validity and legitimacy of the data and its interpretation, and agreed to the submission of the manuscript to *BMC Complementary and Alternative Medicine*. All authors read and approved the final manuscript.

Authors' information

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Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Ethics approval and consent to participate

The Regional Committee for Medical and Health Research Ethics presented no objections to the study design (2014/1385). As no patients were included, the project was defined as quality assurance. The survey did not collect personally identifiable information and therefore was not accountable to the Norwegian Data Protection Agency. All participants were given written information about the study and informed that submitting the questionnaire was considered to be study consent.

Consent for publication

Not applicable.

Competing interests

None of the authors has any conflict of interest to claim.

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References

1. Services USDoHH. Dietary Supplement Health and Education Act of 1994. Public Law No. 103-417.Paragraph 3a.1994. https://ods.od.nih.gov/About/DSHEA_Wording.aspx.
2. Djuv A, Nilsen OG, Steinsbekk A. The co-use of conventional drugs and herbs among patients in Norwegian general practice: a cross-sectional study. BMC Complement Altern Med. 2013;13:295. https://doi.org/10.1186/1472-6882-13-295.
3. Garcia-Alvarez A, Egan B, de Klein S, Dima L, Maggi FM, Isoniemi M, Ribas-Barba L, Raats MM, Meissner EM, Badea M, et al. Usage of plant food supplements across six European countries: findings from the PlantLIBRA consumer survey. PLoS One. 2014;9(3):e92265. https://doi.org/10.1371/journal.pone.0092265.
4. Starr RR. Too little, too late: ineffective regulation of dietary supplements in the United States. Am J Public Health. 2015;105(3):478–85. https://doi.org/10.2105/ajph.2014.302348.
5. Bello N, Winit-Watjana W, Baqir W, McGarry K. Disclosure and adverse effects of complementary and alternative medicine used by hospitalized patients in the north east of England. Pharm Pract (Granada). 2012;10(3):125–35. https://doi.org/10.4321/s1886-36552012000300002.
6. Dergal JM, Gold JL, Laxer DA, Lee MS, Binns MA, Lanctot KL, Freedman M, Rochon PA. Potential interactions between herbal medicines and conventional drug therapies used by older adults attending a memory clinic. Drugs Aging. 2002;19(11):879–86. https://doi.org/10.2165/00002512-200219110-00005.
7. Kupiec T, Raj V. Fatal seizures due to potential herb-drug interactions with Ginkgo biloba. J Anal Toxicol. 2005;29(7):755–8. https://doi.org/10.1093/jat/29.7.755.
8. Winblad B, Amouyel P, Andrieu S, Ballard C, Brayne C, Brodaty H, Cedazo-Minguez A, Dubois B, Edvardsson D, Feldman H, et al. Defeating Alzheimer's disease and other dementias: a priority for European science and society. Lancet Neurol. 2016;15(5):455–532. https://doi.org/10.1016/s1474-4422(16)00062-4.
9. Persson T, Popescu BO, Cedazo-Minguez A. Oxidative stress in Alzheimer's disease: why did antioxidant therapy fail. Oxidative Med Cell Longev. 2014;2014:427318. https://doi.org/10.1155/2014/427318.
10. Dangour AD, Andreeva VA, Sydenham E, Uauy R. Omega 3 fatty acids and cognitive health in older people. Br J Nutr. 2012;107(Suppl 2):S152–8. https://doi.org/10.1017/s0007114512001547.
11. Landin J, Frolich L, Schwarz S. Use of alternative therapies in patients with dementia and mild cognitive impairment: a prospective, controlled study. Int J Geriatr Psychiatry. 2008;23(11):1163–5. https://doi.org/10.1002/gps.2046.
12. Risvoll H, Giverhaug T, Halvorsen KH, Waaseth M, Musial F. Direct and indirect risk associated with the use of dietary supplements among persons with dementia in a Norwegian memory clinic. BMC Complement Altern Med. 2017;17(1):261. https://doi.org/10.1186/s12906-017-1765-5.
13. Edersheim JG, Stern TA. Liability associated with prescribing medications. Prim Care Companion J Clin Psychiatry. 2009;11(3):115–9. https://doi.org/10.4088/PCC.08r00717.
14. Beauchamp TL, Childress J. Principles of biomedical ethichs. 6th edn: Oxford University Press; 2009.
15. Handels RLH, Skoldunger A, Bieber A, Edwards RT, Goncalves-Pereira M, Hopper L, Irving K, Jelley H, Kerpershoek L, Marques MJ, et al. Quality of life, care resource use, and costs of dementia in 8 European countries in a cross-sectional cohort of the Actifcare study. J Alzheimers Dis. 2018. https://doi.org/10.3233/jad-180275.
16. Coon SA, Stevens VW, Brown JE, Wolff SE, Wrobel MJ. Comparison of dietary supplement product knowledge and confidence between pharmacists and health food store employees. J Am Pharm Assoc (2003). 2015;55(2):161–8. https://doi.org/10.1331/JAPhA.2015.14071.
17. Mørk E. Seniorer i Norge 2010/Seniors in Norway 2010 (Report in Norwegian with English abstract). Statistics Norway. 2011. https://www.ssb.no/sosiale-forhold-og-kriminalitet/artikler-og-publikasjoner/_attachment/157022?_ts=14370df7000. Accessed:21 Nov 2018.

18. Waaseth M, Eggen AE, Grimsgaard S. Natural remedies in Scandinavia-authorization and sales. Pharm World Sci. 2007;29(3):137–45. https://doi.org/10.1007/s11096-006-9033-7.
19. Boon H, Hirschkorn K, Griener G, Cali M. The ethics of dietary supplements and natural health products in pharmacy practice: a systematic documentary analysis. Int J Pharm Pract. 2009;17(1):31–8. https://doi.org/10.1211/ijpp.17.1.0005.
20. Kwan D, Hirschkorn K, Boon H. U.S. and Canadian pharmacists' attitudes, knowledge, and professional practice behaviors toward dietary supplements: a systematic review. BMC Complement Altern Med. 2006;6:31. https://doi.org/10.1186/1472-6882-6-31.
21. Waddington F, Naunton M, Kyle G, Thomas J, Cooper G, Waddington A. A systematic review of community pharmacist therapeutic knowledge of dietary supplements. Int J Clin Pharm. 2015;37(3):439–46. https://doi.org/10.1007/s11096-015-0092-5.
22. Jordan MA, Foster K, Gandhi A, Mohebbi N, Tehrani L. Assessment of herbal weight loss supplement counseling provided to patients by pharmacists and nonpharmacists in community settings. J Am Pharm Assoc. 2011;51(4):499–509. https://doi.org/10.1331/JAPhA.2011.09233.
23. Trained healthcare professionals. Key figures: Pharmacies and pharmaceuticals in Norway. The Norwegian Pharmacy Union. The Norwegian Pharmacy Union (Apotekerforeningen). 2018. [https://www.apotek.no/in-english/education]. Accessed:10 Sept 2018.
24. Barry HE, Parsons C, Passmore P, Hughes CM. Community pharmacists and people with dementia: a cross-sectional survey exploring experiences, attitudes, and knowledge of pain and its management. Int J Geriatr Psychiatry. 2013;28(10):1077–85. https://doi.org/10.1002/gps.3931.
25. Johnell K, Fastbom J. Multi-dose drug dispensing and inappropriate drug use: a nationwide register-based study of over 700 000 elderly. Scand J Prim Health Care. 2008;26(2):86–91. https://doi.org/10.1080/02813430802022196.
26. Welna EM, Hadsall RS, Schommer JC. Pharmacists' personal use, professional practice behaviors, and perceptions regarding herbal and other natural products. J Am Pharm Assoc. 2003;43(5):602–11. https://doi.org/10.1331/154434503322452247.
27. Howard N, Tsourounis C, Kapusnik-Uner J. Dietary supplement survey of pharmacists: personal and professional practices. J Altern Complement Med. 2001;7(6):667–80. https://doi.org/10.1089/10755530152755225.
28. Gardiner P, Woods C, Kemper KJ. Dietary supplement use among health care professionals enrolled in an online curriculum on herbs and dietary supplements. BMC Complement Altern Med. 2006;6:21. https://doi.org/10.1186/1472-6882-6-21.
29. Culverhouse SE, Wohlmuth H. Factors affecting pharmacists' recommendation of complementary medicines - a qualitative pilot study of Australian pharmacists. BMC Complement Altern Med. 2012;12:183. https://doi.org/10.1186/1472-6882-12-183.
30. Zerafa N, Scerri C. Knowledge and pharmacological management of Alzheimer's disease by managing community pharmacists: a nationwide study. Int J Clin Pharm. 2016;38(6):1416–24. https://doi.org/10.1007/s11096-016-0380-8.
31. Song M, Ung CO, Lee VW, Hu Y, Zhao J, Li P, Hu H. Community pharmacists' perceptions about pharmaceutical service of over-the-counter traditional Chinese medicine: a survey study in Harbin of China. BMC Complement Altern Med. 2017;17(1):9. https://doi.org/10.1186/s12906-016-1532-z.
32. Braund R, Chesney KM, Keast EP, Ng LJ, Qi S, Samaranayaka S, Wang E. Are all pharmacy staff interested in potential future roles? Int J Pharm Pract. 2012;20(6):417–21. https://doi.org/10.1111/j.2042-7174.2012.00216.x.
33. Shaw D, Ladds G, Duez P, Williamson E, Chan K. Pharmacovigilance of herbal medicine. J Ethnopharmacol. 2012;140(3):513–8. https://doi.org/10.1016/j.jep.2012.01.051.
34. Raynor DK, Dickinson R, Knapp P, Long AF, Nicolson DJ. Buyer beware? Does the information provided with herbal products available over the counter enable safe use? BMC Med. 2011;9:94. https://doi.org/10.1186/1741-7015-9-94.
35. Driesenaar JA, De Smet PA, van Hulten R, Horne R, Zwikker H, van den Bemt B, van Dulmen S. Beliefs about inhaled corticosteroids: comparison of community pharmacists, pharmacy technicians and patients with asthma. J Asthma. 2016;53(10):1051–8. https://doi.org/10.1080/02770903.2016.1180696.
36. Morken T, Fossum S, Horn AM, Granas AG. Self-efficacy in counseling in Norwegian chain pharmacies: a cross-sectional study. Res Social Adm Pharm. 2008;4(4):375–83. https://doi.org/10.1016/j.sapharm.2008.03.001.
37. Ansatte i apotek i Norden/Employees in pharmacies in the Nordic countries (web page in Norwegian). The Norwegian pharmacy Union (Apotekerforeningen). The Norwegian pharmacy Union (Apotekerforeningen). 2018. [https://www.apotek.no/Files/Filer_2014/Engelske_sider/Pharmacies%20and%20prescriptions%20-%20%20Key%20Figures%202017.pdf]. Accessed 10 Sept 2018.
38. Skeie G, Braaten T, Hjartaker A, Lentjes M, Amiano P, Jakszyn P, Pala V, Palanca A, Niekerk EM, Verhagen H, et al. Use of dietary supplements in the European prospective investigation into Cancer and nutrition calibration study. Eur J Clin Nutr. 2009;63(Suppl 4):S226–38. https://doi.org/10.1038/ejcn.2009.83.
39. Danielsen S, Ekrol PS. Food supplements in the Nordic countries. The Norwegian Food Authorities. 2009. https://www.mattilsynet.no/mat_og_vann/spesialmat_og_kosttilskudd/kosttilskudd/food_supplements_in_the_nordic_countries__results_from_survey_among_consumers.4137/binary/Food%20supplements%20in%20the%20Nordic%20countries%20-%20results%20from%20survey%20among%20consumers. Accessed: 11.11.18.
40. Gilmartin-Thomas JF, Orlu M, Alsaeed D, Donovan B. Using public engagement and consultation to inform the development of ageing- and dementia-friendly pharmacies - innovative practice. Dementia (London). 2017:1471301217725896. https://doi.org/10.1177/1471301217725896.

Publisher's Note

Questionnaire

Translated version, full questionnaire. Questions included in the manuscript are marked by asterisk (*)

* 1. Gender?
    a. Male
    b. Female
* 2. How long have you worked in a pharmacy?
    a. Less than one year
    b. 1-5 years
    c. 6-15 years
    d. More than 16 years
* 3. What is your educational background?
    a. Pharmacist, master's degree
    b. Pharmacist, bachelor's degree
    c. Pharmacy technicians
    d. Other
* 4. Do you believe some DS might have effect against dementia (symptomatic or prophylactic)?
    a. Yes
    b. No
    c. I do not know
* 5. If yes; which DS products do you believe might have effect?

    Open-ended question

* 6. Do you currently use DS or have you used DS in the past?
    a. Yes
    b. No
  7. If yes; which DS do you use, or have you used in the past?

    Open-ended question

* 8. Have you experienced pharmacy customers who do not understand important pharmaceutical information due to dementia?
    a. Yes
    b. No
    c. Uncertain
* 9. If yes, does your pharmacy have routines or a common practice to handle this? Please, specify.

    Open-ended question

* 10. Are you aware of pharmacy customers whom you fear have unsafe use of DS due to dementia?
    a. Yes
    b. No
* 11. If yes; how do you act professionally when you discover such a problem?

Open-ended question

* 12. Have you received education on counselling with persons with dementia?
    a. Yes
    b. No
* 13. If yes, specify in which context you received this education

Open-ended question

* 14. Where should the responsibility for the safe use of DS by persons with dementia be placed? It is possible to choose more than one answer. Prioritize the alternatives.
    a. The person with dementia him/her-self
    b. The caregivers
    c. The DS retailer(health food stores, internet merchandisers or complementary and alternative medicine therapists et cetera)
    d. The pharmacy
    e. The GP
    f. Home care service
* 15. Do you think GPs or pharmacists should be responsible for routinely checking for DS-PD interactions in persons with dementia who use DS?
    a. GPs
    b. Pharmacists
* 16. How often do you receive questions about DS?
    a. Daily
    b. Weekly
    c. Monthly
    d. Less often than monthly
    e. Never
* 17. Are you asked to provide information about DS-products not sold in your pharmacy?
    a. Yes
    b. No

If the answer is no, the respondents should go directly to Question 19.

* 18. If yes, do you provide information on DS-products not sold at your pharmacy?
    a. Yes
    b. No
19. Does yours pharmacy upsell DS as a routine?
    a. Yes
    b. No
* 20. Does your pharmacy check for PD-DS interactions as a routine when selling DS? It is possible to choose more than one alternative.
    a. Yes, always
    b. Yes, but only for certain DS
    c. Yes, but only for certain PD
    d. Yes, but only in certain patients groups
    e. No
21. If a customer wants to buy DS, do ask about intended use?
    a. Yes
    b. No

c. Sometimes

* 22. Do you routinely ask customers about DS use when dispensing PD?
    a. Yes
    b. In certain cases
    c. No
* 23. Do you sometimes recommend DS to customers unprompted?
    a. Yes
    b. No

If the answer is yes, the respondent should continue to Question 24 and skip Question 25. If the answer is no, the respondents should go directly to Question 25.

* 24. If yes, which criteria are your recommendation based on? (It is possible to choose more than one reason).
    a. The DS has a documented beneficial effect
    b. A belief that DS would *cure or give symptomatic relief*
    c. A belief the customer wants to buy DS
    d. A belief that the product is harmless.
    e. The pharmacy's upselling policy
* 25. If no, why not? (it is possible to choose more than one reason)
    a. Insufficient knowledge about DS
    b. Do not believe DS to have positive effect
    c. Fear adverse events
    d. Fear interactions with PD
* 26. Do you give information on adverse events from DS including possible interactions?
    a. Yes
    b. No
    c. Sometimes
* 27. Independently of your pharmacy's routines, do you ask customers about PD use when selling DS?
    a. Yes, always
    b. Only when I find there is a reason to do so because of the customer's health
    c. Only for certain types of DS
    d. No

If the answer is no, the respondents should go directly to Question 29.

* 28. If you do ask, do you also check for potential interactions? If you do, which sources do you use for checking?

Open-ended question

⁑ 29. Which option is best to ensure the correct and safe use of DS in persons with dementia? You can choose more than one alternative, prioritize your choices

a. Information from health authorities to the general population

b. Changes in laws and regulations concerning DS

c. Increased effort from GPs (ask all patients about use of DS and check for adverse events and interactions)

d. Increased effort from home care services (convey information about the use of DS to GPs or pharmacists)

e. Increased effort from pharmacies (check for interactions for all customers who buy DS, inform GPs)

f. DS delivered in multidose drug-dispensing systems together with PD

30. What is your most important sources of information about DS? It is possible to choose more than one option.

a. Textbooks, scientific publications

b. From family and friends

c. Web pages recommended by Norwegian health authorities and pharmaceutical research environments

d. Courses on DS (post-school training/post-qualifying education)

e. My professional education

f. Product information/leaflets

g. Media and magazines

31. If you have participated in courses on DS, who were responsible for this education. Were the goal of this education to increase upselling?

∗ *32.* Does your pharmacy provide access to independent scientific information on the DS sold in your pharmacy?

a. Yes, on all DS sold in the pharmacy

b. On most products

c. On a few products

d. No

33. From which sources do you normally seek information about DS?

∗ *34.* Do you agree with this statement: “Use of DS may have potentially harmful effects to the users’ health”?

a. Yes

b. No

c. Do not know

35. Which of the following DS should not be taken together with Warfarin? You can choose more than one alternative

    a. Ginkgo biloba

    b. St John's wort

    c. Salvia officinalis

    d. Echinacea

Paper III

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ORIGINAL ARTICLE

Home care service employees' contribution to patient safety in clients with dementia who use dietary supplements: a Norwegian survey

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ABSTRACT

Objective: To explore home care services (HCS) employees' professional experiences with the use of dietary supplements (DSs) in their clients with dementia. We also investigated their attributed professional responsibility concerning this use and their attitudes toward DSs in general. Differences between nurses and nurse assistants were investigated.

Design: A cross-sectional survey with self-administered questionnaires.

Setting: Home care services in six Norwegian municipalities in the period August-December 2016.

Subjects: A total of 231 (64% response rate) HCS employees; 78 nurses and 153 nurse assistants (auxiliary nurses and employees without formal education).

Main outcome measures: Health care employees' experiences with patient safety in clients with dementia who use DSs.

Results: Fifty per cent were concerned that clients with dementia might harm their health due to DS use. Thirty-one per cent reported having intervened in order to reduce the risk. Seventy-one per cent preferred to administer DSs to clients with dementia rather than leaving this responsibility to the clients. The respondents placed the responsibility for patient safety in clients with dementia using DSs mainly with the general practitioners, while they ascribed themselves and pharmacies a medium level of responsibility. There were only minor difference between nurses and nurse assistants, and no difference in attitudes towards DSs.

Conclusion: Employees in HCS were concerned about the DS use in clients with dementia. Moreover, almost one-third had intervened to improve clients' patient safety. The majority indicated that HCS should administer DSs rather than the clients with dementia themselves.

KEY POINTS

To our knowledge, this is the first study investigating the role of home care services with regard to patient safety in clients with dementia who use dietary supplements (DSs).

- Home care service employees worried about patient safety related to DS use in clients with dementia.
- Home care service employees attributed to themselves medium responsibility to ensure the safe use of DSs in these clients.
- Lack of knowledge was the most important reason why home care service employees did not recommend DSs to clients.

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Introduction

Home care services assist community-dwelling persons (clients) in need of help with their prescription drugs (PDs), nutrition and personal hygiene [1,2]. In Norway, home care services is part of the social welfare system and is provided by local health authorities at the municipality level [3]. Home care service employees have different educational qualifications, some are nurses at the bachelor's level; however the majority of home care service employees have health-related education at the high school level (auxiliary nurses), and a few are assistants without formal education. All employees, including employees without former education, are allowed to administer PDs from an

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automated drug-dispensing system and from a pre-filled pill organizer to clients after being certified in the control and administration of medication (theoretical and practical education). Some advanced treatments are restricted to those with more education, but for the majority of clients, all types of employees perform the same tasks.

Cognitive impairment, including dementia, is a common reason for receiving assistance from home care services [4,5]. The term dementia covers several diseases that cause a progressive decline in cognitive function and reduce the ability to be self-sufficient in activities of daily living [6].

Up to 57% of persons with dementia use dietary supplements (DSs) [7–9]. The United States Dietary Supplements Health and Education Act (DSHEA) of 1994 defines a DS as a product meant to supplement the diet and includes vitamins, minerals, herbs, botanical products, amino acids, or dietary substances [10]. Generally, people use DSs to improve their health and wellbeing [11]. Although considered natural and safe by many, DSs can compromise health by causing adverse events and/or interact with ongoing PD treatment [12,13] and have also been associated with fatal outcomes [13]. Unapproved pharmaceutical drugs have been found in cognitive enhancement supplements [14]. No specific effect on dementia has been proven so far, even though some single studies may have shown promising results [15–18]. Clients with dementia are at particular risk because their cognitive problems may compromise the correct use of DSs and PDs [7]. Moreover, persons with dementia seldom disclose their DS use to health care personnel [9], leaving general practitioners (GPs) and other health care providers, such as home care services unaware of their use. Dementia symptoms reduce a person's ability to administer both PDs and DSs correctly, and these clients may therefore need help to administer their PDs [5] and DSs [7].

Home care service employees usually collaborate with GPs and pharmacists to secure safe use of PDs in their clients. In an earlier study, caregivers (next of kin) reported that although home care service employees often assisted clients with dementia with their PDs, they were seldom involved in administering DSs [7].

The aim of this study was to investigate home care service employees' professional practice, experiences with and knowledge of unsafe DS use in their clients with dementia, including their attitudes towards DSs in general. We also investigated their attribution of responsibility concerning DS use in their clients and investigated differences in professional practice and attitudes between nurses and nurse assistants.

Methods

Study population

We conducted a cross-sectional survey between August and December 2016. All home care service employees in six municipalities in Northern Norway were invited to participate. The municipality populations ranged from 1000 to 50,000 inhabitants. We included employees with a minimum of experience working with clients, and excluded employees on long-term sick leave (>8 weeks), employees working less than 40% of the full-time equivalent, employees on temporary employment of less than six months, and administrative personnel. We categorized the respondents into nurses (including social educators and other health-related education at bachelor's level), nurse assistants (including auxiliary nurses and other health-related education of three years of upper secondary school), and employees without formal education. In the analysis, we combined the latter category with nurse assistants after checking that this did not affect the analysis. The group without formal education was small, and we hypothesized that the largest difference, if any, would be between nurses and assistants in general.

Intermediate leaders assisted in the recruitment of respondents. The response rate was calculated based on the numbers of employees provided by these leaders.

The questionnaire was available both electronically (Questback formula, Questback AS, Oslo, Norway) and in paper format. The home care service employees received three reminders through their intermediate leaders. Figure 1 provides an overview of the study population and the recruitment process.

Questionnaire

We developed a questionnaire specifically for this study. The questionnaire included 31 questions and took 15–20 min to complete (see Supplementary material 1 (English translation)). A feasibility study testing the questionnaire was conducted by including 15 home care service employees working outside the study area.

The questions about the attribution of responsibilities and suggestions for improvements were ordinal. Respondents were asked to rank the six categories, resulting in a ranking scale from 1–6. We merged scores of 2–4 into a medium-level responsibility/medium preferred category and scores 5–6 into a least-responsibility/least preferred category. In the questionnaire, the term dietary supplements was supplied with natural remedies, but as the definition of

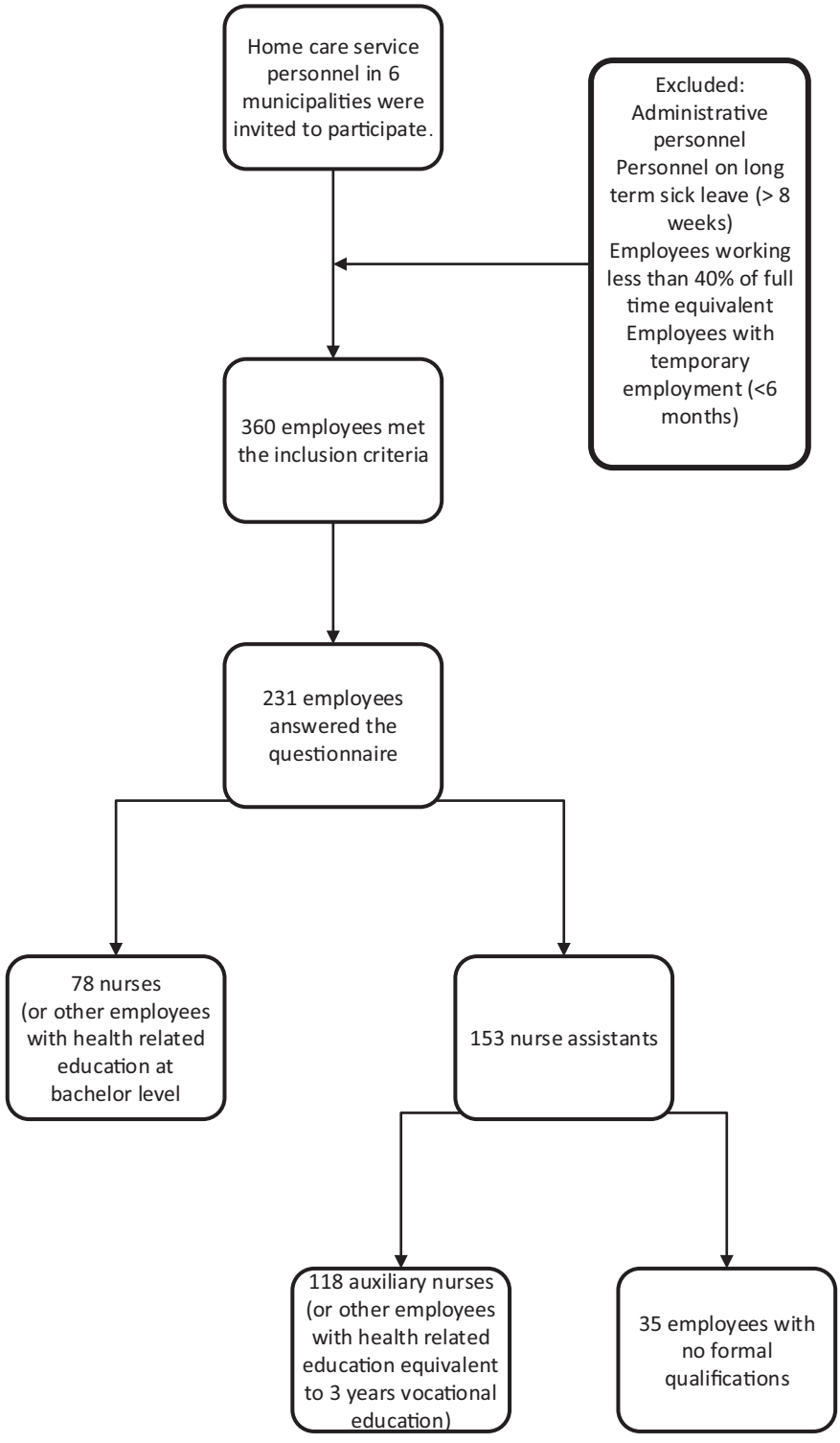

Figure 1. Study population and the recruitment process.

DS [10] includes all elements of natural remedies, we only use (the term) DS in the text.

Ethics

The Regional Committee for Medical and Health Research Ethics had no objections to the study design (2014/1385). The survey did not collect personally identifiable information and was therefore not accountable under the Norwegian Data Protection Agency. All participants were given written information about the study and informed that answering the questionnaire was considered study consent.

Statistics

We used IBM SPSS (Statistical Package for the Social Sciences) version 23.0 (IBM Corp., Armonk, NY, US) for the statistical analyses. Pearson's chi-square test or Fisher's exact test was applied to detect differences in categorical data. *P*-values <0.05 were considered statistically significant. Bonferroni correction was performed to correct for potential multiple testing.

Results

A total of 231 respondents answered the questionnaire, of whom 218 (94%) were women. The response rate was 64% (Figure 1). Seventy-eight (34%) of the respondents were nurses, and 153 (66%) were nurse assistants. Of the respondents, 91 (40%) had 0–5 years of working experience, 74 (32%) had 6–15 years, and 65 (28%) had more than 15 years. One respondent did not answer this question.

Regarding personal use, 143 respondents (62%) used DSs themselves. The majority of the respondents ($n = 172$, 75%) were uncertain whether some DSs could prevent or cure dementia symptoms, 23 (10%) believed some DSs could, and 31 (13%) considered DSs to have no such effects. Five respondents (2%) did not answer this question. The respondents considered the following DSs to be effective against dementia (in descending order): omega-3 fatty acids ($n = 9$) or fish liver oil ($n = 4$), vitamin B12 ($n = 4$), vitamin D ($n = 3$), coconut oil ($n = 2$), calcium ($n = 1$), folic acid ($n = 1$) lactic acid supplement ($n = 1$) and St. John's wort ($n = 1$). Four respondents indicated that vitamins and minerals could be effective without specifying which vitamins and/or minerals. As a response to the statement 'Some DSs may pose a threat to users' health', 134 respondents (58%) agreed, 15 (6%) disagreed, 73 (32%) were uncertain, and nine (4%) did not answer the question. Eighty (35%) respondents had recommended DSs to clients, of which 71 (31%) had recommended vitamins, 21 (9%) had recommended minerals and three (1%) had recommended herbs, 146 (63%) had not recommended DSs, and 5 (2%) did not answer the question. Among those who recommended DSs ($n = 80$), the following reasons were given: the recommended DS was believed to have scientifically documented effects ($n = 31$, 39%), the DS would not harm the client ($n = 15$, 19%) or the DS would cure or ease symptoms ($n = 7$, 9%). Among those who never had recommended DSs ($n = 146$), the most common reason was lack of knowledge about DSs ($n = 127$, 87%). Other reasons were concern about adverse events and DS-PD interactions ($n = 58$, 40%), recommending DSs was considered beyond their duty ($n = 50$, 34%), DSs were considered ineffective ($n = 5$, 3%) or the clients took enough pills already ($n = 4$, 3%). It was possible to choose more than one reason for recommending or not recommending DSs. There were no differences in reasons for recommending or not recommending DSs between nurses and nurse assistants and no other differences in attitudes between the subgroups (see Supplementary material 2). More employees with longer work experience had recommended DSs than those with less experience. There were no other differences associated with the duration of work experience (see Supplementary material 2).

Table 1 describes how often respondents experienced different professional concerns regarding DSs.

Respondents who had intervened to secure safe DS use by their clients with dementia ($n = 71$) reported which interventions they had performed (Table 2). Of those who had intervened, 59 answered the question about whether they would intervene again, 49 (83%) would (answers a and c, Supplementary material 1), and ten (17%) were more uncertain (answers b and d, Supplementary material 1). As a response to the question about the frequency of interventions, 55 respondents replied that they had intervened at least once (Table 1); however, examining the question about different types of interventions resulted in 71 respondents who reported at least one type of intervention (Table 2). The latter number is reported as the total number of respondents who reported any type of intervention.

Concerning who should administer DSs to clients with dementia, 164 respondents (71%) preferred that the home care services performed this service rather than leave the clients to manage by themselves, seven (3%) disagreed, 55 (24%) were uncertain, and five (2%) did not answer the question. To the question "In your opinion, how many of the clients have dementia? Their diagnosis do not need to be confirmed for you to answer", 88 (38%) answered 0–24%, 94 (41%) answered 25–49%, 37 (16%) answered 50–74% and seven (3%) answered 75–100%. Five respondents (2%) did not answer this question.

To the question of whether the employees knew where to find reliable (scientific) information about DSs specified in the questionnaire as 'not information from the manufacturer or information from magazines or newspapers et cetera', one-third of the respondents ($n = 74$) confirmed this. The remaining two-thirds either did not know ($n = 147$) or did not respond ($n = 10$). To obtain information or check whether

Table 1. Professional practice experience related to DS use by clients with dementia.

How often do you, as an employee in home care service,	Several times a week *n*	Weekly-monthly *n*	Monthly-bi-annually *n*	Bi-annually-annually *n*	Annually or less often *n*	Never *n*	Respondents with experience *n*	(%)	Differences between nurses and nurse assistants *p*	Cramer's *V*
Fear that clients might suffer harm due to their DS use $n = 213$	3	4	17	17	66	106	107	(50)	0.199	0.184
Experience that caregivers raise concern about clients' DS use $n = 222$	0	0	1	5	30	186	36	(16)	0.065	0.179
Consult caregivers concerning the safety of clients because of their DS use $n = 225$	0	0	2	9	29	185	40	(18)	0.009	0.229
Experience that clients consult you regarding their DS use $n = 227$	0	0	3	17	51	156	71	(31)	0.347	0.139
Observe DSs in the homes of clients $n = 226$	6	28	20	36	80	56	170	(75)	0.095	0.238
Intervene with clients' DS use to avoid harm to their health $n = 224$	0	0	1	9	45	169	55	(25)	**<0.001***	**0.304**

DS: dietary supplement. The nurse category may include social educators and other health-related education at bachelor's level. Nurse assistants include auxiliary nurses, other individuals with health-related education (three years of upper secondary school), and employees without formal education. Differences between nurses and nurse assistants were tested with Fisher's exact test. Bonferroni adjusted α was 0.05/6 resulting in $\alpha = 0.008$. Statistically significant differences between subgroups after adjustment are printed in bold and marked with *. A Cramer's $V > 0.1$ indicate a small effect size, a Cramer's $V > 0.3$ indicates a medium effect size.

Table 2. Interventions to increase the safety of clients with dementia who used DSs.

Interventions to increase safety	Respondents *n*	(%)	Level of education: Nurses *n*	Proportions of nurses who applied each intervention (%)	Nurse assistants *n*	Proportions of nurse assistants who applied each intervention (%)	Differences between nurses and nurse assistants *p*	*Phi*
Consulted GP $n = 71$	32	(45)	22	(28)	10	(7)	**<0.001***	**0.431**
Consulted pharmacy $n = 70$	10	(14)	9	(12)	1	(1)	**0.002***	**0.363**
Consulted caregiver $n = 71$	19	(27)	10	(13)	9	(6)	0.439	0.092
Asked caregiver to remove DSs $n = 70$	12	(17)	8	(10)	4	(3)	0.109	0.191
Took action to include DSs in automated drug-dispensing system $n = 70$	29	(41)	17	(22)	12	(8)	0.068	0.218
Discussed the problem with colleagues $n = 70$	35	(50)	10	(13)	25	(16)	**0.004***	**0.344**

GP: general practitioner; DS: dietary supplement. The nurse category may include social educators and other health-related education at bachelor's level. Nurse assistants include auxiliary nurses, other individuals with health-related education (three years of upper secondary school), and employees without formal education. Differences between subgroups were tested with Chi-square test. Bonferroni adjusted α was 0.05/6 resulting in $\alpha = 0.008$. Statistically significant differences between subgroups after adjustment are printed in bold and marked with *. A phi >0.1 indicates a small effect size, a phi >0.3 indicates a medium effect size.

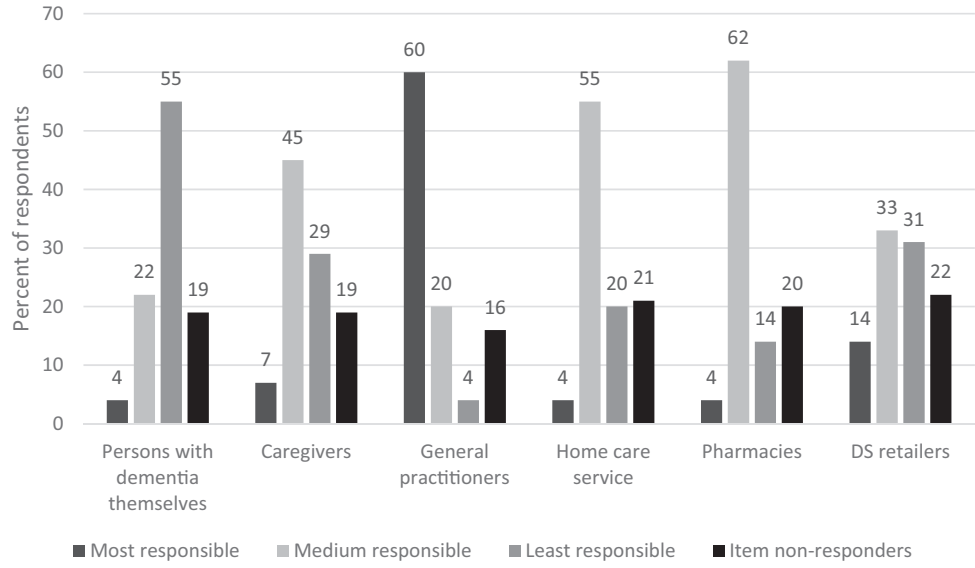

Figure 2. The respondents' ranking of responsibility for the safety of clients with dementia who use dietary supplements. DS: dietary supplement. DS retailers could be health food store staff, internet retailers, complementary and alternative medicine therapists, or others. For the question 'Where should the responsibility for the safe use of DS in clients with dementia be placed?', respondents were asked to rank the six categories from 1 (most responsible) to 6 (least responsible). We merged ranks 2–4 into medium-level responsible and ranks 5–6 into least responsible.

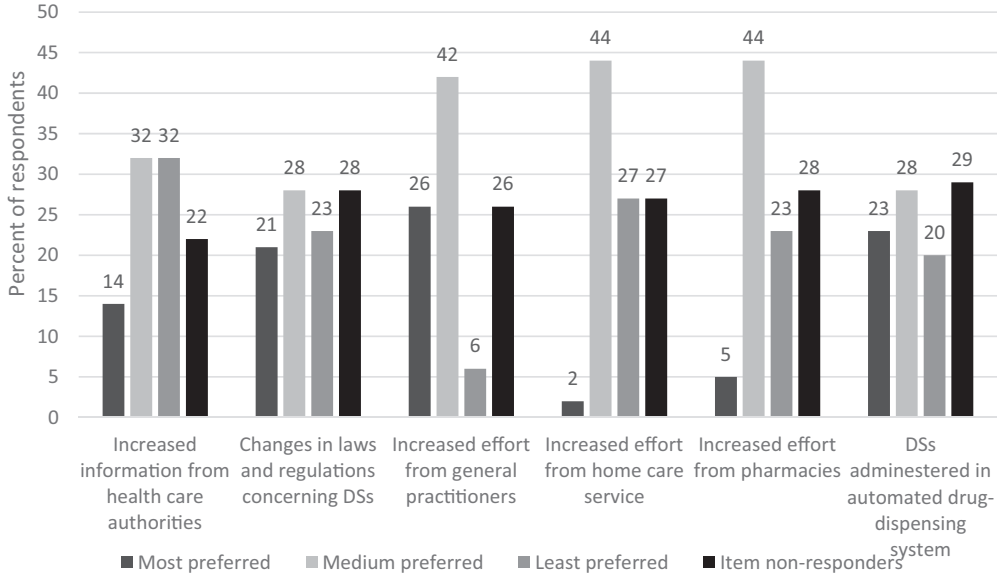

Figure 3. Respondents' opinions on how to improve the safety of clients with dementia who use dietary supplements. DS: dietary supplement. The employees were given six alternatives on how to ensure the correct and safe use of DSs. Respondents were asked to rank the six categories from 1 (most preferred) to 6 (least preferred). We merged priorities 2–4 into medium-level priority and priorities 5–6 into lowest-priority.

clients' DSs were safe, the respondents reported consulting GPs ($n = 14$), pharmacies ($n = 14$), the Summary of Product Characteristics ($n = 4$), the internet ($n = 2$), the pharmacovigilance centre ($n = 2$) or the Norwegian Medicines Agency ($n = 1$). Sixty-four respondents (28%) had received information on DSs during their professional training. A minority ($n = 9$, 4%) of the respondents had participated in continuous education on DSs. There was no difference between nurses' and nurse assistants' ability to find reliable information on DSs or their view on administering DSs to clients with dementia (see Supplementary material 2).

Figure 2 provides an overview of the respondents' opinion on who should be responsible for the safe use of DSs in clients with dementia. GPs were

considered most responsible, and there were no differences between subgroups (see Supplementary material 2).

Figure 3 provides an overview of the respondents' opinions on how to improve the safety of clients with dementia who use DSs. Most respondents chose increased effort from GPs as the most preferred intervention, followed by DSs administered *via* the automated drug-dispensing system and changes in laws and regulations concerning DSs. The only difference between health care personnel groups was that nurses were less positive about the suggestion to administer DSs *via* the automated drug-dispensing system as the most preferred option (see Supplementary material 2).

Discussion

Statement of principal findings

Half of the respondents were worried about potentially harmful DS use in clients with dementia, and almost one-third had intervened to secure safety. Most of those who had intervened would do it again. Nurses' and nurse assistants' interventions differed according to their professional responsibilities; however, their attitudes towards DSs were similar. The respondents did not consider themselves as primarily responsible for patient safety in clients with dementia who use DSs but attributed this responsibility to the GPs. A minority had received education on DSs.

Strengths and weaknesses

The major strength of this study is its originality. There are very few studies among home care services in general, and we have not identified any other study exploring this particular topic. We invited all home care service employees who had sufficiently recent professional experience with clients to maintain external validity. The response rate was satisfactory, and the total number of respondents was comparable to related studies [19,20].

The study included a high proportion of nurse assistants. Nurse assistants make up a substantial proportion of employees in Norwegian home care services, and their experiences and attitudes are highly relevant for clients. The person with dementia receiving services from home care services does not necessarily know whether it is a certified nurse who is visiting or a person without formal education, as the professional tasks in most cases are the same. All groups of employees, including the group without formal education, had experience with different aspects of worrying or counselling regarding clients' use of DSs.

The team behind this study has a multidisciplinary background, including experience from a dementia clinic, pharmacological expertise, user-expertise and expertise on complementary and alternative medicine. We believe this increased the quality and relevance of the survey questions and the interpretation of the results.

The results should be generalizable for Norway and areas with similar health care systems, such as Scandinavian countries. Nevertheless, we believe the study findings are relevant for home care services or nurses caring for people with dementia in their homes regardless of country of residence.

Weaknesses of the study include that some of the questions had a high proportion of item nonrespondents. This mainly applies to the question about attribution of responsibility, which might be difficult to answer, as it also relates to the organization of the health care system. Another question with high nonresponse concerned reasons for recommending DSs, which might have been better captured by an open-ended question. Furthermore, we cannot totally exclude either selection bias or recall bias.

Lack of time could be an important reason for not noticing problems related to DSs. We did not include a question about how many visits/clients each respondent attended to per shift, but in retrospect asked their intermediate leaders about this. They estimated the number of visits per shift to vary between eight and 20, which could include several visits to the same clients. The visits took from ten minutes to several hours. We have no reliable knowledge on how many clients with dementia these employees visited every day/week.

Findings in relation to other studies

Unsafe and inappropriate use of PDs has been reported in another Norwegian home care service setting [21], where unclear documentation and adverse events were more prominent among home care service clients ($n = 93$) than among nursing home residents ($n = 61$). We have not identified any other study exploring home care service employees' contribution to securing patient safety in clients with dementia who use DS, their awareness of the problem and attribution of responsibility.

We previously conducted a similar study among employees in pharmacies in the same geographical area [22]. In contrast to the high proportion of home

care service employees who reported worries about unsafe use of DSs in their clients, only 8% of employees in pharmacies reported similar worries. Home care service employees are closer to their clients than pharmacy employees; they visit their clients multiple times in their homes and are to a greater extent aware of their clients' cognitive capacity than pharmacy employees. Attitudes towards the safety and efficiency of DSs were similar between home care service employees and pharmacy employees, as approximately ten percent of the respondents in both study populations believed in effects derived from DSs in the treatment of dementia and approximately 60% agreed with the statement that DSs in some cases can compromise users' health. Likewise, 35% of both study populations had recommended DSs to clients [22].

In this study, we did not investigate actual DS use in clients. In a previous study, we revealed that 46% of patients with dementia ($n = 151$) used DSs, and on average, these patients used 1.7 DSs [7]. Fish oils were the most commonly used DS (57%), followed by various mixed herbal supplements (41%) and vitamin and mineral supplements (40%). We identified potentially clinically relevant interactions between DSs and PDs in 11% of DS users, which was mainly due to the use of herbs.

It needs to be emphasized that DSs constitute a very large and diverse group of products in which some, such as herbs, are more prone to cause adverse events and interactions. Vitamins, minerals and fish oils are also defined as DSs, and although these may be a part of medical doctors' prescriptions [23], most are bought over-the-counter. They are less prone to interactions than herbals, but fat-soluble vitamins may accumulate and cause toxic reactions.

Lack of knowledge is a barrier to communication about complementary and alternative medicine [24,25]. Health care personnel who possess such knowledge are more likely to discuss issues related to DSs with clients [25] and may therefore be better equipped to reveal unsafe DS use in clients. Health care professionals have stated that being trained on DSs is essential, and lack of training raises ethical implications in performing their professional tasks [26]. We did not address knowledge of DSs in our study and have not identified other studies exploring home care service employees' knowledge of DSs. However, only one out of four respondents had received training on DSs during their education and almost none had received continuing education on DSs. Lack of knowledge was the main reason why the respondents did not recommend DS to their clients, as seen in another study regarding complementary and alternative methods in general [25]. Even though one-third of the respondents claimed to know where to find reliable information about DSs, we did not know if this was the case because the study design only explored the respondents' opinions on this matter. The factual proportion could be smaller.

The respondents did not consider themselves to have the main responsibility for patient safety in clients with dementia who use DS. Instead, they placed this responsibility with the GPs. This corresponds with the results of a homologous survey among pharmacy employees [22]. Potential reasons could be lack of knowledge of DS contents and safety profiles and concerns about the effects of DSs in frail, older, polymedicated people. Moreover, it is not always known to home care service employees or pharmacy employees whether their clients have dementia. Even if the majority of the respondents in this study believed that less than half of their clients had dementia, underdiagnosis of dementia is common also in the home care service setting [4,27]. Concerning suggestions for improvements, the main difference between this study and a homologous study among pharmacy employees [22] is that home care service employees were more positively oriented to include DSs in the automated drug-dispensing system. Nurses were less positive than nurse assistants, which might relate to their understanding of drug treatment and limitations in the automated drug-dispensing system (see Supplementary material 2). In both studies, a multidisciplinary approach (i.e. between home care services, pharmacies and especially GPs) was considered necessary for securing patient safety in clients who use DSs.

Implications

The study implies that home care services have the potential to play a role in securing patient safety in clients with dementia who use DSs. No guidelines or regulations are in place regarding healthcare professionals' responsibility for safe DS use in their clients [28]. This lack of clear responsibilities compromises patient safety in clients with cognitive impairment. We suggest that a collaboration between GPs, home care services and pharmacy employees that also includes caregivers is the best way to secure safe DS use in clients who are incapable of handling this themselves due to dementia, similar to routines for safe use of PDs [29]. The first step to safeguard DS use is to identify it. Home care service employees have a unique position, as they perform regular home visits. To some

degree, they already uncover such problems today, although it is not a systematic part of their job routine. Home care services could communicate findings to GPs and ask pharmacists for advice. If the use is safe and to be continued, an evaluation is needed to assess whether the client with dementia is capable of self-administering. If not, home care services might help with the administration as the majority of the respondents agreed to. Pharmacies and GPs will be involved in including DSs in the automated drug-dispensing system.

Longitudinal observational studies are needed to establish the true frequency of unsafe DS use in clients with dementia in the home care service setting. Such studies should include DS-PD interaction analyses. Moreover, to identify barriers that home care service employees experience when assisting clients with dementia who use DSs, a qualitative study methodology is favourable.

In the Norwegian home care service, the number of nurse assistants is greater than the number of nurses. There were some differences between nurses and nurse assistants in professional conduct related to DS safety. Nurses intervened more often than nurse assistants and communicated more often with other health care professionals, such as GPs and pharmacists to increase the safety of their clients. Nurse assistants discussed problems at work to a greater extent than nurses. This could be explained by different professional roles and responsibilities, where nurse assistants might find it natural to seek advice from nurses/other colleagues in difficult work-related situations. Most importantly, there were no differences in awareness of the problem and feelings of responsibility or in attitudes towards DSs.

The respondents did not report their worries about DS use in clients with dementia to occur frequently. This could indicate that unsafe DS use is an infrequent problem or that there has been little or no focus on discovering such problems. Our data reveal that only a minority of the employees had received education on DSs. We believe that more focus on the safety of DS use in persons with dementia, including an increased focus on education of home care service employees on DSs, is needed. It is important for employees to possess evidence-based knowledge about common DSs to give advice to clients, and especially to know which DSs need to be checked for interactions.

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Ethical approval

The Regional Committee for Medical and Health Research Ethics presented no objections to the study design (2014/1385). The survey did not collect personally identifiable information and was therefore not accountable by the Norwegian Data Protection Agency. All participants were given written information about the study and informed that answering the questionnaire was considered as study consent.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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References

[1] Holm SG, Mathisen TA, Saeterstrand TM, et al. Allocation of home care services by municipalities in Norway: a document analysis. BMC Health Serv Res. 2017;17(1):673.

[2] Johansen E, Fagerstrom L. An investigation of the role nurses play in norwegian home care. Br J Community Nurs. 2010;15(10):497–502.

[3] Andersen GR, Westgaard RH. Discrepancies in assessing home care workers' working conditions in a norwegian home care service: differing views of stakeholders at three organizational levels. BMC Health Serv Res. 2015;15:286.

[4] Wergeland JN, Selbaek G, Høgset LD, et al. Dementia, neuropsychiatric symptoms, and the use of psychotropic drugs among older people who receive domiciliary care: a cross-sectional study. Int Psychogeriatr. 2014;26(3):383–391.

[5] Eichler T, Hoffmann W, Hertel J, et al. Living alone with dementia: prevalence, correlates and the utilization of health and nursing care services. JAD. 2016; 52(2):619–629.
[6] Winblad B, Amouyel P, Andrieu S, et al. Defeating Alzheimer's disease and other dementias: a priority for European science and society. Lancet Neurol. 2016;15(5):455–532.
[7] Risvoll H, Giverhaug T, Halvorsen KH, et al. Direct and indirect risk associated with the use of dietary supplements among persons with dementia in a Norwegian memory clinic. BMC Complement Altern Med. 2017; 17(1):261.
[8] Cross AJ, George J, Woodward MC, et al. Dietary supplement use in older people attending memory clinics in Australia. J Nutr Health Aging. 2017;21(1):46–50.
[9] Landin J, Frolich L, Schwarz S. Use of alternative therapies in patients with dementia and mild cognitive impairment: a prospective, controlled study. Int J Geriat Psychiatry. 2008;23(11):1163–1165.
[10] Dietary Supplement Health and Education Act of 1994. Public Law No. 103-417.Paragraph 3a., 1994.
[11] Bailey RL, Gahche JJ, Miller PE, et al. Why US adults use dietary supplements. JAMA Intern Med. 2013; 173(5):355–361.
[12] Awortwe C, Makiwane M, Reuter H, et al. Critical evaluation of causality assessment of herb-drug interactions in patients. Br J Clin Pharmacol. 2018;84(4): 679–693.
[13] Phua DH, Zosel A, Heard K. Dietary supplements and herbal medicine toxicities-when to anticipate them and how to manage them. Int J Emerg Med. 2009; 2(2):69–76.
[14] Cohen PA, Avula B, Wang YH, et al. Five unapproved drugs found in cognitive enhancement supplements. Neurol Clin Pract. 2021;11(3):e303–e307.
[15] McCleery J, Abraham RP, Denton DA, et al. Vitamin and mineral supplementation for preventing dementia or delaying cognitive decline in people with mild cognitive impairment. Cochrane Database Syst Rev. 2018;11(11):CD011905.
[16] Burckhardt M, Herke M, Wustmann T, et al. Omega-3 fatty acids for the treatment of dementia. Cochrane Database Syst Rev. 2016;4(4):CD009002.
[17] Chan ES, Bautista DT, Zhu Y, et al. Traditional Chinese herbal medicine for vascular dementia. Cochrane Database Syst Rev. 2018;12(12):CD010284.
[18] Persson T, Popescu BO, Cedazo-Minguez A. Oxidative stress in Alzheimer's disease: why did antioxidant therapy fail? Oxid Med Cell Longev. 2014;2014: 427318.
[19] Oyen KR, Sunde OS, Solheim M, et al. Understanding attitudes toward information and communication technology in home-care: information and communication technology as a market good within norwegian welfare services. Inform Health Soc Care. 2018; 43(3):300–309.
[20] Ree E, Wiig S. Employees' perceptions of patient safety culture in Norwegian nursing homes and home care services. BMC Health Serv Res. 2019;19(1):607.
[21] Devik SA, Olsen RM, Fiskvik IL, et al. Variations in drug-related problems detected by multidisciplinary teams in Norwegian nursing homes and home nursing care. Scand J Prim Health Care. 2018;36(3): 291–299.
[22] Risvoll H, Musial F, Halvorsen KH, et al. Pharmacy employees' involvement in safeguarding persons with dementia who use dietary supplements: results from a survey of Norwegian pharmacies. BMC Complement Altern Med. 2019;19(1):179.
[23] Cham G, Davis N, Strivens E, et al. Factors correlating to the propensity of general practitioners to substitute borderline vitamin B12 deficiency. Scand J Prim Health Care. 2018;36(3):242–248.
[24] Chang HY, Chang HL. A review of nurses' knowledge, attitudes, and ability to communicate the risks and benefits of complementary and alternative medicine. J Clin Nurs. 2015;24(11–12):1466–1478.
[25] Jong M, Lundqvist V, Jong MC. A cross-sectional study on Swedish licensed nurses' use, practice, perception and knowledge about complementary and alternative medicine. Scand J Caring Sci. 2015;29(4):642–650.
[26] Barnes J, Butler R. Community pharmacists' professional practices for complementary medicines: a qualitative study in New Zealand. Int J Clin Pharm. 2020; 42(4):1109–1117.
[27] Lang L, Clifford A, Wei L, et al. Prevalence and determinants of undetected dementia in the community: a systematic literature review and a Meta-analysis. BMJ Open. 2017;7(2):e011146.
[28] Dwyer JT, Coates PM, Smith MJ. Dietary supplements: regulatory challenges and research resources. Nutrients. 2018;10(1):41.
[29] Halvorsen KH, Ruths S, Granas AG, et al. Multidisciplinary intervention to identify and resolve drug-related problems in norwegian nursing homes. Scand J Prim Health Care. 2010;28(2):82–88.

Supplementary material 1. Questionnaire: home care service (translated)

1. Gender?
    a. Female
    b. Male
2. Education?
    a. Nurse (including social educators or others with health-related educational programs at bachelor's level)
    b. Auxiliary nurse (includes other types of health-related education from vocational school (three years))
    c. No education or no health-related education
3. For how long have you worked in home care service (HCS)?
    a. 0-5 years
    b. 6-15 years
    c. More than 15 years
4. Do you use some of the following dietary supplements (DSs)/natural remedies? You can give more than one answer.
    a. Vitamins
    b. Minerals
    c. Herbs
    d. Other types of DSs/natural remedies
    e. I do not use DSs/natural remedies
5. Do you believe some DSs/natural remedies can prevent or cure dementia symptoms?
    a. Yes
    b. No
    c. I do not know
6. Which DSs/natural remedies do you believe can prevent or cure dementia symptoms?
7. Have you recommended DSs/natural remedies to clients? You can give more than one answer.
    a. I have never recommended DSs/natural remedies
    b. I have recommended vitamins
    c. I have recommended minerals
    d. I have recommended herbs
    e. I have recommended other types of DSs, includes homeopathic medicine
8. If you never have recommended DSs/natural remedies to clients, why not? You can give more than one answer.
    a. I do not have sufficient knowledge about DSs/natural remedies to recommend
    b. I do not believe DSs/natural remedies to have positive effects
    c. The risk of adverse events and interactions with prescribed modifications (PDs)
    d. My clients take enough tablets as it is
    e. It is not my job to recommend
9. If you have recommended DSs/natural remedies to clients, what were your reasons for recommending? You can give more than one answer.

    a. The types of DSs/natural remedies I recommend have positive effects (scientifically documented effects)
    b. I believe the DSs/natural remedies will cure or ease the clients' symptoms
    c. I believe DSs/natural remedies to be harmless at least
10. In your opinion, how many of the clients have dementia? Their diagnosis do not need to be confirmed for you to answer.
    a. 0-24%
    b. 25-49%
    c. 50-74%
    d. 75-100%
11. How many of your clients have a confirmed dementia diagnosis documented in the clients' electronic health records?
    a. 0-24%
    b. 25-49%
    c. 50-74%
    d. 75-100%
12. How many of your clients use DSs/natural remedies without receiving help with the administration?
    a. 0-24%
    b. 25-49%
    c. 50-74%
    d. 75-100%
13. How often do you meet clients with dementia that you fear might harm their health, due to their use of DSs/natural remedies? By this, we mean that the DSs/natural remedies can have unfortunate health effects either because of direct toxic effects or because the clients are incapable of correct administration.
    a. Never
    b. Annually or less often
    c. Bi-annually to annually
    d. Monthly to bi-annually
    e. Weekly to monthly
    f. Several times a week
14. How often do your clients' caregivers (next of kin) discuss their worries about the clients' use of DSs/natural remedies with you?
    a. Never
    b. Annually or less often
    c. Bi-annually to annually
    d. Monthly to bi-annually
    e. Weekly to monthly
    f. Several times a week
15. Regarding worry about DSs/natural remedy use among clients with dementia, how often do you discuss such worries with client's caregiver/next of kin?
    a. Never
    b. Annually or less often
    c. Bi-annually to annually
    d. Monthly to bi-annually
    e. Weekly to monthly

    f. Several times a week
16. How often do clients with dementia ask you for advice about their DSs/natural remedies?
    a. Never
    b. Annually or less often
    c. Bi-annually to annually
    d. Monthly to bi-annually
    e. Weekly to monthly
    f. Several times a week
17. How often have you observed DSs/natural remedies lying about in the homes of your clients with dementia?
    a. Never
    b. Annually or less often
    c. Bi-annually to annually
    d. Monthly to bi-annually
    e. Weekly to monthly
    f. Several times a week
18. How often have you interfered when your clients with dementia used DSs/natural remedies with the intention to increase the clients' safety? Either because you feared, the DS/natural remedy products themselves could cause harm to the clients' health, or because you feared, the clients did not manage to administer the DS/natural remedy products correctly by themselves.
    a. Never
    b. Annually or less often
    c. Bi-annually to annually
    d. Monthly to bi-annually
    e. Weekly to monthly
    f. Several times a week
19. This question does only apply for those who answered question 18 b-f. How did you interfere? You can give more than one answer.
    a. Consulted the clients' caregivers (next of kind)
    b. Consulted the clients' general practitioners (GPs)
    c. Consulted a pharmacy (pharmacists)
    d. Asked the clients' caregivers (next of kin) to remove the DS/DSs
    e. Arranged for the DSs to be administered by HCS after a GP or a pharmacists had checked that the products were safe to use (did not interact with the clients' prescribed medications (PDs))
    f. Discussed the safety issue with my colleagues at work
20. This question does only apply for those who answered question 18 b-f. If you have interfered one or several times and later experienced that your interference did not lead to any improvements for your clients, did this make you stop interfering?
    a. I have interfered and experienced an improvement in clients' safety
    b. I have stopped interfering because my interference did not lead to any improvements for my clients
    c. I have not stopped interfering even though earlier attempts did not lead to any improvements for my clients
    d. I am uncertain if I will interfere again

21. Do you prefer the clients with dementia who use DSs/natural remedies to have their DSs/natural remedies administered by HCS rather than managing the administration by themselves?
    a. Yes
    b. No
    c. I do not know
22. If HCS should be responsible for supervising DSs/natural remedies use by new clients with dementia, would that be problematic? You can give more than one answer.
    a. No, I already do this
    b. I do not find this responsibility problematic, even though I am not responsible for this today
    c. Yes, because of time. I would not have enough time to take on more responsibilities
    d. Yes, because of ethical considerations, it is not ethically right to ask the clients about this
    e. Practical problems would make this responsibility problematic
23. This question is only applicable for those who answered 22e. What practical problems would make this responsibility problematic?
24. Have you received information about DSs/natural remedies during your professional training?
    a. Yes
    b. No
    c. I have no professional training
25. Have you participated in continuous education on DSs/natural remedies after you started working in HCS?
    a. Yes
    b. No
26. Do you know where to find scientific information about DSs/natural remedies products? (not information from the manufacturer or information from magazines or newspapers et cetera)
    a. Yes
    b. No
27. Where do you get the best information about DSs/natural remedies?
    a. Pharmacies/pharmacists
    b. GPs
    c. Other employees in HCS
    d. Pharmacovigilance center
    e. I do not know
28. If you as a part of your professional work have checked whether clients' DSs/natural remedies were safe, how did you do this? If you have never done this, please write, "Not applicable".
29. Do you agree with this statement:" DSs/natural remedies may pose a threat to users' health"?
    a. Yes
    b. No
    c. I do not know

30. Which options are most adequate to secure safe use of DSs/natural remedies by persons with dementia? Please prioritize the options from one to six (one as most adequate, two as second most adequate and so forth).
    a. Information from the health authorities to the general population
    b. Changes in laws and regulations concerning DSs/natural remedies (indicates increased control with the DS content such as increased testing for toxic effects. As today, DSs has less strict safety routines compared to PDs)
    c. Increased effort from GPs (ask all patients about DS/natural remedy use and check for adverse events and interactions)
    d. Increased effort from HCS (ask all clients about DS/natural remedy use and convey information about use to GPs or pharmacists)
    e. Increased effort from pharmacies/pharmacists (for all customers who buy DSs/natural remedies, check for interactions, and inform GPs and, if appropriate, HCS about findings when interactions are identified)
    f. DSs/natural remedies delivered in automated drug-dispensing systems together with PDs (when it has been established that DS is safe to use)
31. Who should be responsible for the correct and safe use of DSs/natural remedies by persons with dementia? Please prioritize the options from one to six (one as most responsible, two as second most responsible, and so forth).
    a. The person with dementia him/her-self
    b. The caregivers
    c. The retailers of DSs/natural remedies
    d. The pharmacies/pharmacists
    e. The GPs
    f. HCS

Supplementary material 2

Suppl. Table 1a. Attitudes towards DS. Nurses versus nurse assistants.

	Nurses	Nurse assistants	χ^2 /degrees of freedom	*P*
	n (%)	n (%)		
Personal use of DSs n=143	52 (67)	92 (60)	1.199 (1)	0.274
Believed certain DSs could prevent or cure dementia symptoms n=23	11 (14)	12 (8)	2.806	0.415†
Agreed that DSs might pose a threat to users' health n=134	53 (69)	81 (53)	6,021 (3)	0.110
Preferred their clients with dementia to have their DSs administered by the HCS rather than leave them to manage the administration by themselves n=164	56 (72)	108 (70)	6.486	0,067†
Have recommended DSs to clients n=80	31 (40)	49 (32)	0.983 (1)	0.321
Reasons for recommending DSs				

	Positive documented effects n=31	14 (18)	17 (11)	3.176 (1)	0.075
	The DSs caused no harm to clients n=15	3 (4)	12 (8)	2.100 (1)	0.147
	The DSs would cure or ease symptoms n=7	23 (3)	5 (3)		1.000†
Bonferroni adjusted α was 0.05/3 resulting in α=0.017.					
Reasons for not recommending DSs					
	Lack of knowledge about DSs n=127	42 (54)	85 (56)	0.051 (1)	0.822
	Concern about adverse events and DS-PD interactions n=58	26 (33)	32 (22)	5.086 (1)	0.024
	Recommending DSs was considered beyond their duty	12 (15)	38 (25)	2.910 (1)	0.088

	n=50				
	DSs were considered ineffective n=5	1 (1)	4 (3)		0.665†
	The clients took enough tablets already n=4	1 (1)	3 (2)		1.000†
Bonferroni adjusted α was 0.05/5 resulting in α=0.01.					

DS, dietary supplement. HCS, home care service. PD, prescription drug. The nurse category may include social educators and other health-related education at bachelor's level. Nurse assistants include auxiliary nurses, other individuals with health-related education (three years of upper secondary school), and employees without formal education. Differences between subgroups were tested with Chi-square test or Fisher exact test †.There were no statistically significant differences between subgroups.

Suppl. Table 1b. Attitudes towards DS. Years of work experience.

	0-5 years' experience	6-10 years' experience	>15 years' experience	χ^2 /degrees of freedom	*P*
	n (%)	n (%)	n (%)		
Personal use of DSs n=143	54 (61)	45 (63)	44 (69)		0.721†
Believed certain DSs could prevent or cure dementia symptoms n=23	11 (12)	10 (14)	2 (3)		0.415†

Agreed that DSs might pose a threat to users' health n=134		52 (58)	45 (63)	36 (56)		0.972†
Preferred their clients with dementia to have their DSs administered by the HCS rather than leave them to manage the administration by themselves n=164		64 (72)	51 (71)	49 (77)		0,627†
Have recommended DSs to clients n=80		23 (26)	21 (29)	35 (54)		<0.001†
Reasons for recommending DS						
	Positive documented effects n=31	10 (11)	5 (7)	16 (25)	2.482 (2)	0.289
	The DS caused no harm to clients n=15	8 (9)	3 (4)	4 (6)	2.727 (2)	0.256
	The DS would cure or ease symptoms n=7	2 (3)	2 (3)	3 (5)		0.875†
Bonferroni adjusted α was 0.05/3 resulting in α=0.017.						
Reasons for not recommending DS						

	Lack of knowledge about DSs n=127	56 (63)	41 (57)	30 (47)	1.531 (2)	0.465
	Concern about adverse events and DS-PD interactions n=58	20 (23)	22 (31)	16 (25)	2.115 (2)	0.347
	Recommending DSs was considered beyond their duty n=50	15 (17)	20 (28)	15 (23)	4.338 (2)	0.114
	DSs were considered ineffective n=5	4 (5)	1 (1)	0 0		0.295†
	The clients took enough tablets already n=4	0 (0)	4 (6)	0 (0)		0.016†
Bonferroni adjusted α was 0.05/5 resulting in α=0.01.						

DS, dietary supplement. HCS, home care service. PD, prescription drug. Differences between subgroups were tested with Chi-square test or Fisher exact test †. There were no statistically significant differences between subgroups.

Suppl. Table 2a. Respondents access to knowledge on DSs. Nurses versus nurse assistants

	Nurses	Nurse		*P*

		assistants	χ^2 /degrees of freedom	
	n (%)	n (%)		
Knew where to find reliable (scientific) information aboutDSs n=74	27 (35)	47 (31)	2,774 (2)	0,250
Received information on DSs during their professional training n=64	23 (30)	41 (27)	0,090 (1)	0,764[α]
Participated in continuous education on DSs after they started working in HCS n=9	3 (4)	6 (4)	0.665	0,830†

DS, dietary supplement. HCS, home care service. The nurse category may include social educators and other health-related education at bachelor's level. Nurse assistants include auxiliary nurses, other individuals with health-related education (three years of upper secondary school), and employees without formal education. Differences between subgroups were tested with Chi-square test or Fisher exact test †. [α] We excluded 22

respondents who had not studied when analyzing this question. There were no statistically significant differences between subgroups.

Suppl. Table 2b. Respondents access to knowledge on DS. Years of work experience

	0-5 years' experience	6-15 years' experience	>15 years' experience	χ^2 /degrees of freedom	*p*
	n (%)	n (%)	n (%)		
Knew where to find reliable (scientific) information about DSs n=74	34 (38)	24 (33)	16 (25)		0,449†
Received information on DSs during their professional training n=64	32 (36)	19 (26)	12 (19)		0,018[α]†
Participated in continuous education on DSs after they started	5 (6)	2 (3)	2 (3)		0,833†

working in HCS n=9					

DS, dietary supplement. HCS, home care service. Differences between subgroups tested with Chi-square test or Fisher exact test †. [α] We excluded 22 respondents who had not studied when analyzing this question. There were no statistically significant differences between subgroups

Suppl. Table 3a. Employees' opinions on how to improve the safety of clients with dementia who use DSs. Nurses versus nurse assistants.

		Nurses	Nurse assistants	χ^2 /degrees of freedom	*P*
Increased information from health care authorities					
	Most preferred	7	27	6.958 (2)	0.031
	Medium preferred	24	50		
	Least preferred	33	39		
	Item non-responders	14	37		
Changes in laws and regulation					
	First priority	19	30	1.238 (2)	0.538
	Medium priority	20	45		
	Last priority	21	32		

	Item non-respondents	18	46		
Increased effort from GPs					
	First priority	27	34		
	Medium priority	32	66	2.392 (2)	0.303
	Last priority	4	9		
	Item non-respondents	15	44		
Increased effort from HCS					
	First priority	2	3		
	Medium priority	39	61	1.483 (2)	0.530
	Last priority	19	44		
	Item non-respondents	18	45		
Increased effort from pharmacies					
	First priority	3	10		
	Medium priority	38	63	1.059 (2)	0.589
	Last priority	19	34		
	Item non-respondents	18	46		
DSs administered in automated drug-dispensing system					
	First priority	13	40		
	Medium priority	34	31	12.496 (2)	**0.002***

	Last priority	12	34		
	Item non-respondents	19	48		

DS, dietary supplement. GP, general practitioner. HCS, home care service. The nurse category may include social educators and other health-related education at bachelor's level. Nurse assistants include auxiliary nurses, other individuals with health-related education (three years of upper secondary school), and employees without formal education. Differences between subgroups were tested with Chi-square test. Bonferroni adjusted α was 0.05/6 resulting in α=0.008. Statistically significant differences between subgroups after adjustment are printed in bold and marked with *.

Suppl. Table 3b. Employees' opinions on how to improve the safety of clients with dementia who use DSs. Years of work experience.

		0-5 years' experience	6-15 years' experience	>15 years' experience	*P*
Increased information from health care authorities					
	Most preferred	13	9	12	
	Medium preferred	28	29	16	0,563
	Least preferred	31	18	23	
	Item non-responders	19	18	14	
Changes in laws and regulation					
	First priority	19	19	10	
	Medium priority	28	20	17	0.259

	Last priority	24	11	18	
	Item non-respondents	20	24	20	
Increased effort from GPs					
	First priority	19	18	24	
	Medium priority	44	31	22	0.390
	Last priority	5	6	2	
	Item non-respondents	23	19	17	
Increased effort from HCS					
	First priority	2	1	2	
	Medium priority	39	28	32	0.357
	Last priority	25	27	11	
	Item non-respondents	25	18	20	
Increased effort from pharmacies					
	First priority	6	4	3	
	Medium priority	40	32	29	0.641
	Last priority	20	21	11	
	Item non-respondents	25	17	22	
DSs administered in automated drug-dispensing system					
	First priority	19	13	21	0.131

	Medium priority	27	25	13	
	Last priority	16	19	10	
	Item non-respondents	29	17	21	

DS, dietary supplement. GP, general practitioners. HCS, home care service. Years of work experience were given in the ranges: 1-5 years' experience, 6-15 years' experience and >15 years' experience. Differences between subgroups were tested with Fisher exact test. Bonferroni adjusted α was 0.05/6 resulting in α=0.008. There were no statistically significant differences between subgroups.

Suppl. Table 4a. The respondents' ranking of responsibility for the safety of clients with dementia who use DSs. Nurses versus nurse assistants.

	Nurses	Nurse assistants	χ^2 (degrees of freedom)	*P*
Persons with dementia themselves				
Most responsible	1	8		
Medium	19	36	2.778 (2)	0.249
Least	49	77		
Item non-responders	9	36		
Caregivers				
Most responsible	5	10		
Medium	39	66	0.118 (2)	0.943
Least	24	44		
Item non-respondents	10	33		
GPs				
Most responsible	50	89		

Medium	15	32	1.836 (2)	0.399
Least	5	4		
Item non-respondents	8	28		
HCS				
Most responsible	1	8		
Medium	53	73	5.742 (2)	0.057
Least	13	34		
Item non-respondents	11	38		
Pharmacies				
Most responsible	4	6		
Medium	54	90	0.025 (2)	0.987
Least	12	20		
Item non-respondents	8	37		
DS retailers				
Most responsible	17	16		
Medium	23	54	4.955 (2)	0.084
Least	29	42		
Item non-respondents	9	41		

DS, dietary supplement. GP, general practitioner. HCS, home care service. The nurse category may include social educators and other health-related education at bachelor's level. Nurse assistants include auxiliary nurses, other individuals with health-related education (three years of upper secondary school), and employees without formal education. DS retailers could be health food store staff, internet retailers, complementary and alternative medicine therapists, or others. Differences between subgroups were tested with Chi-square test. Bonferroni adjusted α was 0.05/6 resulting in $\alpha=0.008$. There were no statistically significant differences between subgroups.

Suppl. Table 4b. The respondents' ranking of responsibility for the safety of clients with dementia who use DSs. Years of work experience.

	0-5 years' experience	6-15 years' experience	<15 years' experience	*P*
Persons with dementia themselves				
Most responsible	6	1	2	
Medium	16	18	17	0.669
Least	53	39	33	
Item non-responders	16	16	13	
Caregivers				
Most responsible	5	7	3	
Medium	39	33	33	0.800
Least	30	21	16	
Item non-respondents	17	13	13	
GPs				
Most responsible	44	46	48	
Medium	24	13	10	0.081
Least	3	4	2	
Item non-respondents	20	11	5	
HCS				
Most responsible	3	4	2	
Medium	52	35	38	0.899
Least	16	18	13	
Item non-respondents	20	17	12	
Pharmacies				
Most responsible	5	5	0	
Medium	54	45	44	0.595

Least	13	9	10	
Item non-respondents	19	15	11	
DS retailers				
Most responsible	17	10	6	
Medium	28	26	22	0.838
Least	28	21	22	
Item non-respondents	18	17	15	

DS, dietary supplement. GP, general practitioner. HCS, home care service. Years of work experience were given in the ranges: 1-5 years' experience, 6-15 years' experience and >15 years' experience. DS retailers could be health food store staff, internet retailers, complementary and alternative medicine therapists, or others. Differences between subgroups were tested with Fischer's exact test. Bonferroni adjusted α was 0.05/6 resulting in α=0.008. There were no statistically significant differences between subgroups.

Suppl. Table 5. Professional practice experience related to DS use by clients with dementia

How often do you, as an employee in home care service,	**Several times a week**	**Weekly-monthly**	**Monthly-bi-annually**	**Bi-annually-annually**	**Annually or less often**	**Never**	**Respondents with experience**		**Difference in work experience**
	n	**n**	**n**	**n**	**n**	**n**	**n**	**(%)**	***P***
Fear that clients might suffer harm due to their DS use n=213	3	4	17	17	66	106	107	(50)	0.416
Experience that caregivers raise	0	0	1	5	30	186	36	(16)	0.387

concern about clients' DS use n=222									
Consult caregivers concerning the safety of clients because of their DS use n=225	0	0	2	9	29	185	40	(18)	0.242
Experience that clients consult you regarding their DS use n=227	0	0	3	17	51	156	71	(31)	0.055
Observe DSs in the homes of clients n=226	6	28	20	36	80	56	170	(75)	0.201
Intervene with clients' DS use to avoid harm to their health n=224	0	0	1	9	45	169	55	(25)	0.367

DS, Dietary supplement. Years of work experience were given in the ranges: 1-5 years' experience, 6-15 years' experience and >15 years' experience. Differences between subgroups were tested with Fisher's exact test.

Bonferroni adjusted α was 0.05/6 resulting in α=0.008. There were no statistically significant differences between subgroups.

Suppl. Table 6. Interventions to increase the safety of clients with dementia who used DS. Years of work experience.

Interventions to increase safety	**Respondents**	**Years of work experience**			**Differences**
	n	**0-5**	**6-15**	**>15**	***p***
		n	**n**	**n**	
Consulted GP n=71	32	9	9	14	0.261
Consulted pharmacy n=70	6	3	1	23	0.134†
Consulted caregiver n=71	19	6	5	8	0.667
Asked caregiver to remove DSs n=70	12	4	4	4	1.000†
Took action to include DSs in automated drug-dispensing system n=70	29	10	11	8	0.426
Discussed the problem with colleagues n=70	35	14	7	14	0.186

GP, general practitioner; DS, dietary supplement. Differences between subgroups were tested with Chi square test or Fischer's exact test †. Bonferroni adjusted α was 0.05/6 resulting in α=0.008. There were no statistically significant differences between subgroups.

Paper IV

General practitioners' role in safeguarding use of dietary supplements among patients with dementia. A qualitative study.

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Key findings

Currently, little is known about general practitioners (GPs) caretaking of patients with dementia who use dietary supplements (DS). Our study showed that:

GPs showed little awareness of the potential safety risk that DS use may represent for patients with dementia.

Several obstacles in the treatment setting and in the regulation of DS make it difficult for the GPs to assume responsibility for patients with dementia who use DS.

Lack of evidence about DS safety and effect adds to professional uncertainty and may cause frustration or avoidance of the problem.

Abstract

Objective

The use of dietary supplements (DS) may cause harm through direct and indirect effects. Patients with dementia may be particularly vulnerable to risk due to cognitive deficiencies. This study aims to explore general practitioners' (GPs') experiences with DS use by patients with dementia, their perceived responsibilities, obstacles to take on this responsibility, their attitudes toward DS, and suggestions for improvements on how to safeguard the use of DS in this patient group.

Design

Qualitative individual interview study conducted between February and December 2019. Data were analysed using systematic text condensation.

Setting

Primary health care clinics in Norway.

Subjects

Fourteen Norwegian GPs.

Results

Most GPs showed little awareness of the extra challenges that patients with dementia may experience before the interview. However, after the interview, they acknowledged the need for increased caretaking of this patient group. The GPs wished to help their patients evaluate the outcome of their DS use but found this difficult due to the lack of quality assured product information and had no effective ways to document DS use in the patients' journal. Several suggestions for improvement were given, such as increased

attention from GPs, better tools for integrating DS in patients' medical journals, and better regulatory systems for DS from the authorities.

Conclusion

The marketing of DS operates in a "grey zone" characterised by unclear rules and lack of procedures and tools, leading to difficulties for GPs in taking the medical responsibility.

Keywords

General practitioners; dementia; dietary supplement; patient safety; qualitative research.

Abbreviations

GP: general practitioner, DS: dietary supplements, PD: prescription drugs, HCS: home care service, ADS: automated dispensing system.

Introduction

Dietary supplements sustain an ambiguous position in medical practice; at the same time diet and medicine, something the patients take at their own discretion, but also something medical doctors are expected to monitor? DS are in the balance between the patient's concern and the doctor's responsibility. This becomes especially clear when the patient is deprived of his or her full capacity for responsibility and reasoning, as is the case for patients with dementia. What is a GP supposed to do in such cases? In this paper, we explore these tensions, known from some authors' professional experience, to understand them better and to provide grounds for an open and structured approach to this challenge.

Dietary supplements (DS) are defined by The United States Dietary Supplements Health and Education Act of 1994 as products meant to supply the diet. Included are vitamins, minerals, herbs, botanical products, amino acids and dietary substances (1). Some DS are pure vitamins with clear recommendations regarding indication, dosage, and monitoring. Others are composite products containing various herbs alone or combined with vitamins, minerals, or fatty acids. The regulation of production, sale, marketing, and use of DS is limited compared to prescription drugs (PD) (2). DS are often used to improve general health (3, 4), but also to improve specific conditions such as dementia, even though the evidence is generally weak (5-8). Up to 57 % of patients with dementia use DS (9-11). The use is often not disclosed to GPs or other health care personnel (9, 12, 13).

The use of DS may compromise health. A direct risk, that is risk from the product itself, would be interactions with PD or adverse reactions such as hepatotoxicity, which in the worst case could be lethal (14). Moreover, cases of illegally added PD to DS marketed as cognitive enhancement supplements have been discovered (15). In addition, DS may

impose indirect risks related to the condition of use (10, 16); confusing DS with PD or taking more DS than recommended are examples that are relevant for patients with dementia (10).

Author HR worked for several years with patients with dementia in an outpatient memory clinic. She experienced that the accompanying caregiver often expressed concerns or had questions about the patients' DS, but she was seldom able to find studies documenting safety and effect of the DS used. In a former study of 151 patients with dementia, of which 70 used DS, we found possible interactions between DS and PD in eight patients (11% of the DS users) (10). This led to an increased concern about these patients' safety. As most clinical encounters with doctors take place in primary care in Norway, the role of the general practitioner (GP) in managing this issue is obvious (17). All Norwegian inhabitants are entitled to a GP, based on the principle of equality irrespective of income, age, ethnicity, geographic affiliation or disease status (17). It is estimated that 90.000 Norwegians have dementia (18). As there are 5000 Norwegian GPs (19), each GP have on average 18 such patients on their list. When managing these patients, GPs must always consider their progressive decline in cognitive function, potential lack of judgement, and reduced ability to maintain their own interests including the proper use of both PD and DS.

The documented efficiency and quality of Nordic primary care models (17) may conceal the fact that GPs experience and manage uncertainty and ambiguity as an integrated part of daily work, and often experience doubts concerning their clinical decisions (20). This is especially true for patients with dementia (21).

Some studies have investigated how GPs communicate with patients in general about DS (22), and others how they manage patients with dementia (23). The present study is to

our knowledge the first to specifically explore GPs professional practice concerning home-dwelling patients with dementia who use DS.

Aims:

The study aimed to describe GPs' experience with DS use by home-dwelling patients with dementia, focusing on composite DS products without clear evidence-based recommendations for use. In addition, we explore the GPs attitudes, their perceived responsibilities, what the GPs believed could be obstacles to take on this responsibility, and suggestions for improvements in safeguarding patients with dementia who use DS.

Material and method

Study design

Qualitative individual interview was chosen as the research approach to allow both descriptive and exploratory work. An interview guide (see Supplementary material 1) was developed by the authors and the user representatives (see Acknowledgements) based on the aim of the study and previous research (10, 16, 24, 25). We piloted the interview guide to check for feasibility and thematic relevance.

Study area and settings

The Norwegian primary health care system.

Recruitment of informants

Based on the public GP index, we invited a purposive, diversified sample of GPs to cover different groups of gender, age, native/non-native Norwegian according to their names, and a rural/non-rural workplace in North-Norway, see Table 1. Rural was defined as a municipality of <50 000 inhabitants. The potential informants were recruited by the first author (HR) by phone. Only one GP refused to participate. The informants were offered

81 euros for their participation according to the standards of UiT The Arctic University of Norway.

Data collection

The interviews were conducted by HR between February and December 2019. Nine interviews were performed face-to-face, most in the GP's office, and five on the telephone. The interviews lasted on average 48 minutes (range 19-89 minutes). The interviews were audiotaped and transcribed verbatim. HR, FM and KHH assessed the transcripts consecutively and decided that the study had enough information power after 14 interviews.

Analyses

The analyses were inspired by the research questions and knowledge derived from former studies (10, 24, 25), including a theoretical model for direct and indirect risk (10). The data material was analysed using systematic text condensation, a method for thematic qualitative analysis (26). The analysis followed these steps: (i) reading all the transcripts to obtain an overall impression; (ii) identifying units of meaning and coding for these units; (iii) condensing and summarising the contents of each of the coded groups; and (iv), reconceptualising the data making generalised descriptions and concepts reflecting the GPs management of patients with dementia who use DS. This was done in several rounds for each step by FM, KHH and HR. After step iii, MW and HR read all transcripts to quality check if the results reflected the opinion of the informants and TG performed a top-down quality control, by reading the preliminary results before the transcripts. All authors joined the analysis at step iv. The multidisciplinary team behind this study has experiences in general practice, from a memory clinic, pharmacological expertise, psychological expertise, caregivers' expertise, and expertise in complementary and alternative medicine. We present our preconceptions in

Supplementary material 2. We translated quotes into English with help from a bilingual native English speaker.

All informants were offered a read-through of their own transcript and were invited to give feedback on the first version of results. Four informants provided general feedback (e.g., "interesting findings" and "important work"). None suggested any corrections.

Ethics

All informants gave written informed consent to participate and were entitled to withdraw their consent at any time. All audiotapes were deleted, and the transcripts anonymised at the end of the study. The informants are only referred to by numbers in the text. Information that could facilitate recognition is left out.

Results

Table 1 presents the characteristics of the informants.

Table 1 Characteristics of the informants

Characteristics	Categories	Number or mean (range)
Gender *	Female/male	7/7
Age *	<40 years	4
	40-55 years	6
	>55 years	4
Birthplace*	Norway/abroad	10/4
Medical degree from	Norway/abroad	9/5
Workplace†*	Urban/rural	6/6
Work experience as GP	Years, mean (range)	15.5 (1-36)
Practice list size	Number of patients, mean (range)	906 (450-1500)

* Information from a public list of GPs used in the selection of informants

† Rural was defined as a municipality of <50 000 inhabitants

GP: General practitioner

The findings from the interviews were organised into four main themes, see Table 2.

Table 2 Main themes and subthemes extracted from the interviews

Main theme	**Experience of risks from DS**	**GPs' self-perception of their professional role including attitudes towards DS and knowledge about DS**	**External factors challenging the caretaking of patients with dementia who use DS**	**Suggestions to improve the safety**
Subthemes associated with each theme	Direct risks	Unawareness of DS use	Lack of available information	
	Indirect risks related to dementia symptoms	Unclear lines of responsibility	Lack of time	
		Attitudes towards DS	Lack of sufficient tools	
		Understanding of the professional role	Insufficient laws and regulations	

DS; dietary supplements, GP; general practitioner

Several participating GPs appreciated this subject being tackled by this research project or had more thoughts about it afterwards than they had presupposed before the interview. The main impression was that nobody had thought much, if at all, about the risk patients with dementia using DS face, and several said they would pursue this issue more closely in the future now that they were more aware of it.

The GPs were each responsible for relatively few patients with dementia (from 3 to 30). Most followed up the patients through systematic controls, while others often left it to the patient, relatives or home care service (HCS), to make contact. The GPs stressed the importance of working with the HCS/memory team and relatives in the follow-up.

Experience of risks from DS

Direct risks

The GPs had experienced that DS use could constitute a direct risk for patients' health. such as, elevated liver enzyme tests, creatinine, creatine kinase and INR (international normalised ratio) tests, that normalised when discontinuing the DS. In the same manner, DS had caused dizziness, lethargy, malaise and vomiting in patients. One GP had reported side effects from DS to RELIS (the Norwegian national network of regional medicines information and pharmacovigilance centres). Unlawfully added oestrogen, caffeine and narcotics in DS were mentioned. Several had been contacted by pharmacists and warned of interactions between DS and PD relating to specific patients. Regarding patients with dementia, the GPs recalled the use of fat-soluble vitamins over the recommended dose, and escitalopram-overdosing due to interaction with St. John's wort.

Indirect risks relating to dementia symptoms

The use of DS leads to confusion because of the many tins and boxes at home resulting in patients with dementia losing track of what they took and why. It was impossible to judge whether the products were effective, other than by discontinuing and evaluating afterwards.

Some informants had experienced that patients had confused PD with DS because the names were similar and had subsequently stopped taking the PD. One patient with

vascular dementia preferred to use an oats-based DS, rather than statins. There was also a concern that patients with dementia used more DS than recommended. Taking lots of tablets, especially large ones, affected elderly debilitated patient's appetite and contributed to malnutrition.

Some patients could have difficulty terminating Internet, mail-order or telephone sales. Relatives could be concerned about economic exploitation. Several GPs suggested that the DS industry exploited patients' health anxieties or economic gullibility, and that advertising played on this.

GPs' self-perception of their professional role including their attitudes towards DS and knowledge about DS

Unawareness of DS use

Patients' DS use was not a central part of the working day, and the informants did not follow patients with dementia more closely than other patient groups on this point. The GPs had a variable focus on DS, from having "parked it", or scarcely remembering situations where this came up, to having many thoughts about this. One GP reported to systematically investigate whether patients used DS. Certain "red flag situations" led to the GPs asking about DS use, e.g., warfarin use, high liver count and diffuse symptoms in the elderly. Most often conversation about DS was prompted by an enquiry from the patient, relatives or HCS. Some GPs did not generally inquire about DS, apart from vitamins. Several GPs thought that patients' use of DS was generally unknown. The use of DS might be discovered when the patient with dementia moved out of the home and all the containers were found. One GP thought that many compound products could slip under the radar as "my vitamin pills".

Several GPs mentioned that communication was essential to ascertain the use. It was important not to have a judgmental attitude towards patients who used DS without documented effect, but rather to ask about patients' motives to be "*someone patients wanted to consult with"* (ID 4, 9). Several said they thought that patients might refuse to discuss their use with them because they were afraid of being blamed, ridiculed, not being heard, or that it was not relevant. Some GPs consciously tried to hide their scepticism from patients, to ensure communication, and to show in many ways that they were not only concerned with treatment using PD but could also be open to talking about other methods of improving health.

Unclear lines of responsibility

Unlike PD, which quite clearly is the GP's responsibility, DS was regarded as being the patient's own responsibility by all the GPs. The only exception was DS specifically initiated by the GP. On further questioning about whether this also applied in dementia cases, all the GPs accepted the need for more responsibility for safety reasons.

"For those who have dementia and cannot understand relevant information, then the responsibility is more on us" (ID 2).

Responsibility for the use of DS in patients with dementia did not seem to be an issue any of the GPs had considered before. The GPs did not want the primary responsibility of safeguarding DS use in these patients, especially since they had not initiated the use. Instead, they felt that relatives, who often had bought these preparations, should be more responsible. However, ambiguities related to the responsibility existed as GPs perceived that not all patients or relatives understood the potential risk of using the DS. Several GPs also saw HCS as more responsible than themselves.

The GPs defined their responsibility as mapping use and possible risks, and after that to give advice. Any responsibility beyond that was less clear. One GP, who asked patients systematically about their use of DS, also tried to evaluate whether the products were effective. Generally, the usage then ended. Several took, or would take when relevant, the initiative to have harmful products removed with the help of relatives or HCS.

A lack of available, reliable information on effects, safety profile and sometimes also DS contents was the main reason that this responsibility was perceived as problematic.

*"I actually feel I **should** take quite a large responsibility for this because it may have implications for medications I have prescribed, and overall health, but I have to admit I haven't taken that responsibility"* (ID 10).

One GP considered:

"We must deal with the reality that people use a number of things which affect the medicines we prescribe. So, if we refuse to deal with that, then that could even be dangerous for the patients" (ID 9).

Attitudes towards DS

Although some described DS as a nutritional supplement/a kind of food and not part of medical treatment, most GPs felt that DS belonged together with PD review rather than lifestyle in anamnesis, because DS and PD can interact. Hence, DS has a place in medical practice.

"I think it belongs in our medical discipline, given that it actually affects the body and may interact negatively with PD" (ID 10).

Nobody was dismissive of patients using DS, but several expressed a certain scepticism, as they can make people sick, be expensive and have a limited effect. One GP did not

want to deal with DS in the current situation where exact information often is lacking; at the same time, this GP, and several others, wanted an overview of DS with positive effects, in order to advise the patients. One GP had a consistent curiosity and positive attitude to herbs. Nobody had experienced conflicts with patients or relatives caused by DS. Placebo effect was claimed to be beneficial for patients, especially for disorders with no medical cure. Some were also open to the idea that certain DS products could have a result beyond the placebo effect. Respect was voiced for patient choice and self-determination.

"If people believe in it and it actually works, why run it down as long as it's not dangerous" (ID 8).

Understanding of the professional role

Three attitudes to the understanding of the professional role emerged in the interviews.

Uncertainty/risk assessment

Lack of access to valid information about individual DS products meant that many of the GPs felt uncertain and deemed it difficult to talk to patients about this. They ended up preferring to say, "*I don't know about this, but it doesn't seem risky for you*" (ID 2/3/4/6/7/8/10/13/14) "*if you can afford it*" (ID 3/7/13). But several pointed out that "*my saying that you can use this doesn't mean I recommend it*" (ID 2/3/4/6/7/10/12).

"The whole problem is that I don't have a proper assessment basis. It's exceedingly difficult, since I can't find any quality-based information about whether ginkgo biloba has any interaction with a specific medication. I don't feel comfortable with that" (ID 12).

Others thought that if they did not find concrete safety threats relating to the specific product, then patients could try and see how it went.

"I'm not sure I can find secure knowledge about it, but that's not so important to me, as long as the actual patient experiences a positive effect and there aren't any side effects" (ID 11).

Whether this discrimination in risk assessment reflected their medical practice in general did not emerge.

Advisor

The GPs used the term "advice" rather than "recommendation" regarding DS. "*I'd like to be someone they consult with and help them make sensible choices*" (ID 9). Some suggested this was a general attitude in their medical practice. It was emphasised that patients make their own choices. Some GPs stressed patients' autonomy.

Holistic thinking

The GPs were concerned with holistic thinking, including diet and lifestyle. Some realised during the interview that holistic thinking should also include DS to a greater extent than is currently the case. On the other hand, one GP thought that only medical issues belong in a doctor's consultation, and not "medicalisation" (27), one example of which could be follow-up of DS, "where only quasi-knowledge is available". One GP mentioned the limitations of evidence-based medicine.

External factors challenging the caretaking of patients with dementia who use DS

Lack of available information

The GPs initially said that they remembered little or no teaching about DS in their medical education or training. What they remembered best was that DS could cause

negative interactions with PD. Only one GP remembered that the doctor's responsibility to ask routinely about the use of DS was emphasised in training. Nobody mentioned whether DS had been discussed regarding vulnerable patient groups, e.g., patients with dementia.

Relevant national medical journals contain only curiosity articles on DS. Nobody had attended continuing education courses where DS was mentioned. The GPs did not generally receive advertising for DS, apart from vitamins and fatty acids.

It appeared that the GPs who had the most ideas about DS had obtained extra information about DS by having written a master's dissertation on this topic, being interested in herbs even before starting their medical training or had been taught about DS used as therapy in their medical training which took place outside of Norway.

To find reliable information independent of the producer was seen as particularly difficult for compound preparations with herbs, whilst all the GPs felt that purely vitamin-based preparations were manageable to deal with. Information from Internet searches (Google) was judged to be unreliable and even deciding the exact contents of the preparations could be difficult.

"Sales promotions usually come up first, then maybe an explanation that it's a decoction or extract from a plant, root, or bark, without specifying the active ingredient. Obviously, the decoction of a plant will contain many ingredients" (ID 4).

After googling the contents, the GPs searched in national interaction databases. Some had also contacted RELIS, and risk in a specific usage situation had been assessed. Since the GPs often did not find valid studies on the effects of DS, their focus was often limited to finding documentation about whether it possessed any risk for the patient.
The patients'/relatives' concern were "is it good for my/their health".

"I have very little sense of ownership or control engaging with DS when I haven't learned anything sensible about it, not during my training or in later life, aside from the minerals and vitamins we use" (ID 12).

Lack of time

Some GPs suggested that limited time per patient, many pressing issues relating to each patient, and fear of falling behind with consultations were reasons why DS were not on the agenda. Most did not bring up time specifically, and some felt they had time to ask about DS in the same way as they already did about diet and tobacco. One said that time had to be viewed in the context of lack of knowledge, and that reliable and easily obtainable information about DS-products was needed. One GP considered it unproblematic to assess DS use among patients with dementia. However, if he had to do it for all patients, it would be too time consuming.

Lack of sufficient tools

According to the GPs, not all DS were integrated in the GPs' prescription module/prescription mediator set-up, because these are not included or maintained by the FEST (Norwegian National Formulary). FEST is an updated database from the Norwegian medicines agency of preparations that can be prescribed in Norway. FEST only includes PD/preparations and therefore excludes most DS; including DS sold in pharmacies. As a result, most DS that a patient uses regularly are not included in a GP's overview. These DS would therefore not be included in a patient's referral letter, nor in the patient's automated dispensing system (ADS). This lack of integration contributed to GPs unawareness of what the patients were taking.

Insufficient laws and regulations

Several were frustrated because they thought the authorities are not taking responsibility for laws and regulations, especially regarding the marketing of DS,

including requirements to document their effect. Governmental authorities were credited with the responsibility that there should be available reliable information on all DS sold in Norway.

Suggestions to improve the safety

Several informants argued that GPs should be more focused, e.g. asking about DS in red flag situations and a few said that HCS should make contact if they observed DS which were not registered in the prescription module in patients with dementia's homes.

Although the informants thought there were too many guidelines already, several could envisage a guideline with an overview of which DS could be safely recommended because documentation of their contents/indication/expected effect/dosage/possible side effects existed.

Several thought it would be an advantage if patients' use of DS could be incorporated in the prescription module so that they had an overview, could do digital interaction searches and easily convey information about the patients' use to different levels in the health service. An integration could also increase the sense of responsibility. DS could also be incorporated in the guide for PD review, possibly with its own fee-for-service reimbursement to motivate this being done. The GPs wanted stricter legislation regarding marketing and sales of DS. They also wanted greater control over product purity, and a correct table of contents for active ingredients and quantities. One GP recommended that pharmacies should not be allowed to sell DS which lacked documentation of effect or safety.

Some thought information campaigns encouraging DS users/relatives to discuss this with their GP would be useful. Others opposed this due to pressure of time or because GPs cannot provide documentation on the effect and safety as these do not exist for

many products. In order to save time, it was suggested that nurses could obtain an overview of patients' use of DS.

When asked whether all the DS used regularly by a patient with dementia should be included in the ADS to avoid incorrect dosage and clutter, GPs were ambivalent. They wanted to avoid patients taking an incorrect dose, but at the same time they had to be able to vouch for what was listed on the prescription card. If no studies of effect/risk were available, this would be difficult. In the case of indication, if the GP had initiated treatment, or if the products were included in the prescription module, that would be fine. Some said it would be fine if there was no information about negative interactions. There was uncertainty as to whether DS were placed in the ADS at present.

Discussion

Main findings

All GPs were aware of the possibility for interactions between DS and PD, and several had experienced patients developing adverse effects from DS. However, their awareness of the potential of DS-associated harm in patients with dementia was less prominent. The issue of patients with dementia as a vulnerable group had never been brought up as relevant related to DS use, and DS were hardly discussed at all in the available fora of medical knowledge development (medical school, medical journals, medical conferences). The GPs professional practice varied from avoiding discussing DS, to more actively seeking information about patients' DS use and adjusting their attitude to be informed about such use, possibly according to how they perceived their professional role in general.

An important reason why GPs had problems keeping track of patients' DS use, was the lack of appropriate tools in the electronic patient journal. The inability to register DS in

the medical journal was one of the informants' most important suggestions for improvement of these patients' safety.

Even though the GPs were aware of the potential harm from DS they experienced a lack of valid information about some DS which made it impossible to give specific advice about the effect and sometimes also safety of the products. This was an important reason why they found it difficult to take the responsibility for the safety of patients with (or without) dementia who use DS. We believe the frustration some of the GPs expressed, and for some also an avoidance of the theme, may be a result of a weakness in the system involving the definition of DS as merely diet, the lack of control/regulation and thus a lack of information and documentation on safety and effect of some DS-products.

Strengths and weaknesses

A strength of the study is the originality of the research question and relevance for practice.

It is important to consider how the preconceptions of the analytic team may have influenced the results, i.e., the interpretative validity of the study. HR's previous clinical experience with patients with dementia have been a strength in planning and conducting the study. We believe the multidisciplinary background of the research team has increased the quality and relevance of the interview questions and the interpretation of the results. The advantage of having several people involved in the analytic process increases the trustworthiness of the findings. To further enhance credibility, we applied investigator triangulation, method triangulation and member check. To increase confirmability, one author (TG) conducted a "top-down" check – reading the result section and mirroring it with the transcripts.

We obtained rich, high-quality data in both face-to-face and telephone interviews; however, we are aware that interviewing some of the GPs by telephone may cause loss of some non-verbal information. Therefore, neither information about contextual data and facial expressions, nor body language was included in the analysis. The effort made to select a purposive sample was successful and ensured transferability.

Findings related to other studies

The GPs responsibility for patients with dementia who use DS has, to our knowledge, not been studied before. In previous studies of the professional caretaking of patients with dementia who use DS both pharmacy and HCS employees attributed GPs the greatest responsibility for the safe use of DS by patients with dementia (24, 25). The GPs attributed HCS and caregivers a greater responsibility than themselves.

The informants discussed DS with their patients, although several noticed that this happened infrequently, and some were reluctant to have these discussions. Tarn et al. evaluated 1477 GP consultations in Southern California in 2009-2010 (22). DS were discussed in one-fourth of the consultations. The most common issues were correct administration, potential risks, effectiveness and costs. Ciba et al. found that one fourth of 515 medical doctors (in specialised health care) had received information about adverse reactions of DS from their patients (4). This may implicate that use of DS and potential adverse reactions may be more common than indicated by our informants.

Even though the informants indicated that the problem seldom came up, some discussed DS with patients more frequently than others. The GPs who were informed about patients DS use more often said that they made an effort to be informed. Djuv et al. found that only one fourth of Norwegian patients recruited from a GPs office, disclosed use of herbs to their GP (12). Several studies have shown that the most common reason for non-disclosure of DS use is that health care personnel do not ask (4, 13). GPs practice

style affect patients (28) and clinical decision making varies between medical doctors even in comparable situations (20, 29). This includes medical tasks that are not done, such as not obtaining sufficient information from histories and medical examinations (30). The informants had varying views on their own professional role as a GP. Some were active and asked about patients' DS use and initiated systematic follow-up of these patients. Others were more passive and viewed themselves more as a consultant, limited to answering questions regarding DS use when the patient specifically asked about it. One GP did not want to answer questions because the scientific knowledge about specific DS often do not exist. Knowing that maybe the most important reason for non-disclosure of DS is not being asked, makes the passive practice style less safe regarding adverse effects and interactions with PD.

The informants underlined the need for an evidence base for DS. The lack of available information on effect and safety, in some cases also uncertainty about the contents of the DS, was the major reason they felt uncomfortable discussing DS with their patients. In a recent review study from New Zealand perceived lack of evidence, lack of regulation, potential side effects, interactions with PD, and cost were the GPs (n=884) most important concern against complementary and alternative medicine including DS (31).

The GPs difficulty dealing with DS professionally may on a deeper level represents uncertainty. Uncertainty is a subjective, cognitive experience. The defining feature of this state of mind appears to be the lack of knowledge about some aspects of reality. Especially when the likelihood of risk is unknown, lack of knowledge promotes pessimistic appraisals of risk as well as avoidance of decision-making (32). Uncertainty is known to affect medical practice (20).

Meaning of the study

GPs can uncover DS use by patients with dementia as part of their job. Although all the informants wanted to help their patients, this study revealed a lack of attention which may represent a general attitude among medical doctors towards the safety aspect of DS. The topic almost never comes up in arenas where GPs gain medical knowledge, except during medical studies in lectures covering DS-PD interactions. The topic of patient safety related to DS use needs to be addressed, and the medical education should highlight both the responsibility to uncover such use, and the need to secure vulnerable patient groups, such as patients with dementia. Since patients do not always disclose DS use, the GPs need to ask to be informed. GPs collaborate with HCS and sometimes with pharmacy employees about DS in a non-systematic fashion. A systematic collaboration to secure the DS use by this patient group would be a huge advantage, but a clarification of each profession's role and responsibilities seems necessary. GPs, employees in pharmacies and HCS are all health care professionals who can, as part of their job, discover use of DS by patients with dementia (24, 25). If the DS use is continued, how should safe administration be ensured? The GPs did not want DS without valid information about safety, efficacy and content to be delivered by the ADS. This is in line with pharmacy employees (24) and some of the employees in HCS (25). The GPs had no specific suggestions for safe methods to ensure proper administration of DS to patients with dementia. This is therefore a topic that needs to be addressed. If none of the central health care professions see caretaking of patients with dementia who use DS as their responsibility, this responsibility is in practice left to this vulnerable patient group, unless the patients have a caregiver to help them.

There are several hindrances for the GPs to take on this responsibility, for instance lack of awareness of the topic, inadequate tools in the electronic patient journals, and especially lack of valid information about content, safety and effect of many DS.

Integrated information about DS in the patients' medical journal could provide the opportunity of automatic data analyses of potential interactions between DS and PD. Moreover, it would prompt the GPs to inquire about the patients' DS use and thus increase the feeling of responsibility. Several of the informants had experienced that specific DS caused harm to their patients, so monitoring DS use is an imperative start in securing safety. It is also important that information is passed on between the different levels of health care service (information transfer at hospital admission), and having the relevant DS registered in the patient's journal, will facilitate this. The availability of valid information about every marketed DS is a precondition for safe use. Only the health authorities can demand secure information about safety, effect and correct content for all marketed DS. Attention must be drawn towards the complex organisational- and system-level mechanisms responsible for creating and maintaining a situation where DS are in a grey area between food and medicine.

The Norwegian legal regulations on DS are under revision. We recommend regulations that enforce stricter control and that considers the known or unknown risk/benefit profile of DS. In addition, we see a need to clarify the different health care personnel's responsibilities regarding DS consumption.

The use of DS by patients with dementia is challenging for GPs, and several regulatory changes are needed, if caretaking of these patients and safeguarding their use of DS should be a manageable task in the GPs' daily practice. The GPs included in this study generally acknowledged the problematic situation and expressed their wish to have available appropriate tools to support the caretaking of these patients. The study also shows that increased awareness of the problem could contribute to improving the safety of DS use for this vulnerable patient group in the future.

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Ethics

The Regional Committee for Medical and Health Research Ethics had no objections to the study design (2016/1775). As no patients were included, the project was defined as "quality assurance". The study was approved by Norwegian Centre for Research Data (2019/357669). The data from this study are transcripts. We do not share these data as this would be a violation against confidentiality, ref the Norwegian Data Protection Agency.

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Competing interests

None of the authors have any competing interest to declare.

References

1. Dietary Supplement Health and Education Act of 1994. Public Law No. 103-417.Paragraph 3a., (1994).

2. Starr RR. Too Little, Too Late: Ineffective Regulation of Dietary Supplements in the United States. Am J Public Health. 2015;105(3):478-85.

3. Bailey RL, Gahche JJ, Miller PE, Thomas PR, Dwyer JT. Why US Adults Use Dietary Supplements. JAMA Intern med. 2013;173(5):355-61.

4. Chiba T, Sato Y, Nakanishi T, Yokotani K, Suzuki S, Umegaki K. Inappropriate Usage of Dietary Supplements in Patients by Miscommunication with Physicians in Japan. Nutrients. 2014;6(12):5392-404.

5. Persson T, Popescu BO, Cedazo-Minguez A. Oxidative stress in Alzheimer's disease: why did antioxidant therapy fail? Oxid Med Cell Longev. 2014;2014:427318.

6. McCleery J, Abraham RP, Denton DA, Rutjes AW, Chong LY, Al-Assaf AS, et al. Vitamin and mineral supplementation for preventing dementia or delaying cognitive decline in people with mild cognitive impairment. Cochrane Database Syst Rev. 2018;11(11):Cd011905.

7. Burckhardt M, Herke M, Wustmann T, Watzke S, Langer G, Fink A. Omega-3 fatty acids for the treatment of dementia. Cochrane Database Syst Rev. 2016;4(4):Cd009002.

8. Chan ES, Bautista DT, Zhu Y, You Y, Long JT, Li W, et al. Traditional Chinese herbal medicine for vascular dementia. Cochrane Database Syst Rev. 2018;12(12):Cd010284.

9. Landin J, Frolich L, Schwarz S. Use of alternative therapies in patients with dementia and mild cognitive impairment: a prospective, controlled study. Int J Geriatr Psychiatry. 2008;23(11):1163-5.

10. Risvoll H, Giverhaug T, Halvorsen KH, Waaseth M, Musial F. Direct and indirect risk associated with the use of dietary supplements among persons with dementia in a Norwegian memory clinic. BMC Complement Altern Med. 2017;17(1):261.

11. Cross AJ, George J, Woodward MC, Ames D, Brodaty H, Elliott RA. Dietary Supplement Use in Older People Attending Memory Clinics in Australia. J Nutr Health Aging. 2017;21(1):46-50.

12. Djuv A, Nilsen OG, Steinsbekk A. The co-use of conventional drugs and herbs among patients in Norwegian general practice: a cross-sectional study. BMC Complement Altern Med. 2013;13:295.

13. Gardiner P, Sadikova E, Filippelli AC, White LF, Jack BW. Medical reconciliation of dietary supplements: don't ask, don't tell. Patient Educ Couns. 2015;98(4):512-7.

14. Parvez MK, Rishi V. Herb-Drug Interactions and Hepatotoxicity. Curr Drug Metab. 2019;20(4):275-82.

15. Cohen PA, Avula B, Wang YH, Zakharevich I, Khan I. Five unapproved drugs found in cognitive enhancement supplements. Neurol Clin Pract. 2020.

16. Wardle JL, Adams J. Indirect and non-health risks associated with complementary and alternative medicine use: An integrative review. Eur J Integr Med. 2014;6(4):409-22.

17. Hasvold T, Christensen B. In: Kringos DS, Boerma WGW, Hutchinson A, Saltman RB, editors. Building primary care in a changing Europe: Case studies (Internet). Copenhagen (Denmark): European Observatory on Health Systems and Policies. 2015. PMID:29064645.

18. Strand BH, Vollrath MEMT, Skirbekk VF. Dementia. Public Health Report - Health Status in Norway (online publication): Norwegian Institute of Public Health [updated 10.12.2019; read 01.07.22]. Available from: https://www.fhi.no/en/op/hin/health-disease/dementia-in-norway/.

19. Gaardsrud PØ. Styringsdata for fastlegeordningen 4. kvartal 2020 (GP statistics 4 th quarter 2020, document in Norwegian). The Norwegian Directorate of Health (Helsedirektoratet) official webpage.Read 01.07.22]. Available from: https://www.helsedirektoratet.no/statistikk/fastlegestatistikk/Hovedtallsrapport%20fastlegeordningen%20landstall%202020-4.pdf/_/attachment/inline/987b5db5-9d42-48bf-badb-6f225eea825b:11c3859a805483c6183d8d4d1deaf2de66903ef8/Hovedtallsrapport%20fastlegeordningen%20landstall%202020-4.pdf.

20. Al-Azzawi R, Halvorsen PA, Risør T. Context and general practitioner decision-making - a scoping review of contextual influence on antibiotic prescribing. BMC Fam Pract. 2021;22(1):225.

21. Boustani M, Schubert C, Sennour Y. The challenge of supporting care for dementia in primary care. Clin Interv Aging. 2007;2(4):631-6.

22. Tarn DM, Paterniti DA, Good JS, Coulter ID, Galliher JM, Kravitz RL, et al. Physician-patient communication about dietary supplements. Patient Educ Couns. 2013;91(3):287-94.

23. Thyrian JR, Hertel J, Wucherer D, Eichler T, Michalowsky B, Dreier-Wolfgramm A, et al. Effectiveness and Safety of Dementia Care Management in Primary Care: A Randomized Clinical Trial. JAMA Psychiatry. 2017;74(10):996-1004.

24. Risvoll H, Musial F, Halvorsen KH, Giverhaug T, Waaseth M. Pharmacy employees' involvement in safeguarding persons with dementia who use dietary supplements: Results from a survey of Norwegian pharmacies. BMC Complement Altern Med. 2019;19(1):179.

25. Risvoll H, Musial F, Waaseth M, Giverhaug T, Kjell H, Halvorsen. Home care service employees' contribution to patient safety in clients with dementia who use dietary supplements: a Norwegian survey. Scand J Prim Health Care. 2021:1-10.

26. Malterud K. Systematic text condensation: a strategy for qualitative analysis. Scand J Public Health. 2012;40(8):795-805.

27. Illich I. Medical Nemesis. Lancet. 1974;1(7863):918-21.

28. Fadlon I, Van Parys J. Primary care physician practice styles and patient care: Evidence from physician exits in Medicare. J Health Econ. 2020;71:102304.

29. Cham G, Davis N, Strivens E, Traves A, Manypeney G, Gunnarsson R. Factors correlating to the propensity of general practitioners to substitute borderline vitamin B12 deficiency. Scand J Prim Health Care. 2018;36(3):242-8.

30. Hayward RA, Asch SM, Hogan MM, Hofer TP, Kerr EA. Sins of omission: getting too little medical care may be the greatest threat to patient safety. J Gen Intern Med. 2005;20(8):686-91.

31. Liu L, Tang Y, Baxter GD, Yin H, Tumilty S. Complementary and alternative medicine - practice, attitudes, and knowledge among healthcare professionals in New Zealand: an integrative review. BMC Complement Med Ther. 2021;21(1):63.

32. Han PK, Klein WM, Arora NK. Varieties of uncertainty in health care: a conceptual taxonomy. Med Decis Making. 2011;31(6):828-38.

Semi structured interview guide general practitioners (GPs) (translated and modified)

Opening questions:

How many of your patients have dementia?

Can you describe how you assess your patients with dementia?

Possible follow up questions:

Do you involve caregiver/home care service in the assessment? *

Is the assessment systematic? *

Do you use guidelines?

What is your opinion on guidelines in general?

Can use of guidelines interfere with your professional autonomy?

Can use of guidelines make it more difficult to treat each patient as an individual?

Main questions

How do you understand the term dietary supplements (DS)? (for clarification of the term)

How often do you ask your patients with dementia about their use of DS in order to secure this use?

How do you assess use of DS among your patients?

Possible follow up questions:

What do you do to improve the safety of patients with dementia who use DS?

Does your assessment of patients with dementia who use DS differ from the assessments of cognitive healthy patients? Please explain how.

Do you conduct home visits to these patients?

How often do patients ask you about DS? Which issues are addressed? *

Do you address DS use when you talk about prescribed medication or when you discuss their lifestyle? *

Can you give an example of adverse events or interactions that have happened because a person with dementia used DS? If not, can you give examples from other patients?

How do you handle, or how would you have handled, adverse events or interactions in patients who used DS?*

Can you provide examples of how you, caregivers, or patients have raised the issue of DS use by these patients? *

Have you had positive or negative experiences with DS in your professional career? Please explain. *

How do you secure that your patients with dementia administer their dietary supplement correctly (use of the automated drug dispensing system)?

If you do not ask your patients about DS as part of your routine assessment, what is the reason for this?

Can you give examples of ethical dilemmas you have found yourself in that are related to patients with dementia who use DS?

Have patients' use of DS led to any conflicts? *

How can one improve the assessment of patients with dementia who use DS?

Would you like to use a guideline for assessment of patients with dementia who use DS? Why? Why not?

Should DS be included in a central database known as the prescription module/prescription mediator set-up? And in the patients' medical journal? *

Are DS an issue when you perform medication reconciliation? (or possibly fee-for-service reimbursement)? *

Poster with information for patients hanging in the GPs' office? *

Measures from health authorities? *

Collaboration between different involved parties? (Home care service, next of kin, nurses, et cetera)? *

What is your understanding/interpretation of the term responsibility? (as in GPs' responsibility)?

How far does the GPs responsibility reach for patients' use of DS?

Possible follow up questions:

Do you make other considerations about your responsibility towards persons with dementia than for patients without cognitive impairment? If so, why?

Do you accept the responsibility for the safety of patients' use of DS? Why/why not?

Regarding patients' use of DS, which part of this use does not fall under the responsibility of a GP? Please give examples.

Who has the main responsibility for the safety of persons with dementia who use DS? *

Which are the main hindrances for taking the responsibility for the safety of patients with dementia who use DS?

Possible follow up questions:

Can you think of a legal matter that can be a hindrance?

Can you think of an ethical matter that can be a hindrance?

Can you think of a practical matter that can be a hindrance?

In your opinion, where can one best find reliable, scientific information about DS?

Possible follow up questions:

Where do you find information about DS? *

How was your medical education when it comes to DS?

Were you trained in the assessment of DS use during your medical education? *

As a professional, have you received advertising material for DS? *

Have you read articles about DS in Journal of the Norwegian Medical Association /non-medical literature? *

Do you get information about DS on web pages? (Relis/NAFKAM)?*

Have DS been a subject in continuing education or in medical conferences? *

Do you discuss DS with your colleagues? *

How do most GPs feel about use of DS among their patients? Is your attitude different from the majority's' in any way? How?

End Question

Do you want to share something that is important about GPs' assessment of this patient group; something you have experienced, reflections, or something else?

DS; dietary supplements

* New question developed in the process

Supplementary material 2: The authors preconception

TG has worked as a teacher in pharmacy and as a consultant at a drug information center serving health personnel. In both roles searching information and giving advice about the use of dietary supplements was a part of her practice.

KHH is a pharmacist who, for some years, has studied the use of medication and dietary supplement in older adults with special attention towards the quality of such use. In relation to the use of dietary supplements, the regulations are unclear about responsibilities for involved health care personnel. In addition, several supplements inform about possible effects that are highly disputable - from an evidence point of view. With the increasing number of older adults with dementia and cognitive decline, it is necessary to investigate several aspects related to health, nutrition and wellness. I believe that this can be solved interdisciplinary, where the views of different health care professions, alongside with opinions from next of kin and the patients themselves are taken into considerations. The importance of understanding why people use dietary supplements and perspectives about attributed responsibilities by health care personnel is of especial value to ensure the safe use of these products in older adults with reduced abilities to safeguard themselves. Also, with the increasing use of different supplements, there is a necessity to develop systems and regulations that monitor different aspects of such use. To succeed, different health care personnel will need to contribute.

FM are a psychologist with a research background in neuroscience, biological psychology, clinical psychology, clinical trials, research methodology, and alternative

treatment / complementary medicine (CAM) and risk related to these interventions. Her first contact with alternative treatment / CAM was when she became head of research at the Department for Complementary and Integrative Medicine at the University Duisburg-Essen, Germany in 2006. From that time on she has worked scientifically within the field of CAM. Her major area of expertise in CAM is the conductance of clinical studies on pain in the non-pharmacological arena as well as the integration of biomarkers into these trials, with the aim to explore the potential biological mechanisms of effect. In 2015 she was appointed the first Norwegian professorship for "Healthcare Research – Alternative Treatment" at NAFKAM, Department of community Medicine, The Arctic University of Norway, UiT.

As head of research at Department for Complementary and Integrative Medicine at the University Duisburg-Essen, Germany, she has conducted or been involved in more than 20 studies involving non-pharmacological interventions, such as acupuncture, cupping, Alexander technique, Yoga, medical leeches etc. Since she was quite unfamiliar with these techniques when she started in the field, she felt that she needed to try at least those techniques that we investigated in clinical trials on herself, before exposing study participants to it. Thus, she has experienced acupuncture, dry and wet cupping, GuaSha massage, massage, osteopathy, and healing as part of her profession as a CAM researcher.

In opposite to that, her research and personal experience with herbs and dietary supplements is limited. Having multiple sclerosis, she does take Møller Tran, vitamin B, and another supplement containing short chain fatty acids. There is scientific evidence for these supplements, which is the basis for her decision to take them.

Her principal approach to research in CAM is that there is no difference to clinical research in the conventional arena. She is a quantitative researcher, and, in her opinion,

research methodology must be as sound, and evidence based as it should be the case in any type of clinical research. Possibly even more so, because CAM interventions are usually not performed within a conventional healthcare setting, which may increase direct or indirect risk to patient safety.

Reading through the interviews, she realized, that her focus of attention was influenced by her background as a psychologist. She noticed that she was interested in aspects, possibly relating more to a meta-level beyond the immediate question of risk, although related to it. Such aspects are the “perception and concept of men/patient “, “the doctor-patient dyad/relationship”, the understanding of the “doctors’ responsibilities” and “accept” of the patients’ wishes and attitudes. She believes that she focused on these aspects, because assume that they are related to potential indirect risk for the patients.

HR has worked as a clinician in the field of neurology/dementia/rehabilitation for 25 years. As a clinician in a memory clinic, she often received questions from patients or caregivers about dietary supplements. The questions were about safety and effects and difficult to answer as the information on specific DS were sparse. This led to a contact with TG at the pharmacovigilance center, and the idea for this study as a need to focus more on this safety aspect was discovered. HR has otherwise little experience with DS or CAM.

TR believe that many patients use various forms of dietary supplements, herbal medicines, vitamins etc. This is not something he know a great deal about as family physician, and he hope patients do some research if they take it. When it comes to patients with dementia or others where the judgment and/or memory is impaired, this

is something he feel even more uncertain about. He rarely has all the information about what medications the patient actually uses, and it is somewhat unclear where the responsibility to ensure alignment with prescription drugs lie. Maybe with him? He knows that there are inappropriate combinations, but he mostly focuses on the information he has in the medical record.

TS is trained as an acupuncturist and homeopath. She holds a PhD in medicine. Phytotherapy was a substantial part of her training as homeopath, and as a former health care provider working outside the official health care system, she prescribed dietary supplements and herbs to patients daily. However not so often to patients with dementia. Her PhD and post-doc focused on risk and patient safety in the complementary and alternative (CAM) field.

MW is a pharmacist with a PhD in epidemiology and a background from community pharmacy practice. Her interest in determinants of dietary supplements (DS) use started at the pharmacy and continued through her academic training and into research on general population survey data. She has been teaching pharmacy students about DS, particularly herbal supplements, for fifteen years, with a special focus on safety. MW's preconception of general practitioners' views on DS was that, as a group, they do not concern themselves with patients' use of DS and do not consider this a problem that they need to handle.

Works cited

1. Katz S. Assessing self-maintenance: activities of daily living, mobility, and instrumental activities of daily living. J Am Geriatr Soc. 1983;31(12):721-7. DOI: 10.1111/j.1532-5415.1983.tb03391.x.
2. Wekre LJ, Melby L, Grimsmo A. Early experiences with the multidose drug dispensing system--a matter of trust? Scand J Prim Health Care. 2011;29(1):45-50. DOI: 10.3109/02813432.2011.554002.
3. World Health Organization (WHO). Traditional, Complementary and Integrative Medicine 2021 [cited 14.04.23. web page]. Available from: https://www.who.int/health-topics/traditional-complementary-and-integrative-medicine#tab=tab_1.
4. Dietary Supplement Health and Education Act of 1994. Public Law No. 103-417. Paragraph 3a, (1994).
5. de Wit M, Abma T, Koelewijn-van Loon M, Collins S, Kirwan J. Involving patient research partners has a significant impact on outcomes research: a responsive evaluation of the international OMERACT conferences. BMJ Open. 2013;3(5):e002241. DOI: 10.1136/bmjopen-2012-002241.
6. World Health Organization (WHO). Global patient safety action plan 2021–2030: towards eliminating avoidable harm in health care. Page 1. World Health Organization (WHO); 2021.
7. Helvik AS, Høgseth LD, Bergh S, Šaltytė-Benth J, Kirkevold Ø, Selbæk G. A 36-month follow-up of decline in activities of daily living in individuals receiving domiciliary care. BMC Geriatr. 2015;15:47. DOI: 10.1186/s12877-015-0047-7.
8. Winblad B, Amouyel P, Andrieu S, Ballard C, Brayne C, Brodaty H, et al. Defeating Alzheimer's disease and other dementias: a priority for European science and society. Lancet Neurol. 2016;15(5):455-532. DOI: 10.1016/s1474-4422(16)00062-4.
9. Cao Q, Tan CC, Xu W, Hu H, Cao XP, Dong Q, et al. The Prevalence of Dementia: A Systematic Review and Meta-Analysis. J Alzheimers Dis. 2020;73(3):1157-66. DOI: 10.3233/jad-191092.
10. GBD 2019 Dementia Forecasting Collaborators. Estimation of the global prevalence of dementia in 2019 and forecasted prevalence in 2050: an analysis for the Global Burden of Disease Study 2019. Lancet Public Health. 2022;7(2):e105-e25. DOI: 10.1016/s2468-2667(21)00249-8.
11. Gjøra L, Strand BH, Bergh S, Borza T, Brækhus A, Engedal K, et al. Current and Future Prevalence Estimates of Mild Cognitive Impairment, Dementia, and Its Subtypes in a Population-Based Sample of People 70 Years and Older in Norway: The HUNT Study. J Alzheimers Dis. 2021;79(3):1213-26. DOI: 10.3233/jad-201275.
12. Tisher A, Salardini A. A Comprehensive Update on Treatment of Dementia. Semin Neurol. 2019;39(2):167-78. DOI: 10.1055/s-0039-1683408.
13. Handels RLH, Skoldunger A, Bieber A, Edwards RT, Goncalves-Pereira M, Hopper L, et al. Quality of Life, Care Resource Use, and Costs of Dementia in 8 European Countries in a Cross-Sectional Cohort of the Actifcare Study. J Alzheimers Dis. 2018. DOI: 10.3233/jad-180275.
14. Wimo A, Guerchet M, Ali GC, Wu YT, Prina AM, Winblad B, et al. The worldwide costs of dementia 2015 and comparisons with 2010. Alzheimers Dement. 2017;13(1):1-7. DOI: 10.1016/j.jalz.2016.07.150.
15. Bailey RL, Gahche JJ, Miller PE, Thomas PR, Dwyer JT. Why US Adults Use Dietary Supplements. JAMA Intern med. 2013;173(5):355-61. DOI: 10.1001/jamainternmed.2013.2299.

16. Starr RR. Too Little, Too Late: Ineffective Regulation of Dietary Supplements in the United States. Am J Public Health. 2015;105(3):478-85. DOI: 10.2105/ajph.2014.302348.
17. Persson T, Popescu BO, Cedazo-Minguez A. Oxidative stress in Alzheimer's disease: why did antioxidant therapy fail? Oxid Med Cell Longev. 2014;2014:427318. DOI: 10.1155/2014/427318.
18. McCleery J, Abraham RP, Denton DA, Rutjes AW, Chong LY, Al-Assaf AS, et al. Vitamin and mineral supplementation for preventing dementia or delaying cognitive decline in people with mild cognitive impairment. Cochrane Database Syst Rev. 2018;11(11):Cd011905. DOI: 10.1002/14651858.CD011905.pub2.
19. Chan ES, Bautista DT, Zhu Y, You Y, Long JT, Li W, et al. Traditional Chinese herbal medicine for vascular dementia. Cochrane Database Syst Rev. 2018;12(12):Cd010284. DOI: 10.1002/14651858.CD010284.pub2.
20. Burckhardt M, Herke M, Wustmann T, Watzke S, Langer G, Fink A. Omega-3 fatty acids for the treatment of dementia. Cochrane Database Syst Rev. 2016;4(4):Cd009002. DOI: 10.1002/14651858.CD009002.pub3.
21. Rutjes AW, Denton DA, Di Nisio M, Chong LY, Abraham RP, Al-Assaf AS, et al. Vitamin and mineral supplementation for maintaining cognitive function in cognitively healthy people in mid and late life. Cochrane Database Syst Rev. 2018;12(12):Cd011906. DOI: 10.1002/14651858.CD011906.pub2.
22. The Norwegian Food Safety Authority. Regulations on food supplements: The Norwegian Food Safety Authority; 2014. [updated 05.10.20; cited 30.08.22. web page]. Available from: https://www.mattilsynet.no/language/english/food_and_water/food_supplements/regulations_on_food_supplements.16383.
23. The Norwegian Food Safety Authority. Omfattende ulovlig feilmerking av kosttilskudd: The Norwegian Food Safety Authority 2022. [updated 17.02.22; cited 14.04.23. web page]. Available from: https://kommunikasjon.ntb.no/pressemelding/omfattende-ulovlig-feilmerking-av-kosttilskudd?publisherId=10773547&releaseId=17926721.
24. Palmour N, Vanderbyl BL, Zimmerman E, Gauthier S, Racine E. Alzheimer's disease dietary supplements in websites. HEC Forum. 2013;25(4):361-82. DOI: 10.1007/s10730-013-9217-1.
25. The Norwegian Medicines Agency. Plantebaserte legemidler med markedsføringstillatelse 2016. [updated 19.08.21; cited 25.02.23. web page]. Available from: (https://legemiddelverket.no/godkjenning/godkjenning-av-legemidler/soknad-om-mt/mt-for-plantebaserte-legemidler-og-naturlegemidler/plantebaserte-legemidler-med-markedsforingstillatelse.
26. Cham G, Davis N, Strivens E, Traves A, Manypeney G, Gunnarsson R. Factors correlating to the propensity of general practitioners to substitute borderline vitamin B12 deficiency. Scand J Prim Health Care. 2018;36(3):242-8. DOI: 10.1080/02813432.2018.1487522.
27. Hamishehkar H, Ranjdoost F, Asgharian P, Mahmoodpoor A, Sanaie S. Vitamins, Are They Safe? Adv Pharm Bull. 2016;6(4):467-77. DOI: 10.15171/apb.2016.061.
28. Wooltorton E. Too much of a good thing? Toxic effects of vitamin and mineral supplements. CMAJ. 2003;169(1):47-8. DOI: Retrieved from: https://www.cmaj.ca/content/cmaj/169/1/47.full.pdf.
29. Nicholls SJ, Lincoff AM, Garcia M, Bash D, Ballantyne CM, Barter PJ, et al. Effect of High-Dose Omega-3 Fatty Acids vs Corn Oil on Major Adverse Cardiovascular Events in Patients at High Cardiovascular Risk: The STRENGTH Randomized Clinical Trial. JAMA. 2020;324(22):2268-80. DOI: 10.1001/jama.2020.22258.

30. Abdelhamid AS, Brown TJ, Brainard JS, Biswas P, Thorpe GC, Moore HJ, et al. Omega-3 fatty acids for the primary and secondary prevention of cardiovascular disease. Cochrane Database Syst Rev. 2020;3(3):Cd003177. DOI: 10.1002/14651858.CD003177.pub5.
31. Jia X, Gao F, Pickett JK, Al Rifai M, Birnbaum Y, Nambi V, et al. Association Between Omega-3 Fatty Acid Treatment and Atrial Fibrillation in Cardiovascular Outcome Trials: A Systematic Review and Meta-Analysis. Cardiovasc Drugs Ther. 2021;35(4):793-800. DOI: 10.1007/s10557-021-07204-z.
32. Begtrup KM, Krag AE, Hvas AM. No impact of fish oil supplements on bleeding risk: a systematic review. Dan Med J. 2017;64(5). DOI: Retrived at https://pubmed.ncbi.nlm.nih.gov/28552094/.
33. Whayne TF, Jr. Clinical Use of Digitalis: A State of the Art Review. Am J Cardiovasc Drugs. 2018;18(6):427-40. DOI: 10.1007/s40256-018-0292-1.
34. Ballotin VR, Bigarella LG, Brandão ABM, Balbinot RA, Balbinot SS, Soldera J. Herb-induced liver injury: Systematic review and meta-analysis. World J Clin Cases. 2021;9(20):5490-513. DOI: 10.12998/wjcc.v9.i20.5490.
35. Parvez MK, Rishi V. Herb-Drug Interactions and Hepatotoxicity. Curr Drug Metab. 2019;20(4):275-82. DOI: 10.2174/1389200220666190325141422.
36. Dergal JM, Gold JL, Laxer DA, Lee MS, Binns MA, Lanctot KL, et al. Potential interactions between herbal medicines and conventional drug therapies used by older adults attending a memory clinic. Drugs Aging. 2002;19(11):879-86. DOI: 10.2165/00002512-200219110-00005.
37. Auxtero MD, Chalante S, Abade MR, Jorge R, Fernandes AI. Potential Herb-Drug Interactions in the Management of Age-Related Cognitive Dysfunction. Pharmaceutics. 2021;13(1). DOI: 10.3390/pharmaceutics13010124.
38. Ito N, Saito H, Seki S, Ueda F, Asada T. Effects of Composite Supplement Containing Astaxanthin and Sesamin on Cognitive Functions in People with Mild Cognitive Impairment: A Randomized, Double-Blind, Placebo-Controlled Trial. J Alzheimers Dis. 2018;62(4):1767-75. DOI: 10.3233/jad-170969.
39. Dwyer JT, Coates PM, Smith MJ. Dietary Supplements: Regulatory Challenges and Research Resources. Nutrients. 2018;10(1). DOI: 10.3390/nu10010041.
40. Danielsen S, Ekrol PS. Food supplements in the Nordic countries. Pages 42-44. The Norwegian Food Authorities; 2009.
41. Kristoffersen AE, Quandt SA, Stub T. Use of complementary and alternative medicine in Norway: a cross-sectional survey with a modified Norwegian version of the international questionnaire to measure use of complementary and alternative medicine (I-CAM-QN). BMC Complement Med Ther. 2021;21(1):93. DOI: 10.1186/s12906-021-03258-6.
42. Bergli TL. NAFKAM-undersøkelsen 2020 2022 [updated 30.09.22; cited 14.03.23. web page]. Available from: https://nafkam.no/nafkam-undersokelsen-2020-infografikk.
43. Emanuel L, Berwick D, Conway J, Combes J, Hatlie M, Leape L, et al. Advances in Patient Safety. What Exactly Is Patient Safety? In: Henriksen K, Battles JB, Keyes MA, Grady ML, editors. Advances in Patient Safety: New Directions and Alternative Approaches (Vol 1: Assessment). Rockville (MD): Agency for Healthcare Research and Quality; 2008.
44. Hayward RA, Asch SM, Hogan MM, Hofer TP, Kerr EA. Sins of omission: getting too little medical care may be the greatest threat to patient safety. J Gen Intern Med. 2005;20(8):686-91. DOI: 10.1111/j.1525-1497.2005.0152.x.
45. Hollnagel E, Woods DD. Epilogue: Resilience Engineering Precepts. Resilience Engineering. 1 ed: United Kingdom: CRC Press; 2006. p. 347-58.

46. Wardle JL, Adams J. Indirect and non-health risks associated with complementary and alternative medicine use: An integrative review. Eur J Integr Med. 2014;6(4):409-22. DOI: https://doi.org/10.1016/j.eujim.2014.01.001.
47. Ernst E. Complementary medicine: its hidden risks. Diabetes Care. 2001;24(8):1486-8. DOI: 10.2337/diacare.24.8.1486.
48. Stub T, Salamonsen A, Kristoffersen A, Musial F. How to handle worsening of condition during treatment - risk assessment in homeopathic practice. Forsch Komplementmed. 2015;22(1):30-5. DOI: 10.1159/000377644.
49. Postma MJ, Kappelhoff BS, van Hulst M, Brouwers JR. Economic evaluation of dabigatran etexilate for the primary prevention of venous tromboembolic events following major orthopedic surgery in the Netherlands. J Med Econ. 2012;15(5):878-86. DOI: 10.3111/13696998.2012.691144.
50. Awortwe C, Makiwane M, Reuter H, Muller C, Louw J, Rosenkranz B. Critical evaluation of causality assessment of herb-drug interactions in patients. Br J Clin Pharmacol. 2018;84(4):679-93. DOI: 10.1111/bcp.13490.
51. Geller AI, Shehab N, Weidle NJ, Lovegrove MC, Wolpert BJ, Timbo BB, et al. Emergency Department Visits for Adverse Events Related to Dietary Supplements. N Engl J Med. 2015;373(16):1531-40. DOI: 10.1056/NEJMsa1504267.
52. Wang CZ, Moss J, Yuan CS. Commonly Used Dietary Supplements on Coagulation Function during Surgery. Medicines (Basel). 2015;2(3):157-85. DOI: 10.3390/medicines2030157.
53. Muschietti L, Redko F, Ulloa J. Adulterants in selected dietary supplements and their detection methods. Drug Test Anal. 2020;12(7):861-86. DOI: 10.1002/dta.2806.
54. Vaclavik L, Krynitsky AJ, Rader JI. Mass spectrometric analysis of pharmaceutical adulterants in products labeled as botanical dietary supplements or herbal remedies: a review. Anal Bioanal Chem. 2014;406(27):6767-90. DOI: 10.1007/s00216-014-8159-z.
55. Kupiec T, Raj V. Fatal Seizures Due to Potential Herb-Drug Interactions with Ginkgo Biloba. J Anal Toxicol. 2005;29(7):755-8. DOI: 10.1093/jat/29.7.755.
56. Raynor DK, Dickinson R, Knapp P, Long AF, Nicolson DJ. Buyer beware? Does the information provided with herbal products available over the counter enable safe use? BMC Med. 2011;9:94. DOI: 10.1186/1741-7015-9-94.
57. Shaw D, Ladds G, Duez P, Williamson E, Chan K. Pharmacovigilance of herbal medicine. J Ethnopharmacol. 2012;140(3):513-8. DOI: 10.1016/j.jep.2012.01.051.
58. Owens C, Baergen R, Puckett D. Online sources of herbal product information. Am J Med. 2014;127(2):109-15. DOI: 10.1016/j.amjmed.2013.09.016.
59. Paul SS. Strategies for home nutritional support in dementia care and its relevance in low-middle-income countries. J Family Med Prim Care. 2020;9(1):43-8. DOI: 10.4103/jfmpc.jfmpc_850_19.
60. Tangvik RJ, Bruvik FK, Drageset J, Kyte K, Hunskår I. Effects of oral nutrition supplements in persons with dementia: A systematic review. Geriatric Nursing. 2021;42(1):117-23. DOI: https://doi.org/10.1016/j.gerinurse.2020.12.005.
61. Landin J, Frolich L, Schwarz S. Use of alternative therapies in patients with dementia and mild cognitive impairment: a prospective, controlled study. Int J Geriatr Psychiatry. 2008;23(11):1163-5. DOI: 10.1002/gps.2046.
62. Cross AJ, George J, Woodward MC, Ames D, Brodaty H, Elliott RA. Dietary Supplement Use in Older People Attending Memory Clinics in Australia. J Nutr Health Aging. 2017;21(1):46-50. DOI: 10.1007/s12603-016-0742-x.
63. Cohen PA, Avula B, Wang YH, Zakharevich I, Khan I. Five unapproved drugs found in cognitive enhancement supplements. Neurol Clin Pract. 2020. DOI: 10.1212/cpj.0000000000000960.

64. Smith D, Lovell J, Weller C, Kennedy B, Winbolt M, Young C, et al. A systematic review of medication non-adherence in persons with dementia or cognitive impairment. PLoS One. 2017;12(2):e0170651. DOI: 10.1371/journal.pone.0170651.
65. Pamuk ON, Kisacik B, Pamuk GE, Onat AM, Sayarlioglu M, Donmez S, et al. Do impaired memory, cognitive dysfunction and distress play a role in methotrexate-related neutropenia in rheumatoid arthritis patients? A comparative study. Rheumatol Int. 2013;33(10):2631-5. DOI: 10.1007/s00296-013-2792-2.
66. Dhikav V, Anand KS. Complementary and alternative medicine usage among Alzheimer's disease patients. Int Psychogeriatr. 2012;24(8):1361-2. DOI: 10.1017/s1041610212000427.
67. Kales HC, Blow FC, Welsh DE, Mellow AM. Herbal products and other supplements: use by elderly veterans with depression and dementia and their caregivers. J Geriatr Psychiatry Neurol. 2004;17(1):25-31. DOI: 10.1177/0891988703261998.
68. Wattmo C, Londos E, Minthon L. Solitary living in Alzheimer's disease over 3 years: association between cognitive and functional impairment and community-based services. Clin Interv Aging. 2014;9:1951-62. DOI: 10.2147/cia.s71709.
69. Statistics Norway. Families and households: Statistics Norway; 2022 [cited 09.11.22. web page]. Available from: https://www.ssb.no/en/statbank/table/06090/.
70. Rosenwohl-Mack A, Dubbin L, Chodos A, Dulaney S, Fang ML, Merrilees J, et al. Use of Services by People Living Alone With Cognitive Impairment: A Systematic Review. Innov Aging. 2021;5(1):igab004. DOI: 10.1093/geroni/igab004.
71. Hasvold T, Christensen B. Norway. 2015. In: Building primary care in a changing Europe: Case studies: [Internet]. United Kingdom European Observatory on Health Systems and Policies; [193-200]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK459031/.
72. Norwegian Directorate for Higher Education and Skills. Klinisk ernæringsfysiolog: Utdanningsdirektoratet; 2022 [cited 14.03.23. web page]. Available from: https://utdanning.no/yrker/beskrivelse/klinisk_ernaeringsfysiolog.
73. The Norwegian Pharmacy Union. Trained healthcare professionals 2017. [cited 20.04.23. web page]. Available from: https://www.apotek.no/in-english/education.
74. Waaseth M, Eggen AE, Grimsgaard S. Natural remedies in Scandinavia-authorization and sales. Pharm World Sci. 2007;29(3):137-45. DOI: 10.1007/s11096-006-9033-7.
75. Ogbogu U, Necyk C. Community Pharmacists' Views and Practices Regarding Natural Health Products Sold in Community Pharmacies. PLoS One. 2016;11(9):e0163450. DOI: 10.1371/journal.pone.0163450.
76. Altamimi M, Hamdan M, Badrasawi M, Allahham S. Knowledge, Attitudes and Practices Related to Dietary Supplements among a Group of Palestinian Pharmacists. Sultan Qaboos Univ Med J. 2021;21(4):613-20. DOI: 10.18295/squmj.4.2021.029.
77. Bukic J, Kuzmanic B, Rusic D, Portolan M, Mihanovic A, Seselja Perisin A, et al. Community pharmacists' use, perception and knowledge on dietary supplements: a cross sectional study. Pharm Pract (Granada). 2021;19(1):2251. DOI: 10.18549/PharmPract.2021.1.2251.
78. Marupuru S, Axon DR, Slack MK. How do pharmacists use and recommend vitamins, minerals, herbals and other dietary supplements? BMC Complement Altern Med. 2019;19(1):229. DOI: 10.1186/s12906-019-2637-y.
79. Carr A, Santanello C. Pharmacists' Knowledge, Perceptions, and Practices Regarding Herbal Medicine. Innov Pharm. 2019;10(3). DOI: 10.24926/iip.v10i3.2059.
80. Chiba T, Sato Y, Kobayashi E, Ide K, Yamada H, Umegaki K. Behaviors of consumers, physicians and pharmacists in response to adverse events associated with dietary supplement use. Nutr J. 2017;16(1):18. DOI: 10.1186/s12937-017-0239-4.

81. Barnes J, Butler R. Community pharmacists' professional practices for complementary medicines: a qualitative study in New Zealand. Int J Clin Pharm. 2020;42(4):1109-17. DOI: 10.1007/s11096-020-01093-2.
82. Boon H, Hirschkorn K, Griener G, Cali M. The ethics of dietary supplements and natural health products in pharmacy practice: a systematic documentary analysis. Int J Pharm Pract. 2009;17(1):31-8. DOI: 10.1211/ijpp.17.1.0005.
83. Kwan D, Boon HS, Hirschkorn K, Welsh S, Jurgens T, Eccott L, et al. Exploring consumer and pharmacist views on the professional role of the pharmacist with respect to natural health products: a study of focus groups. BMC Complement Altern Med. 2008;8:40. DOI: 10.1186/1472-6882-8-40.
84. Walji R, Boon H, Barnes J, Welsh S, Austin Z, Baker GR. Reporting natural health product related adverse drug reactions: is it the pharmacist's responsibility? Int J Pharm Pract. 2011;19(6):383-91. DOI: 10.1111/j.2042-7174.2011.00150.x.
85. Jordan MA, Foster K, Gandhi A, Mohebbi N, Tehrani L. Assessment of herbal weight loss supplement counseling provided to patients by pharmacists and nonpharmacists in community settings. J Am Pharm Assoc 2011;51(4):499-509. DOI: 10.1331/JAPhA.2011.09233.
86. Zerafa N, Scerri C. Knowledge and pharmacological management of Alzheimer's disease by managing community pharmacists: a nationwide study. Int J Clin Pharm. 2016;38(6):1416-24. DOI: 10.1007/s11096-016-0380-8.
87. Ramos H, Moreno L, Gil M, García-Lluch G, Sendra-Lillo J, Alacreu M. Pharmacists' Knowledge of Factors Associated with Dementia: The A-to-Z Dementia Knowledge List. Int J Environ Res Public Health. 2021;18(19). DOI: 10.3390/ijerph18199934.
88. Holm SG, Mathisen TA, Saeterstrand TM, Brinchmann BS. Allocation of home care services by municipalities in Norway: a document analysis. BMC Health Serv Res. 2017;17(1):673. DOI: 10.1186/s12913-017-2623-3.
89. Johansen E, Fagerstrom L. An investigation of the role nurses play in Norwegian home care. Br J Community Nurs. 2010;15(10):497-502. DOI: 10.12968/bjcn.2010.15.10.78742.
90. Devik SA, Olsen RM, Fiskvik IL, Halbostad T, Lassen T, Kuzina N, et al. Variations in drug-related problems detected by multidisciplinary teams in Norwegian nursing homes and home nursing care. Scand J Prim Health Care. 2018;36(3):291-9. DOI: 10.1080/02813432.2018.1499581.
91. Halvorsen KH, Granas AG, Engeland A, Ruths S. Prescribing quality for older people in Norwegian nursing homes and home nursing services using multidose dispensed drugs. Pharmacoepidemiol Drug Saf. 2012;21(9):929-36. DOI: 10.1002/pds.2232.
92. Dickinson A, Boyon N, Shao A. Physicians and nurses use and recommend dietary supplements: report of a survey. Nutr J. 2009;8:29. DOI: 10.1186/1475-2891-8-29.
93. Lederman VG, Huffman FG, Enrione EB. Knowledge of Florida nurses and dietitians regarding dietary supplements. Complement Ther Clin Pract. 2009;15(1):38-43. DOI: 10.1016/j.ctcp.2008.10.006.
94. Jong M, Lundqvist V, Jong MC. A cross-sectional study on Swedish licensed nurses' use, practice, perception and knowledge about complementary and alternative medicine. Scand J Caring Sci. 2015;29(4):642-50. DOI: 10.1111/scs.12192.
95. Tabet N, Khan R, Idle H. Vitamin and herbal extracts use in patients diagnosed with dementia: what do health professionals know and think? Aging Ment Health. 2011;15(2):267-71. DOI: 10.1080/13607863.2010.513040.
96. Edersheim JG, Stern TA. Liability Associated With Prescribing Medications. Prim Care Companion J Clin Psychiatry. 2009;11(3):115-9. DOI: 10.4088/PCC.08r00717.

97. Ministry of Health and Care Services. Regulation relating to a Municipal Regular GP Scheme 2000 [updated 23.11.00; cited 02.09.22. web page]. Available from: https://www.regjeringen.no/en/dokumenter/regulation-relating-to-a-municipal-regul/id420530/.
98. Dominguez Castro P, Reynolds CM, Kennelly S, Clyne B, Bury G, Hanlon D, et al. General practitioners' views on malnutrition management and oral nutritional supplementation prescription in the community: A qualitative study. Clin Nutr ESPEN. 2020;36:116-27. DOI: 10.1016/j.clnesp.2020.01.006.
99. Huber CM, Barth N, Linde K. How Young German General Practitioners View and Use Complementary and Alternative Medicine: A Qualitative Study. Complement Med Res. 2020;27(6):383-91. DOI: 10.1159/000507073.
100. Ostermaier A, Barth N, Linde K. How German general practitioners justify their provision of complementary and alternative medicine - a qualitative study. BMC Complement Med Ther. 2020;20(1):111. DOI: 10.1186/s12906-020-02907-6.
101. Meeuwsen EJ, Melis RJF, Van Der Aa GCHM, Golüke-Willemse GAM, De Leest BJM, Van Raak FHJM, et al. Effectiveness of dementia follow-up care by memory clinics or general practitioners: randomised controlled trial. BMJ : British Medical Journal. 2012;344:e3086. DOI: 10.1136/bmj.e3086.
102. Balsinha C, Iliffe S, Dias S, Freitas A, Grave J, Gonçalves-Pereira M. What is the present role for general practitioners in dementia care? Experiences of general practitioners, patients and family carers in Portugal. Dementia (London). 2021;20(6):1988-2006. DOI: 10.1177/1471301220977710.
103. Ydstebø AE, Bergh S, Selbæk G, Benth J, Lurås H, Vossius C. The impact of dementia on the use of general practitioners among the elderly in Norway. Scand J Prim Health Care. 2015;33(3):199-205. DOI: 10.3109/02813432.2015.1067516.
104. Michelet M, Lund A, Strand BH, Engedal K, Selbaek G, Bergh S. Characteristics of patients assessed for cognitive decline in primary healthcare, compared to patients assessed in specialist healthcare. Scand J Prim Health Care. 2020;38(2):107-16. DOI: 10.1080/02813432.2020.1753334.
105. Varkey B. Principles of Clinical Ethics and Their Application to Practice. Med Princ Pract. 2021;30(1):17-28. DOI: 10.1159/000509119.
106. Hegde S, Ellajosyula R. Capacity issues and decision-making in dementia. Ann Indian Acad Neurol. 2016;19(Suppl 1):S34-s9. DOI: 10.4103/0972-2327.192890.
107. Hogan DB, Ebly EM. Complementary medicine use in a dementia clinic population. Alzheimer Dis Assoc Disord. 1996;10(2):63-7. DOI: 10.1097/00002093-199601020-00002.
108. Coleman LM, Fowler LL, Williams ME. Use of unproven therapies by people with Alzheimer's disease. J Am Geriatr Soc. 1995;43(7):747-50. DOI: 10.1111/j.1532-5415.1995.tb07043.x.
109. Sharma P, Herrmann N, Rochon PA, Lee M, Croxford R, Rothenburg L, et al. Perceptions of natural health products among patients attending a memory clinic. Am J Alzheimers Dis Other Demen. 2006;21(3):156-63. DOI: 10.1177/1533317506289351.
110. Tarn DM, Paterniti DA, Good JS, Coulter ID, Galliher JM, Kravitz RL, et al. Physician-patient communication about dietary supplements. Patient Educ Couns. 2013;91(3):287-94. DOI: 10.1016/j.pec.2013.01.021.
111. Ashar BH, Rowland-Seymour A. Advising patients who use dietary supplements. Am J Med. 2008;121(2):91-7. DOI: 10.1016/j.amjmed.2007.10.031.
112. Salman Popattia A, Winch S, La Caze A. Ethical responsibilities of pharmacists when selling complementary medicines: a systematic review. Int J Pharm Pract. 2018;26(2):93-103. DOI: 10.1111/ijpp.12425.

113. Risvoll H, Giverhaug T, Halvorsen KH, Waaseth M, Musial F. Direct and indirect risk associated with the use of dietary supplements among persons with dementia in a Norwegian memory clinic. BMC Complement Altern Med. 2017;17(1):261. DOI: 10.1186/s12906-017-1765-5.
114. Risvoll H, Musial F, Halvorsen KH, Giverhaug T, Waaseth M. Pharmacy employees' involvement in safeguarding persons with dementia who use dietary supplements: Results from a survey of Norwegian pharmacies. BMC Complement Altern Med. 2019;19(1):179. DOI: 10.1186/s12906-019-2587-4.
115. Risvoll H, Musial F, Waaseth M, Giverhaug T, Halvorsen K, H. Home care service employees' contribution to patient safety in clients with dementia who use dietary supplements: a Norwegian survey. Scand J Prim Health Care. 2021:1-10. DOI: 10.1080/02813432.2021.1970944.
116. Malterud K. Systematic text condensation: a strategy for qualitative analysis. Scand J Public Health. 2012;40(8):795-805. DOI: 10.1177/1403494812465030.
117. Folstein MF, Folstein SE, McHugh PR. "Mini-mental state". A practical method for grading the cognitive state of patients for the clinician. J Psychiatr Res. 1975;12(3):189-98. DOI: 10.1016/0022-3956(75)90026-6.
118. Linn MW, Linn BS. The rapid disability rating scale-2. J Am Geriatr Soc. 1982;30(6):378-82. DOI: 10.1111/j.1532-5415.1982.tb02835.x.
119. Krueger CE, Bird AC, Growdon ME, Jang JY, Miller BL, Kramer JH. Conflict monitoring in early frontotemporal dementia. Neurology. 2009;73(5):349-55. DOI: 10.1212/WNL.0b013e3181b04b24.
120. Crum RM, Anthony JC, Bassett SS, Folstein MF. Population-based norms for the Mini-Mental State Examination by age and educational level. JAMA. 1993;269(18):2386-91. DOI: https://doi.org/10.1001/jama.1993.03500180078038
121. Curtin F, Schulz P. Multiple correlations and Bonferroni's correction. Biol Psychiatry. 1998;44(8):775-7. DOI: 10.1016/s0006-3223(98)00043-2.
122. Jalil B, Naser AY, J MP, Heinrich M. Herbal supplements in Jordan: a cross-sectional survey of pharmacists' perspectives and knowledge. BMJ Open. 2022;12(7):e057405. DOI: 10.1136/bmjopen-2021-057405.
123. Ashar BH, Rice TN, Sisson SD. Medical residents' knowledge of dietary supplements. South Med J. 2008;101(10):996-1000. DOI: 10.1097/SMJ.0b013e31817cf79e.
124. Clement YN, Williams AF, Khan K, Bernard T, Bhola S, Fortuné M, et al. A gap between acceptance and knowledge of herbal remedies by physicians: the need for educational intervention. BMC Complement Altern Med. 2005;5:20. DOI: 10.1186/1472-6882-5-20.
125. Farokhzadian J, Dehghan Nayeri N, Borhani F. The long way ahead to achieve an effective patient safety culture: challenges perceived by nurses. BMC Health Serv Res. 2018;18(1):654. DOI: 10.1186/s12913-018-3467-1.
126. Braund R, Chesney KM, Keast EP, Ng LJ, Qi S, Samaranayaka S, et al. Are all pharmacy staff interested in potential future roles? Int J Pharm Pract. 2012;20(6):417-21. DOI: 10.1111/j.2042-7174.2012.00216.x.
127. Djuv A, Nilsen OG, Steinsbekk A. The co-use of conventional drugs and herbs among patients in Norwegian general practice: a cross-sectional study. BMC Complement Altern Med. 2013;13:295. DOI: 10.1186/1472-6882-13-295.
128. Gardiner P, Sadikova E, Filippelli AC, White LF, Jack BW. Medical reconciliation of dietary supplements: don't ask, don't tell. Patient Educ Couns. 2015;98(4):512-7. DOI: 10.1016/j.pec.2014.12.010.

129. Guzman JR, Paterniti DA, Liu Y, Tarn DM. Factors Related to Disclosure and Nondisclosure of Dietary Supplements in Primary Care, Integrative Medicine, and Naturopathic Medicine. J Fam Med Dis Prev. 2019;5(4). DOI: 10.23937/2469-5793/1510109.
130. Fadlon I, Van Parys J. Primary care physician practice styles and patient care: Evidence from physician exits in Medicare. J Health Econ. 2020;71:102304. DOI: 10.1016/j.jhealeco.2020.102304.
131. Al-Azzawi R, Halvorsen PA, Risør T. Context and general practitioner decision-making - a scoping review of contextual influence on antibiotic prescribing. BMC Fam Pract. 2021;22(1):225. DOI: 10.1186/s12875-021-01574-x.
132. Cabana MD, Rand CS, Powe NR, Wu AW, Wilson MH, Abboud PA, et al. Why don't physicians follow clinical practice guidelines? A framework for improvement. JAMA. 1999;282. DOI: 10.1001/jama.282.15.1458.
133. Fox R. Training for Uncertainty. In: Merton R, Reader GC, Kendall P, editors. The Student-Physician: Introductory Studies in the Sociology of Medical Education. Cambridge: Harvard University Pres; 1957. p. 207–41.
134. Han PK, Klein WM, Arora NK. Varieties of uncertainty in health care: a conceptual taxonomy. Med Decis Making. 2011;31(6):828-38. DOI: 10.1177/0272989x11393976.
135. Pitkala KH, Suominen MH, Bell JS, Strandberg TE. Herbal medications and other dietary supplements. A clinical review for physicians caring for older people. Ann Med. 2016;48(8):586-602. DOI: 10.1080/07853890.2016.1197414.
136. Maha N, Shaw A. Academic doctors' views of complementary and alternative medicine (CAM) and its role within the NHS: an exploratory qualitative study. BMC Complement Altern Med. 2007;7:17. DOI: 10.1186/1472-6882-7-17.
137. Jureidini J, McHenry LB. The illusion of evidence based medicine. BMJ. 2022;376:o702. DOI: 10.1136/bmj.o702.
138. Lexchin J. Those who have the gold make the evidence: how the pharmaceutical industry biases the outcomes of clinical trials of medications. Sci Eng Ethics. 2012;18(2):247-61. DOI: 10.1007/s11948-011-9265-3.
139. Sheridan DJ, Julian DG. Achievements and Limitations of Evidence-Based Medicine. J Am Coll Cardiol. 2016;68(2):204-13. DOI: 10.1016/j.jacc.2016.03.600.
140. Maher RL, Hanlon J, Hajjar ER. Clinical consequences of polypharmacy in elderly. Expert Opin Drug Saf. 2014;13(1):57-65. DOI: 10.1517/14740338.2013.827660.
141. Mikail CN, Hearney E, Nemesure B. Increasing Physician Awareness of the Common Uses and Contraindications of Herbal Medicines: Utility of a Case-Based Tutorial for Residents. J Altern Complement Med. 2003;9(4):571-6. DOI: 10.1089/107555303322284866.
142. Farmasiforbundet. Etiske retningslinjer [cited 20.01.2023. web page]. Available from: https://www.parat.com/dm_documents/Etiske_retningslinjer_plakat_r5oMO_hhb3n.pdf.
143. The Norwegian Medical Association. Code of Ethics for Doctors 1961 [updated 2021; cited 14.03.23. web page]. Available from: https://www.legeforeningen.no/om-oss/etikk/etiske-regler-koder-deklarasjoner-og-lignende/code-of-ethics-for-doctors-/#:~:text=A%20doctor%20shall%20protect%20human,with%20patients%20and%20to%20society.
144. The Norwegian Parmaceutical society. Etiske retningslinjer for farmasøyter 2018 [cited 20.01.23. web page]. Available from: https://www.nfs.no/om-oss/etikkradet/etiske-retningslinjer-for-farmasoyter/.
145. Norwegian Nurses Association. Yrkesetiske retningslinjer [cited 20.01.2023. web page]. Available from: https://www.nsf.no/etikk-0/yrkesetiske-retningslinjer.
146. Norwegian Association of Health and Social Care Personnel. Yrkesetiske retningslinjer for helsefagarbeidere 2016 [updated 15.02.22; cited 20.01.23. web page]. Available from: https://www.delta.no/yrke/helsefagarbeiderforbundet/yrkesetiske-

retningslinjer-for-helsefagarbeidere-i-delta#:~:text=Helsefagarbeiderforbundet%20har%20utarbeidet%20yrkesetiske%20retningslinjer,om%20ansvar%20og%20riktige%20handlinger.
147. The Norwegian Directrate of Health. Helsepersonelloven med kommentarer. § 4. Forsvarlighet. 2018.
148. Ung COL, Harnett J, Hu H. Community pharmacist's responsibilities with regards to traditional medicine/complementary medicine products: A systematic literature review. Res Social Adm Pharm. 2017;13(4):686-716. DOI: 10.1016/j.sapharm.2016.08.001.
149. Lichtenberg P, Heresco-Levy U, Nitzan U. The ethics of the placebo in clinical practice. J Med Ethics. 2004;30(6):551-4. DOI: 10.1136/jme.2002.002832.
150. Black BS, Wechsler M, Fogarty L. Decision making for participation in dementia research. Am J Geriatr Psychiatry. 2013;21(4):355-63. DOI: 10.1016/j.jagp.2012.11.009.
151. Scherer DG, Annett RD, Brody JL. Ethical issues in adolescent and parent informed consent for pediatric asthma research participation. J Asthma. 2007;44(7):489-96. DOI: 10.1080/02770900701247137.
152. Pratt R. Nobodys ever asked me how I felt. In: Wilkinson H ed. The perspectives of people with dementia: research methods and motivations: ProQuest Ebook Central; 2002. 165-82 p.
153. HealthManagement. Overview of the Healthcare Systems in the Nordic Countries. HealthManagement. 2010;4(1). DOI: Retrieved from: https://healthmanagement.org/c/cardio/issuearticle/overview-of-the-healthcare-systems-in-the-nordic-countries
154. Cook C, Heath F, Thompson RL. A Meta-Analysis of Response Rates in Web- or Internet-Based Surveys. Educ Psychol Meas. 2000;60(6):821-36. DOI: 10.1177/00131640021970934.
155. Cook JV, Dickinson HO, Eccles MP. Response rates in postal surveys of healthcare professionals between 1996 and 2005: an observational study. BMC Health Serv Res. 2009;9:160. DOI: 10.1186/1472-6963-9-160.
156. Schopf TR, Nedrebø B, Hufthammer KO, Daphu IK, Lærum H. How well is the electronic health record supporting the clinical tasks of hospital physicians? A survey of physicians at three Norwegian hospitals. BMC Health Serv Res. 2019;19(1):934. DOI: 10.1186/s12913-019-4763-0.
157. Bonsaksen T, Horghagen S, Arntzen C, Gramstad A, Stigen L. Job Satisfaction among Occupational Therapists Employed in Primary Care Services in Norway. Int J Environ Res Public Health. 2023;20(6). DOI: 10.3390/ijerph20065062.
158. Wangberg SC. Norwegian midwives' use of screening for and brief interventions on alcohol use in pregnancy. Sex Reprod Healthc. 2015;6(3):186-90. DOI: 10.1016/j.srhc.2015.03.001.
159. Røen I, Kirkevold Ø, Testad I, Selbæk G, Engedal K, Bergh S. Person-centered care in Norwegian nursing homes and its relation to organizational factors and staff characteristics: a cross-sectional survey. Int Psychogeriatr. 2018;30(9):1279-90. DOI: 10.1017/s1041610217002708.
160. Johnsen M, Braaten T, Skeie G, Laholt H, Hansen S. Midwives and public health nurses' knowledge and clinical practice in securing sufficient iodine status in relation to pregnancy. A cross-sectional study. Nurs Open. 2023. DOI: 10.1002/nop2.1675.
161. Andersen GR, Westgaard RH. Discrepancies in assessing home care workers' working conditions in a Norwegian home care service: differing views of stakeholders at three organizational levels. BMC Health Serv Res. 2015;15:286. DOI: 10.1186/s12913-015-0945-6.

162. The Norwegian Pharmacy Union. KEY FIGURES 2017 Pharmacies and pharmaceuticals in Norway [cited 20.04.23. web page]. Available from: https://www.apotek.no/Files/Filer_2014/Engelske_sider/Pharmacies%20and%20prescriptions%20-%20%20Key%20Figures%202017.pdf.
163. Morse JM. Critical Analysis of Strategies for Determining Rigor in Qualitative Inquiry. Qual Health Res. 2015;25(9):1212-22. DOI: 10.1177/1049732315588501.
164. Braun LA, Tiralongo E, Wilkinson JM, Spitzer O, Bailey M, Poole S, et al. Perceptions, use and attitudes of pharmacy customers on complementary medicines and pharmacy practice. BMC Complement Altern Med. 2010;10:38. DOI: 10.1186/1472-6882-10-38.
165. The Norwegian Directorate of Health. Om multidose og de faglige rådene 2019. [updated 18.09.19; cited 14.04.23. web page]. Available from: https://www.helsedirektoratet.no/faglige-rad/multidose/om-multidose-og-de-faglige-radene.
166. Barry HE, Parsons C, Passmore P, Hughes CM. Community pharmacists and people with dementia: a cross-sectional survey exploring experiences, attitudes, and knowledge of pain and its management. Int J Geriatr Psychiatry. 2013;28(10):1077-85. DOI: 10.1002/gps.3931.
167. The Norwegian Directorate of Health. Personer med demens bør ikke tilbys betennelsesdempende legemidler, statiner, kosttilskudd eller naturpreparater mot demens/APSD [updated 11.05.22; cited 11.08.22. web page]. Available from: https://www.helsedirektoratet.no/retningslinjer/demens/betennelsesdempende-legemidler-statiner-kosttilskudd-eller-naturpreparater-mot-demens-apsd/personer-med-demens-bor-ikke-tilbys-betennelsesdempende-legemidler-statiner-kosttilskudd-eller-naturpreparater-mot-demens-apsd.
168. Greenwald JL, Halasyamani L, Greene J, LaCivita C, Stucky E, Benjamin B, et al. Making inpatient medication reconciliation patient centered, clinically relevant and implementable: a consensus statement on key principles and necessary first steps. J Hosp Med. 2010;5(8):477-85. DOI: 10.1002/jhm.849.
169. Cohen PA, Avorn J, Kesselheim AS. Institutionalizing Misinformation — The Dietary Supplement Listing Act of 2022. N Engl J Med. 2022. DOI: 10.1056/NEJMp2205675.

Appendix Ia

Information about study I and invitation to participate

Forespørsel om deltagelse i forskningsprosjekt

Bakgrunn og hensikt

Dette er et spørsmål til deg om å delta i en forskningsstudie for å kartlegge bruken av alternativ medisin (helsekost, kosttilskudd, naturmidler og lignende) blant pasienter med demens, som er under oppfølging ved Kløveråsen hukommelsesklinikk. Vi tror mange som har demens bruker alternativ medisin, men det er ikke tidligere gjennomført undersøkelser i Norge, som kan tallfeste dette. Vi tror også at mange ikke forteller legen at de bruker alternativ medisin.

Grunnen til at vi ønsker å undersøke dette er at noen alternative medisiner, i likhet med vanlige medisiner, kan gi bivirkninger. Ikke all alternativ medisin passer sammen med vanlige medisiner. Vi ønsker å kartlegge hva som brukes, og vi vi ønsker også å høre hvilke erfaringer pasient/pårørende har med ulike alternative medisiner. Dersom vi finner at behandlingen kan ha gitt bivirkninger, eller ikke passer sammen med øvrig medisiner, vil vi gjøre en nærmere vurdering av dette og gi pasient/pårørende råd angående videre behandling.

Hva innebærer studien?

Studien innebærer å svare på noen spørsmål om bruk av alternativ medisin i forbindelse med at dere (pasient og pårørende) kommer til vanlig time ved Kløveråsen. Spørsmålene vil bli stilt av legen din.

Mulige fordeler og ulemper

En mulig fordel for dere ved å delta i prosjektet er at legen får oversikt over all medisinbruk: både vanlige medisiner og alternative medisin. Dersom vi finner bruk av alternativ medisin som ikke passer sammen med dine øvrige medisiner, vil dere bli informert om det.

Det vil ta om lag 10 minutter å svare på spørsmålene om bruk av alternativ medisin.

Hva skjer med informasjonen om deg?

Dere vil bli spurt om følgende: pasientens kjønn, alder, om og i tilfelle hvilke alternative medisiner som brukes, hvor lenge pasienten har brukt dem, hvordan du fikk vite om den medisinen, og hvor du har kjøpt den. Vi vil også innhente pasient/pårørendes erfaring med bruk av alternativ medisin (virkning, bivirkning, annet).

All informasjon blir registrert anonymt, og det er bare legen som har tilgang til en kodeliste, som kobler pasientens navn/fødselsdato til de registrerte opplysningene. Denne kodelisten er nødvendig for at legen skal få gitt deg/dere tilbakemelding, og for at opplysninger som ellers finnes i journalen din skal kunne brukes i vurderingen legen gjør vedrørende videre behandling.

Det vil ikke være mulig å identifisere deg i resultatene av studien når disse publiseres.

Frivillig deltagelse

Deltagelse i prosjektet er frivillig, og dersom du/dere ikke ønsker å delta har det ingen betydning for den videre oppfølgingen dere får ved Kløvernes.

Ytterligere informasjon om studien finnes i kapitel A- *utdypende forklaring av hva studien innebærer.*

Ytterligere informasjon om biobank, personvern og forsikring fins i kapitel B-*Personvern, biobank, økonomi og forsikring.*

Samtykkeerklæring følger etter kapitel B.

Kapitel A-utdypende forklaring av hva studien innebærer.

- Kriterier for deltakelse: demensdiagnose er stilt. Kommer til time sammen med pårørende.
- Tidsskjema-hva skjer og når skjer det? Pasienten/pårørende får informasjon om studien når de ankommer klinikken av en ansatt som ikke er involvert i behandlingen. Skriftlig informasjon deles ut, og det gis tid til gjennomlesning før pasient/pårørende eventuelt samtykker til å delta. Ved samtykke gjennomføres spørreundersøkelsen ved slutten av legekonsultasjonen.
- Mulige fordeler: optimalisert legemiddelbehandling
- Mulige ulemper: litt ekstra tidsbruk. Avsatt konsultasjonstid vil imidlertid ikke bli overskredet (vanligvis totalt 1 time).

Kapitel B-Personvern, biobank, økonomi og forsikring

Personvern

Opplysninger som registreres om deg er

- alder og kjønn
- demensdiagnose og funksjonsnivå, boforhold, hjelp med medisiner
- bruk av alternativ medisin. Hvis ja:
    - Hva som brukes
    - Tidsperiode for bruk
    - Opplevde effekter/bivirkninger

Kløveråsen ved direktør er dataansvarlig.

Informasjon om utfallet av studien

Som deltaker i prosjektet har dere rett til å få vite om utfallet av studien.

Samtykke til deltagelse i studien

Vi er villige til å delta i studien

---------- ----------

(Signert av prosjektdeltaker, dato) (Signert av pårørende, dato)

Jeg bekrefter å ha gitt informasjon om studien

(ansatt, dato)

Appendix Ib

Questionnaire Study 1

Bruk av alternativ medisin blant personer med demens

Pasientnr

Kjønn

Alder (fødselsår)

Funksjonsnivå, grad av demens

- MMSE fra journal
- RDRS-2 fra journal
- Bor alene ja/nei
- Har hjemmetjeneste som deler ut medisin ja/nei

Bruker alternativ medisin ja/nei

- Hvis ja:
  - Hvilke (produktnavn)
  - I hvilken tidsperiode
  - Effekt (ja/nei/hva slags)
  - Bivirkning (ja/nei/hva slags)
  - Hvor fikk du vite om produktet
  - Hvem anbefalte bruk
    - Pasienten selv
    - Partner/ektefelle
    - Barn
    - Helsepersonell, spesifiser
    - Andre, spesifiser
  - Hvor ble produktet kjøpt
    - Apotek
    - Helsekostbutikk
    - Internett
    - Annet, spesifiser
  - Hvordan sikres det at preparatene tas etter forskriftene
    - Hjemmetjenesten deler ut
    - Partner deler ut (eventuelt annen omsorgsperson)

Pasienten selv passer på

Har du brukt annen alternativ medisin tidligere av samme grunn

Hvis mulig utfyllende liste med tidsangivelser

Hva er årsaken til at du ikke tar de preparatene lenger

Har pasienten/pårørende tenkt på eller hørt om at alternativ medisin kan ha bivirkninger eller interagere med pasientens legemiddelliste?

Bruk reseptfrie legemidler (smertestillende, NSAIDs, allergimidler, annet)

Bruker reseptbelagte legemidler: liste

Appendix IIa

Information about study 2 and invitation to participate

Informasjon om forskningsprosjektet:

"Bruk av naturmidler hos personer med demens. Apotekansattes rolle"

Bakgrunn og hensikt
Dette er et spørsmål til deg om å delta i en forskningsstudie for å kartlegge apotekansattes rolle som rådgiver for personer med demens, som bruker urteprodukter, naturmedisin, kosttilskudd eller lignende; heretter kalt naturmidler. Studien er en fortsettelse av en tidligere spørreundersøkelse utført ved NKS Kløveråsen as i samarbeid med RELIS Nord Norge og NAFKAM, UiT Norges arktiske universitet, hvor bruken av naturmidler hos personer med demens ble registrert. Det kom fram at nesten halvparten av pasientene brukte slike produkter, men at de i liten grad fikk hjelp til å sikre rett bruk. Denne studien er ment som en kartlegging av ulike helsearbeidere/omsorgspersoners (fastleger, ansatte i hjemme-tjenesten, apotekansatte og pårørende) mulighet til å hjelpe personer med demens til forsvarlig bruk av legemidler/naturmidler. I denne delen av studien vil alle apotekansatte i Bodø, Fauske, Meløy, Mo i Rana, Saltdal, Vestvågøy og Vågan bli bedt om å svare på et spørreskjema vedrørende deres rolle som veileder i forhold til personer med demens bruk av naturmidler. Apotekansatte i Sortland og Narvik kan bli inkludert i studien hvis deltagelsen blir for lav i de øvrige kommunene. Undersøkelsen er et samarbeid mellom NKS Kløveråsen as (Hukommelsesklinikk), RELIS Nord-Norge (Regionalt legemiddelinformasjonssenter) og NAFKAM (Nasjonalt forskningssenter innen komplementær og alternativ medisin). UiT Norges arktiske universitet, Institutt for farmasi, UiT Norges arktiske universitet, er samarbeidspartner i studien. Siden bruken av naturmidler hos demente allerede er utbredt, er et langsiktig mål med studien å utvikle et system for trygg bruk av naturmidler hos denne gruppen.

Hva innebærer studien?
Deltagere vil få tilsendt et spørreskjema for utfylling. Besvarelsen er anonym. Ansvarlig for den praktiske gjennomføring av studien er masterstudent i farmasi Hamideh Movahedi, Universitetet i Tromsø og overlege Hilde Risvoll, NKS Kløveråsen.

Mulige fordeler og ulemper
Ved å bli med i studien bidrar man til at det settes fokus på hvordan man kan hjelpe en sårbar pasientgruppe til rett legemiddelhåndtering og unngå uheldige interaksjoner mellom legemidler og naturmidler. Det tar 10-15 minutter å svare på spørreskjemaet. Det er få ulemper knyttet til deltagelse siden undersøkelsen er fullstendig anonym.

Hva skjer med informasjonen om deg?
Informasjonen som registreres om deg skal kun brukes for å kartlegge apotekansattes rolle i forhold til bruken av naturmidler hos personer med demenssykdom, i den hensikt å utvikle en prosedyre for å sikre tryggere bruk. Det vil ikke være mulig å identifisere deg i resultatene av studien når disse publiseres

Frivillig deltakelse
Det er frivillig å delta i studien. Å sende inn utfylt skjema oppfattes som samtykke. Siden studien er anonym og du ikke kan identifiseres, kan du heller ikke trekke din deltagelse etter å ha sent inn skjemaet. Har du spørsmål til studien, kan du kontakte Hilde Risvoll 75551610 eller Hamideh Movahedi 46346798.

Personvern
Opplysninger som registreres om deg er svarene fra spørreskjemaet du fyller ut.
Andre forskerinstitusjoner har ikke tilgang til datamaterialet.
UiT Norges arktiske universitet ved direktør er databehandlingsansvarlig.

Rett til innsyn og sletting av opplysninger om deg og sletting av prøver
Siden studien er anonym, kan ikke opplysningene om deg etterspores og heller ikke slettes.

Økonomi og eventuell sponsors rolle
Studiens finansiering er ikke helt avklart. Vi har søkt om midler fra Helse Nord og Den norske legeforening. Andre ideelle sponsorer kan bli spurt om støtte. NKS Kløveråsen as, RELIS, Institutt for farmasi og NAFKAM vil dekke aktuelle utgifter for den delen av studien som omhandler apotekansatte. Ingen kommersielle aktører bidrar.

Forsikring
Ikke aktuelt

Informasjon om utfallet av studien
Studien vil bli publisert i et internasjonalt tidsskrift f.eks. Drugs and Aging og framlagt på en internasjonal konferanse. Studien kan etter ønske legges fram på Norges Farmasøytiske forening - Nordland krets årsmøte eller i andre yrkesrelevante fora. Informasjon om utfallet av studien vil gå til hvert deltagende apotek. Alle deltagere som ønsker informasjon om resultat direkte til seg f.eks. på mail, kan ta kontakt med Hilde Risvoll rih@kloverasen.no.

Appendix IIb

Questionnaire Study 2

Bruk av naturmidler blant personer med demens. Apotekansattes rolle.

Før du begynner å fylle ut skjemaet, vil vi presisere at det med bruk av ”naturmidler” i denne undersøkelsen menes urteprodukter, naturmedisiner, kosttilskudd eller lignende.

Vi understreker at svaret ditt vil være fullstendig anonymt.

Takk for at du bidrar!

Med vennlig hilsen

Hilde Risvoll Hamideh Movahedi

1) 1. Kryss av for kjønn

- Kvinne
- Mann

2) 2. Hvor lenge har du jobbet i apotek?

- Mindre enn ett år
- 1-5 år
- 6-15 år
- Mer enn 16 år

3) 3. Hvilken utdanning har du?

- Provisorfarmasøyt
- Reseptarfarmasøyt
- Apotektekniker
- Annet

4) 4. Tror du enkelte naturmidler kan ha effekt mot demens enten forebyggende eller symptomatisk?

- Ja
- Nei
- Vet ikke

5) 5. Svarte du ja på spørsmål 4, angi eventuelle produkter som du tenker kan ha effekt?

6) 6. Bruker du eller har du selv brukt naturmidler?

- Ja
- Nei

7) 7. Svarte du ja på spørsmål 6, angi hvilke naturmidler du bruker eller brukte?

8) 8. Har du opplevd kunder som ikke forstår eller får med seg informasjon du gir på grunn av mulig demens?

- Ja
- Nei
- Usikker

9) 9. Hvis ja, har dere rutiner/felles praksis på apoteket for å håndtere dette? Spesifiser hvordan.

10) 10. Kjenner du til kunder med demens som du tror kan ha uheldig bruk av naturmidler?

- Ja
- Nei

11) 11. Hvis ja; hva gjør du med det?

12) 12. Har du fått undervisning om kundebehandling når det gjelder personer med demens?

- Ja
- Nei

13) 13. Hvis ja, spesifiser i hvilken sammenheng.

14) 14. Hvem synes du bør være ansvarlig for å sikre rett bruk av naturmidler hos personer med demens? Ett eller flere svar er mulig, prioriter alternativene du velger.

Personen selv

Pårørende

Selger av produkt (helsekost, nettbutikk, terapeut e.l.)

Apotek

Fastlege

Hjemmesykepleier

15) 15. Hvis man rutinemessig skal sjekke om naturmidler kan interagere med pasienters legemidler, hvem bør ha ansvaret?

- Fastlege
- Farmasøyt

16) 16. Hvor ofte får du spørsmål fra kunder om bruk av naturmidler?

- Daglig
- Ukentlig
- Månedlig
- Sjeldnere enn månedlig
- Aldri

17) 17. Får du spørsmål om naturmidler kunden har kjøpt andre steder enn på apoteket?

- Ja

- Nei

18) 18. Hvis ja, gir du informasjon om produkter ditt apotek ikke selger?

- Ja

- Nei

19) 19. Har ditt apotek en prosedyre/rutine for å tilby naturmidler som mersalg?

- Ja

- Nei

20) 20. Har ditt apotek prosedyrer for å sjekke for potensielle legemiddelinteraksjoner ved salg av naturmidler? Flere svaralternativ er mulig.

- [ ] Ja, alltid
- [ ] Ja, men kun ved visse naturmidler
- [ ] Ja, men kun hos spesielle kundegrupper
- [ ] Ja , kun ved visse legemidler
- [ ] Nei

21) 21. Hvis pasienten ønsker å kjøpe et naturmiddel; spør du hva pasienten skal bruke produktet mot?

- Ja

- Nei

- Av og til

22) 22. Ved utlevering av legemidler; spør du rutinemessig om pasienten bruker naturmidler?

- Ja

- I visse tilfeller

- Nei

23) 23. Anbefaler du noen ganger bruk av naturmidler til kunder uten at kunden spør etter dette først?

- Ja

- Nei

24) 24. Hvis du svarte Ja på spørsmål 23; ut fra hvilke kriterier anbefaler du bruk?

- [ ] Dokumentert effekt
- [ ] Tro på helbredelse eller lindring av plagene
- [ ] Tror kunden ønsker det
- [ ] Tror uansett ikke det er skadelig

☐ Apotekets/kjedens ønske om mersalg

25) 25. Hvis du svarte Nei på spørsmål 23; hvorfor ikke? Flere svaralternativ er mulig.

☐ Mangler nødvendig kunnskap for å anbefale

☐ Tror ikke naturmidler har effekt

☐ Risiko for bivirkninger

☐ Fare for legemiddelinteraksjoner

26) 26. Gir du informasjon om mulige bivirkninger av naturmidler, herunder interaksjoner med legemidler?

○ Ja

○ Nei

○ Av og til

27) 27. Uavhengig av prosedyrer, spør du om kunden bruker legemidler når du selger naturmidler?

○ Ja, alltid

○ Kun når jeg tror det er grunn til det ut fra kundens antatte helsetilstand

○ Kun ved visse naturmidler

○ Nei

28) 28. Hvis du ikke svarer Nei på spørsmål 27; sjekker du da for potensielle interaksjoner? Hvilke kilder bruker du i så fall for dette?

29) 29. Hvilke overordnede tiltak tror du kunne være egnet for å sikre personer med demens riktig bruk av naturmidler? Ett eller flere svar er mulig, prioriter alternativene du velger.

Informasjon fra helsemyndighetene til den generelle befolkning

Endringer i lovgivning og regulering av naturmidler

Mer aktiv holdning hos fastlegen: spørre alle pasienter om bruk av naturmidler
og sjekke etter bivirkninger og interaksjoner

Mer aktiv holdning hos hjemmetjenesten: videreformidle svaret til fastlege og/eller apotek

Mer aktiv holdning hos apotekansatte: sjekke etter interaksjoner hos alle som kjøper naturmidler, informere fastlegen

Dele ut naturmidler sammen med legemidler i multidose

30) 30. Hva har vært de viktigste kildene til dine kunnskaper om naturmidler? Ett eller flere svar er mulig, prioriter alternativene du velger.

Fagbøker, vitenskapelige artikler

Fra familie og venner

Internettsider anerkjent av norskehelsemyndigheter, farmasøytiske fagmiljø

Kurs om naturmidler

Utdanning

Produktbrosjyrer

Media, ukeblad

31) 31. Hvis du har deltatt på kurs om naturmidler: hvem arrangerte kurset? Var formålet med kurset mersalg?

32) 32. Har ditt apotek tilgjengelig produktuavhengig informasjon for de ansatte om naturmidlene dere selger?

- Ja, for alle naturmidlene
- For de fleste
- For noen få
- Nei

33) 33. Fra hvilke kilder henter du vanligvis informasjon om naturmidler?

34) 34. Er du enig i denne påstanden: ”Bruk av naturmidler kan innebære en risiko for redusert helse”?

- Ja
- Nei
- Vet ikke

35) 35. Hvilke(t) av følgende urteprodukter bør ikke tas av personer som tar Warfarin? Flere svaralternativ er mulig.

- [ ] Ginkgo biloba
- [ ] Johannesurt
- [ ] Salvia officinalis
- [ ] Solhatt

Appendix IIIa

Information about study 3 and invitation to participate

Kjære ansatte i hjemmetjenesten!

Takk for at du kan tenke deg å delta i vår spørreundersøkelse:

Ansatte i hjemmetjenestens erfaringer med bruk av kosttilskudd/ naturmidler hos brukere med demens.

Relevans for hjemmetjenesten:

Mange i hjemmetjenesten er kjent med at brukere med demens ikke bare bruker legemidler, men også kosttilskudd/naturmidler. Kanskje har dere også erfaring fra slike brukersituasjoner, f.eks. pårørende som vil at dere skal dele ut produktene, eller kanskje de spør dere om råd når det gjelder bruk osv.

Personer med demens bor stadig lengre i egne hjem og stadig flere får hjelp av hjemmetjenesten. Å sikre rett bruk av legemidler er en viktig oppgave for hjemmetjenesten, men hva med brukernes kosttilskudd/naturmidler?

Bakgrunnen til undersøkelsen:

Vi har tidligere spurt personer med demens om deres bruk av kosttilskudd/naturmidler. Det kom fram at ca. halvparten bruker dette, og at de fleste ikke får hjelp med å ta kosttilskudd/ naturmidler. Personer med demens kan ha problemer med å ta rett mengde tabletter og derfor være ekstra utsatt for bivirkninger. Hvis noen kosttilskudd er gunstig for brukeren, hjelper det ikke hvis brukeren ikke klarer å ta produktet riktig.

I motsetning til vanlige legemidler er det lite forskning på bruk og håndtering av kosttilskudd/naturmidler. Vi fokuserer derfor bare på kosttilskudd/naturmidler i denne undersøkelsen.

Hva mener vi med kosttilskudd/naturmiddel:

Vi mener tabletter eller miksturer som er kjøpt i den hensikt å forbedre helsen, men som ikke er en del av «skolemedisinen: urtepreparater, vitamin- og mineraltilskudd. I denne undersøkelsen tar vi også med probiotika (melkesyrebakterier) og homeopatiske preparater.

Vi tar ikke med vitamintilskudd eller andre tilskudd som tas fordi pasienten har fått påvist en mangel av dette. Vi tar heller ikke med urtete, matoljer, honning, krydder, proteinpulver, energibarer, juice eller andre drikker som skal være ekstra sunne. Se lenken under hvis du ønsker mer informasjon.

http://www.nifab.no/lov_og_rett/om_kosttilskudd_og_legemidler

Hva er hensikten med undersøkelsen:

Hensikten med undersøkelsen er å kartlegge hvordan de som arbeider i hjemmetjenesten håndterer bruk av kosttilskudd/naturmidler hos brukere med demens eller demenslignende symptomer. Ansatte i hjemmetjenesten har arbeidsdagen sin i hjemmene til brukerne og kan oppdage problemer som er skjult for andre deler av helsevesenet. Vi har tidligere gjort en lignende spørreundersøkelse blant apotekansatte i Nordland, og tanken er å gjennomføre en spørreundersøkelse blant fastleger senere. Alle resultatene vil bli sett som en helhet, for hvis undersøkelsen viser at det bør settes i verk noen tiltak på dette området, må flere yrkesgrupper samarbeide.

Litt praktiske opplysninger:

Det er frivillig å delta i undersøkelsen. Du trenger ikke delta selv om andre på ditt arbeidssted deltar. For å delta, sender du inn din e-postadresse. Du vil deretter få et elektronisk spørreskjema via e-post, som du svarer på. Undersøkelsen er helt anonym. Svaret ditt kan ikke knyttes til ditt navn eller din e-postadresse. Du kan derfor komme til å motta purring, selv om du har allerede har sendt inn svar, siden vi ikke vet hvem som har sendt inn svar eller ikke. Du skal bare se bort fra purringer hvis du allerede har svart. Vi kan heller ikke uten videre trekke ditt svar etter at du har levert det, fordi det ikke er registrert på ditt navn. Å sende inn svar, betraktes som å samtykke i å delta i undersøkelsen. Når resultatene av undersøkelsen er klare, vil vi sende en oppsummering til de som har deltatt og lederne i hjemmetjenesten.

Hvem er ansvarlig for undersøkelsen:

NKS Kløveråsen med kontaktperson Hilde Risvoll

RELIS Nord Norge med kontaktperson Trude Giverhaug.

Institutt for farmasi, Universitetet i Tromsø med kontaktpersonene Marit Waaseth og Kjell H Halvorsen.

NAFKAM, Universitetet i Tromsø med kontaktperson Frauke Musial.

Du kan når som helst kontakte oss for spørsmål om undersøkelsen på rih@kloverasen.noeller 90095535 (Hilde Risvoll).

Takk for at du deltar!

Vennlig hilsen

Hilde Risvoll

Appendix IIIb

Request to intermediate leaders in home care service to participate in Study 3

Hei!

Vi ønsker at hjemmetjenesten i din kommune blir med i prosjektet:

«Kan hjemmetjenesten hjelpe til å øke sikkerheten til personer med demens som bor hjemme og som bruker naturmidler?»

Bakgrunnen for prosjektet er en tidligere undersøkelse utført blant pasienter på Kløveråsen hukommelsesklinikk. Mange pasienter fra din kommune deltok. Det kom frem at nesten halvparten av pasientene brukte naturmidler og at kun en tredjedel fikk hjelp til å ta disse riktig. Med naturmidler mener vi kosttilskudd og urtepreparater (eventuelt homeopatiske midler, probiotika m.m.) som man inntar i den hensikt å fremme egen helse. Noen ganger kan disse preparatene gi bivirkninger eller være farlig å kombinere med personens legemidler. Vi fant mulige uheldige reaksjoner mellom naturmidler og legemidler hos 10 % av pasientene som deltok i vår spørreundersøkelse. Vi ønsker derfor å gjennomføre en spørreundersøkelse blant ansatte i hjemmetjenesten i utvalgte Nordlandskommuner. Vi ønsker å se i hvor stor grad de ansatte i hjemmetjenesten er klar over om brukerne benytter naturmidler, om de har oppdaget eventuell problematisk bruk, og om de ansatte har erfaring med å hjelpe personer med demens i forhold til dette. Vi har allerede gjennomført en tilsvarende undersøkelse hos apotekansatte i 8 Nordlandskommuner angående deres erfaringer.

Vi ønsker å ta med i studien:

Alle fast ansatte i hjemmetjenesten som drar ut til hjemmeboende brukere.

Stillingsprosent må minst være 40%.

Vi vil inkluderer vikarer som har minst 6 måneders engasjement.

Vi ønsker å utelukke ansatte som har vært sykemeldt i 8 uker eller mer per oppstart 01.09.16.

Vi ønsker å utelukker vikarer med mindre enn 6 måneders engasjement.

(Kriteriene for å bli med i studien kan endres fram mot oppstart av prosjektet, men ikke vesentlig)

De ansatte vil få ett elektronisk spørreskjema med spørsmål knyttet til brukere med demens.

Hvis hjemmetjenesten i din kommune blir med i undersøkelsen, er det allikevel frivillig for hver enkelt ansatt om de velger å delta eller ikke. Besvarelsene er helt anonyme.

Spørreskjema vil ikke ta langt tid å besvare. Man skal kun svare en gang. Det er ikke planlagt senere oppfølgingsspørsmål.

Undertegnede kommer gjerne til basen for hjemmetjenesten og informerer de ansatte om prosjektet før oppstart.

De som er ansvarlige for undersøkelsen er NKS Kløveråsen, Universitetet i Tromsø ved Institutt for farmasi og NAFKAM og RELIS Nord Norge. Profesjonshøyskolen ved Nord Universitet er invitert med som samarbeidspartner, men det er foreløpig uavklart om fakultetet vil delta.

Med vennlig hilsen

Hilde Risvoll

Overlege NKS Kløveråsen

Appendix IIIc

Questionnaire Study 3

Ansatte i hjemmetjenestens erfaringer med bruk av kosttilskudd/naturmidler hos brukere med demens

Kjære ansatte i hjemmetjenesten!

Takk for at du tar deg tid til å delta i undersøkelsen:

Ansatte i hjemmetjenestens erfaringer med bruk av kosttilskudd/naturmidler hos brukere med demens!

1) Kjønn?

- Kvinne
- Mann

2) Utdanning?

- Sykepleier, vernepleier eller annen helsefaglig utdanning tilsvarende minst 3 år på universitet eller høysko
- Hjelpepleiere eller annen helsefaglig utdanning tilsvarende 3 år fra videregående skole
- Ufaglært eller annen bakgrunn

3) Hvor lenge har du jobbet i hjemmetjenesten?

- 0-5 år
- 6-15 år
- Mer enn 15 år

4) Bruker du selv noen av følgende typer kosttilskudd/naturmidler? Du kan gi flere svar.

- [ ] Vitamintilskudd
- [ ] Mineraltilskudd
- [ ] Urter

- [ ] Annet
- [ ] Bruker ikke kosttilskudd eller naturmidler

5) Finnes det enkelte kosttilskudd/naturmidler som kan forebygge eller lindre demensplager?

- ( ) Ja
- ( ) Nei
- ( ) Vet ikke

6) Hvilke kosttilskudd/naturmidler kan forebygge eller lindre demens

7) Har du anbefalt kosttilskudd/naturmidler til brukere? Du kan gi flere svar.

- [ ] Har aldri anbefalt noe naturmiddel/kosttilskudd
- [ ] Har anbefalt vitamintilskudd
- [ ] Har anbefalt mineraltilskudd
- [ ] Har anbefalt urter
- [ ] Har anbefalt andre produkter f.eks. homøopatiske produkter

8) Hvis du aldri har anbefalt bruk av kosttilskudd/naturmiddel til brukere; hvorfor ikke? Du kan gi flere svar.

- [ ] Mangler nødvendig kunnskap til å anbefale
- [ ] Tror ikke naturmidler har effekt
- [ ] Risiko for bivirkninger eller uheldig virkning sammen med legemiddel
- [ ] Brukerne har nok tabletter som det er
- [ ] Det er ikke min jobb å anbefale

9) Hvis du har anbefalt bruk av kosttilskudd/naturmidler til brukere; hvorfor anbefalte du bruk? Du kan gi flere svar.

- [ ] Naturmidlene jeg anbefalte virker positivt (dokumentert effekt)
- [ ] Tro på helbredelse eller lindring av brukerens plager
- [ ] Tror uansett ikke det er skadelig

10) Hvor stor andel av dine brukere har etter din mening en demenslignende tilstand? Du trenger ikke ha fått bekreftet brukernes diagnoser, for å gi et svar.

- ○ 0-24%
- ○ 25-49%
- ○ 50-74%
- ○ 75-100%

11) Hvor stor andel av brukerne dine har du fått bekreftet har en demensdiagnose ved å se i Gerica?

- ○ 0-24%
- ○ 25-49%
- ○ 50-74%
- ○ 75-100%

12) Angi hvor mange av dine brukere som tar kosttilskudd/naturmidler på egen hånd?

- ○ 0-24%
- ○ 25-49%
- ○ 50-74%
- ○ 75-100%

13) Hvor ofte møter du brukere med en demenslignende tilstand, som du frykter kan utsette seg for en helserisiko p.g.a. kosttilskudd/naturmidler? Enten fordi produktene kan være uheldige eller at brukeren ikke mestrer å ta rett mengde av produktene.

- ○ Aldri

- Årlig eller sjeldnere
- Halvårlig eller sjeldnere
- Månedlig - halvårlig
- Ukentlig - månedlig
- Oftere enn en gang i uka

14) Hvor ofte har pårørende tatt opp med deg at de er bekymret for bruken av kosttilskudd/naturmiddel hos en av dine brukere?

- Aldri
- Årlig eller sjeldnere
- Halvårlig eller sjeldnere
- Månedlig - halvårlig
- Ukentlig-månedlig
- Oftere enn en gang i uka

15) Hvor ofte har du tatt opp med pårørende at du er bekymret angående bruk av kosttilskudd/naturmidler hos brukere med demens?

- Aldri
- Årlig eller sjeldnere
- Halvårlig eller sjeldnere
- Månedlig - halvårlig
- Ukentlig - månedlig
- Oftere enn en gang i uka

16) Hvor ofte har brukere med demenslignende tilstand spurt deg til råds om kosttilskudd/naturmidler?

- Aldri
- Årlig eller sjeldnere

- Halvårlig-årlig
- Månedlig-halvårlig
- Ukentlig-månedlig
- Oftere enn en gang i uka

17) Hvor ofte har du sett kosttilskudd/naturmidler hjemme hos pasienter med demenslignende tilstander?

- Aldri
- Årlig eller sjeldnere
- Halvårlig - årlig
- Månedlig - halvårlig
- Ukentlig - månedlig
- Oftere enn en gang i uka

18) Hvor ofte har du grepet inn overfor brukere fordi du mener at deres bruk av kosttilskudd/naturmidler kan være uheldig for dem? Enten fordi produktene kan være uheldige eller at brukeren ikke mestrer å ta rett mengde av produktene.

- Aldri
- Årlig eller sjeldnere
- Halvårlig - årlig
- Månedlig - halvårlig
- Ukentlig - månedlig
- Oftere enn en gang i uka

19) På hvilke måter har du grepet inn hvis du trodde en av brukeren ikke var istand til å håndtere sine kosttilskudd/naturmidler selv? Du kan gi flere svar.

- [ ] Tok opp problemet med pårørende
- [ ] Rådføre meg med fastlegen

- [ ] Rådføre meg på apoteket
- [ ] Ba pårørende fjerne kosttilskudd/naturmiddel
- [ ] Fikk ordnet det slik at kosttilskudd/naturmiddel ble delt ut i dosett/multidose etter at apotek eller fastlege
- [ ] Tok opp problemet internt på jobb

20) Hvis du har grepet inn en eller flere ganger og opplevd at det ikke førte til noen bedring for brukeren, førte det til at du har sluttet å gripe inn?

- ○ Har grepet inn og opplevd at det førte til økt sikkerhet for brukeren.
- ○ Har sluttet å gripe inn fordi det ikke fører til noen bedring
- ○ Har ikke sluttet å gripe inn selv om tidligere forsøk ikke har ført til noen bedring
- ○ Usikker på om jeg kommer til å gripe inn igjen

21) Ville du synes det var bedre om personer med demens fikk sine kosttilskudd/naturmidler delt ut av hjemmetjenesten enn at de hadde ansvaret for dette selv?

- ○ Ja
- ○ Nei
- ○ Vet ikke

22) Dersom hjemmetjenesten skulle få ansvaret for å finne ut om nye brukere med demensplager bruker kosttilskudd/naturmidler ved å undersøke om det finnes slike produkter i brukerens hjem, vill det være problematisk for deg? Du kan gi flere svar.

- [ ] Gjør dette allerede for alle brukere
- [ ] Ikke noe problem selv om jeg ikke gjør dette i dag
- [ ] Tiden er et problem, ville ikke hatt tid
- [ ] Etikk er et problem, det er ikke riktig å spørre brukere om dette
- [ ] Praktiske forhold gjør dette vanskelig

23) Hvilke praktiske forhold ville gjøre det vanskelig for hjemmetjenesten å sjekke om alle nye brukere benytter naturmidler/kosttilskudd?

24) Har du fått informasjon om kosttilskudd/naturmiddel på studiet ditt?

- Ja
- Nei
- Har ikke studert

25) Har du deltatt på kurs om kosttilskudd/naturmiddel etter at du begynte å arbeide i hjemmetjenesten?

- Ja
- Nei

26) Vet du hvor man kan finne nøytral/produktuavhengig informasjon om kosttilskudd/naturmidler? (gjelder ikke opplysninger som gis på pakningen, eller informasjon hentet fra aviser, ukeblad og lignende)

- Ja
- Nei

27) Hvor får du best svar om kosttilskudd/naturmidler?

- Apotek
- Fastlege
- Andre ansatte i hjemmetjenesten
- RELIS
- Vet ikke

28) Hvis du, i forbindelse med jobben, har sjekket om enkelte kosttilskudd/naturmidler er trygge å bruke, fortell hvordan du gjorde det. Hvis du aldri har gjort det, skriv:Ikke aktuelt.

29) Er du enig i denne påstanden: ”Bruk av kosttilskudd/naturmidler kan innebære en risiko”?

- Ja
- Nei
- Vet ikke

30) Hvordan kan man best sikre personer med demenslignende problemer riktig bruk av kosttilskudd/naturmidler? Prioriter løsningene du synes er mest egnet fra 1-6. Sett 1 på den løsningen du tror er best egnet, 2 på den som er nest best egnet o.s.v.

Informasjon fra helsemyndighetene til den generelle befolkningen

Endringer i lovgivning og regulering av kosttilskudd/naturmidler. Med dette menes bedre kontroll med hvilke stoffer tablettene inneholder og bedre testing av sikkerheten. I dag kreves det ikke at naturmidler sjekkes på samme måte som legemidler.

Mer aktiv holdning hos fastlegen: spørre alle pasienter med demens om bruk av kosttilskudd/naturmidler og sjekke etter bivirkninger og uheldige kombinasjoner med pasientenes legemiddler

Mer aktiv holdning hos hjemmetjenesten: spørre alle brukere med demens om kosttilskudd/naturmidler og videreformidle svaret til fastlege/ alternativt til apotek

Mer aktiv holdning hos apotekansatte: sjekke etter uheldige virkninger mellom kosttilskudd/naturmidler og legemidler hos alle som kjøper kosttilskudd/naturmidler, informere fastlegen, eventuelt hjemmetjenesten

Dele ut kosttilskudd/naturmidler sammen med legemidler i multidose eller dosett. Forutsetter at det først er sjekket at produktene er trygge for brukeren

31) Hvem synes du bør være ansvarlig for å sikre rett bruk av kosttilskudd/naturmidler hos personer med demens? Prioriter 1-6, slik at du setter 1 på den som du mener burde være mest ansvarlig, 2 på den nest mest ansvarlige o.s.v.

Personen selv

Pårørende

Selger av produkt

Apotek

Fastlegen

Hjemmetjenesten

Appendix IVa

Information about study 4 and invitation to participate

Vil du delta i forskningsprosjektet

" Fastlegers arbeid relatert til pasienter med demens som bruker kosttilskudd inklusive naturlegemidler og urter"?

Bakgrunn og hensikt
Jeg, Hilde Risvoll, ønsker å intervjue deg om dine pasienter med demens. Jeg er selv lege (nevrolog) og særlig interessert i problemstillinger rundt bruk av kosttilskudd/naturlegemidler/urter hos denne pasientgruppen.
Studien ønsker å belyse hvordan fastleger ivaretar pasienter med demens som bruker kosttilskudd/naturlegemidler/urter, og eventuelt hva som er de viktigste utfordringene.
Forskningsprosjektet er en del av en doktorgradsstudie ved UiT, Norges Arktiske Universitet, Institutt for samfunnsmedisin.

Hvem er ansvarlig for forskningsprosjektet?
Institutt for samfunnsmedisin, UiT Norges arktiske universitet. Prosjektgruppen består av:
Torstein Risør, Allmennmedisinsk forskningsenhet, Institutt for samfunnsmedisin, UiT.
Kjell H. Halvorsen og Marit Waaseth, begge Forskningsgruppen Klinisk farmasi og farmakoepidemiologi (IPSUM), Institutt for farmasi, UiT.
Frauke Musial, Hilde Risvoll og Trine Stub, alle NAFKAM, Institutt for samfunnsmedisin, UiT.
Trude Giverhaug, RELIS Nord Norge, UNN.
Gjermund Molund og Roy Samuelsen og er brukerrepresentanter knyttet til studien.

Hva innebærer det for deg å delta?
Du er spurt om å bli med i denne studien fordi du arbeider som fastlege i Nord-Norge. Deltakelsen innebærer å være med på et individuelt intervju av ca. 1 times varighet i tillegg til å svare på et spørreskjema (papirversjon) som det kan ta 10-15 minutt å svare på. Det blir tatt notater og lydopptak av intervjuet. Intervjuet transkriberes og det transkriberte intervjuet oppbevares i anonymisert form sammen med spørreskjemaet. Dine svar fra spørreskjema vil bli registrert i et dataprogram (SPSS).

Det er frivillig å delta
Det er frivillig å delta i prosjektet. Hvis du velger å delta, kan du når som helst trekke samtykket tilbake uten å oppgi noen grunn. Du trenger heller ikke svare på alle spørsmål under intervjuet.

Ditt personvern – hvordan vi oppbevarer og bruker dine opplysninger
Vi behandler opplysningene konfidensielt og i samsvar med personvernregelverket.

- Kun prosjektgruppen ved UiT Norges arktiske universitetet har tilgang til det transkriberte intervjuet hvor du er anonymisert (bruk av fiktivt navn, kommune blir ikke nevnt m.m). Kun HR har tilgang til lydfilen. Spørreskjemaet besvares anonymt, men knyttes til det transkriberte intervjuet via et løpenummer. Kun prosjektgruppen har tilgang til data fra spørreskjemaet.
- Personopplysninger om deg som lagres, er kun samtykkeskjemaet hvor navnet ditt står. Dette vil bli oppbevart i nedlåst skuff kun tilgjengelig for HR.
- Deltakerne vil ikke kunne gjenkjennes i en eventuell publikasjon.

Dine rettigheter
Så lenge du kan identifiseres i datamaterialet, har du rett til:

- innsyn i hvilke personopplysninger som er registrert om deg,
- å få rettet personopplysninger om deg,
- å få slettet personopplysninger om deg,
- å få utlevert en kopi av dine personopplysninger (dataportabilitet), og
- å sende klage til personvernombudet eller Datatilsynet om behandlingen av dine personopplysninger.

Hva gir oss rett til å behandle personopplysninger om deg?
Vi behandler opplysninger om deg basert på ditt samtykke. Når prosjektet skal avsluttes slettes de ferdig transkriberte lydopptakene, samt personopplysningene vi har på deg. Prosjektet avsluttes 31.12.2020. Kontaktinformasjon til NSD (Norsk Senter for Forskningsdata. Telefon: 55 58 21 17. E-post: nsd@nsd.no

Hvor kan jeg finne ut mer?
Hvis du har spørsmål til studien, ta kontakt med:

- Hilde Risvoll, hilde.risvoll@uit.no eller telefon 004775602533
- Torstein Risør, torsten.risor@uit.no, eller telefon 004777623339

Med vennlig hilsen

Hilde Risvoll
NAFKAM

Samtykkeerklæring

Jeg har mottatt informasjon om prosjektet «Fastlegers arbeid relatert til pasienter med demens som bruker kosttilskudd inklusive naturlegemidler og urter». Jeg samtykker til å delta i intervju, fylle ut et spørreskjema og at datamaterialet kan brukes til en vitenskapelig publikasjon.

.

(Signert av prosjektdeltaker)

Appendix IVb

Questionnaire Study 4

Fastlegers arbeid relatert til pasienter med demens som bruker kosttilskudd inklusive naturlegemidler og urter

1) Er du:

- ☐ Kvinne
- ☐ Mann

2) Alder

- ☐ <40 år
- ☐ 40-55 år
- ☐ >55 år

3) Hvor lenge har du jobbet som fastlege (angi i år)?

……

4) Hvor mange pasienter har du på din fastlegeliste?

……

5) Hvor har du studert?

- ☐ I Norge
- ☐ I utlandet

6) Har du anbefalt kosttilskudd/naturlegemidler/urter til pasienter? Du kan gi flere svar.

- [ ] Har aldri anbefalt noe kosttilskudd/naturlegemiddel eller urter
- [ ] Har anbefalt vitamintilskudd
- [ ] Har anbefalt mineraltilskudd
- [ ] Har anbefalt urter
- [ ] Har anbefalt fettsyrer
- [ ] Har anbefalt sammensatte kosttilskudd (f.eks. produkter som inneholder flere vitaminer kombinert med urter)
- [ ] Har anbefalt naturlegemiddel

7) Hvis du har anbefalt bruk av kosttilskudd/naturlegemidler/urter til pasienter; hvorfor anbefalte du bruk? Du kan gi flere svar.

- [ ] De kosttilskuddene/naturlegemidlene/urtene jeg anbefalte har vitenskapelig dokumentert effekt
- [ ] Tro på helbredelse eller lindring av pasientens plager, selv om effekten ikke er dokumentert vitenskapelig
- [ ] Tror uansett ikke det er skadelig, og preparatene kan ha en placeboeffekt
- [ ] Annet
- [ ] Har aldri anbefalt, ikke aktuelt

8) Hvis du aldri har anbefalt kosttilskudd/naturlegemidler/urter til pasienter; hvorfor ikke? Du kan gi flere svar.

- [ ] Mangler nødvendig kunnskap til å anbefale
- [ ] Tror ikke kosttilskudd/naturlegemidler eller urter har effekt
- [ ] Risiko for bivirkninger eller interaksjon med legemiddel
- [ ] Pasientene tar nok tabletter som det er
- [ ] Det er ikke min jobb å anbefale kosttilskudd/naturlegemidler/urter
- [ ] Annet
- [ ] Har anbefalt, ikke aktuelt

9) Hvor ofte spør du, som en del av anamnesen, pasienter om de bruker kosttilskudd/naturlegemidler/urter?

- [ ] Aldri
- [ ] Årlig eller sjeldnere
- [ ] Halvårlig - årlig
- [ ] Månedlig – halvårlig
- [ ] Ukentlig – månedlig
- [ ] Oftere enn en gang i uka

10) Hvor ofte møter du pasienter med demens hvor bruk av kosttilskudd/ naturlegemidler/urter er et tema?

- [ ] Aldri
- [ ] Årlig eller sjeldnere
- [ ] Halvårlig - årlig
- [ ] Månedlig – halvårlig
- [ ] Ukentlig – månedlig
- [ ] Oftere enn en gang i uka

11) Hvor ofte har du vært bekymret for helsen til pasienter med demens fordi de bruker kosttilskudd/naturlegemidler/urter?

- [ ] Aldri
- [ ] Årlig eller sjeldnere
- [ ] Halvårlig - årlig
- [ ] Månedlig – halvårlig
- [ ] Ukentlig – månedlig
- [ ] Oftere enn en gang i uka

12) Hvor ofte har du grepet inn fordi du var bekymret for en pasient med demens på grunn av pasientens bruk av kosttilskudd/naturlegemidler/urter?

- [ ] Aldri
- [ ] Årlig eller sjeldnere
- [ ] Halvårlig – årlig
- [ ] Månedlig – halvårlig
- [ ] Ukentlig – månedlig
- [ ] Oftere enn en gang i uka

13) Hvordan ble du oppmerksom på at pasienter med demens hadde et problem med kosttilskudd/naturlegemidler/urter? Du kan gi flere svar.

- [ ] Pasienten selv tok det opp
- [ ] Pårørende tok det opp
- [ ] Hjemmetjenesten tok det opp
- [ ] Apotek/farmasøyt tok det opp
- [ ] Det kom opp etter at du selv spurte pasienten eller pårørende/hjemmetjenesten hvordan det forholdt seg med bruk av kosttilskudd/naturlegemidler/urter
- [ ] Har aldri opplevd det, ikke aktuelt

14) På hvilke måter har du grepet inn hvis du trodde en av pasientene ikke var i stand til å håndtere sine kosttilskudd/naturlegemiddel/urter selv? Du kan gi flere svar.

☐ Tok opp problemet med pasienten, prøvde å finne en løsning sammen

☐ Tok opp problemet med pårørende, prøvde å finne en løsning sammen

☐ Rådførte meg på apoteket/ hos RELIS

☐ Ba pårørende fjerne kosttilskudd/naturlegemiddel/urter

☐ Fikk ordnet det slik at kosttilskudd/naturlegemiddel/urter ble delt ut i dosett/multidose

☐ Har ikke grepet inn

15) Hvem synes du bør være ansvarlig for å sikre rett bruk av kosttilskudd/ naturlegemidler/urter hos personer med demens som bor hjemme?

Prioriter alternativene 1-6, slik at du setter 1 på den av gruppene under, som du mener bør være mest ansvarlig, 2 på den nest mest ansvarlige osv. helt til du setter 6 på den du mener bør være minst ansvarlig. Rekkefølgen vi har plassert de ulike gruppene i er tilfeldig.

Hjemmetjenesten	
Pasienten selv	
Fastlege	
Selger av produkt	
Pårørende	
Apotek	

16) Er du enig i denne påstanden:" Bruk av kosttilskudd/naturlegemidler/urter kan gi bivirkninger eller interaksjoner med legemidler"?

☐ Ja

☐ Nei

☐ Vet ikke

17) Under presenteres du for noen mulig forslag til forbedringer av sikkerheten for denne pasientgruppen.

Hvis du mener det **ikke** er behov for forbedringer, setter du 1 på alternativet «ingen forbedring trengs», og lar de øvrige alternativene stå blanke.

Hvis du mener det er **behov** for forbedringer, ber vi deg rangere de seks forbedringsforslagene fra 1 (beste forslag), 2 (nest beste) osv., til 6 (dårligste forslag), og lar alternativet «ingen forbedring trengs» stå blankt.

Forslagene er plassert i tilfeldig rekkefølge.

Økt informasjon om kosttilskudd/naturlegemidler/urter fra helsemyndighetene til den generelle befolkningen.	
Endringer i lover og regler angående kosttilskudd/naturlegemidler/urter. Strengere krav til dokumentasjon, sikkerhet og økt kontroll med faktisk innhold i produktene.	
Økt innsats fra fastleger. Spørre alle pasienter med demens om de bruker kosttilskudd/naturlegemidler/urter og sjekke om bruken er trygg. Vurdere om pasientene trenger hjelp med administrasjonen av produktene.	
Økt innsats fra hjemmetjenesten. Sjekke om pasienter med demens bruker kosttilskudd/naturlegemidler/urter. Rapportere til fastlege (eventuelt apotek/farmasøyt)	
Økt innsats fra apotek. Spørre alle kunder som kjøper kosttilskudd/naturlegemidler/urter om medisinbruk. Hvis kunden også virker kognitivt svekket, vurdere å ta kontakt med fastlege, eventuelt hjemmetjenesten.	
Kosttilskudd/naturlegemidler/urter som er vurdert som ikke skadelig for pasienten kan deles ut sammen med medisin i multidose.	
Ingen forbedring trengs	

18) Etter din mening, finnes det enkelte kosttilskudd/naturlegemidler/urter som kan forebygge eller lindre demens eller demenssymptomer?

- ☐ Ja
- ☐ Nei
- ☐ Vet ikke

19) Hvis du svarte ja på spørsmål 18, hvilke kosttilskudd/naturlegemidler/urter kan forebygge eller lindre demens eller demenssymptomer?

.....

.....

Appendix IVc

Semi structured interview guide Study 4

Veiledende intervjuguide

«Fastlegers arbeid relatert til pasienter med demens som bruker kosttilskudd inklusive naturlegemidler og urter»

Innledende spørsmål:

1. Hvor mange pasienter har du med demens?
2. Kan du fortelle hvordan følger du opp dine pasienter med demens?
   - Er oppfølgingen systematisk, bruk av veileder
   - Bruk av pårørende/hjemmetjenesten

Hovedspørsmål

1. Hva forstår du med kosttilskudd?

2. Hvordan følger du opp mulig bruk av kosttilskudd blant dine pasienter?

   a. Hvor ofte spør pasienter deg om kosttilskudd? Hva blir tema?

   b. Hører kosttilskudd hjemme under medikamentgjennomgang eller under livsstil?

3. Kan du fortelle hvordan følger du opp/håndterer du bruk av kosttilskudd blant dine pasienter med demens?
   a. Hva gjør du for å øke sikkerheten til pasienter med demens som bruker kosttilskudd?
   b. Er din oppfølging av pasienter med demens som bruker kosttilskudd annerledes sammenlignet med kognitiv friske pasienter? Fortell hvordan
   c. Er hjemmebesøk aktuelt?
   d. Er samarbeid med andre helseprofesjoner (med hjemmetjeneste, apotek, demensteam om) aktuelt?
   e. Eksempler på hvordan kosttilskudd er tatt opp av deg eller av pasienter og pårørende.
   f. Har du hatt positive eller negative erfaringer med kosttilskudd? Fortell
   g. Kan du gi eksempler på etiske dilemma du har kommet i vedrørende bruk av kosttilskudd hos pasienter med demens?
   h. Har det oppstått en konflikt rundt bruk av kosttilskudd?
   i. Har du et eksempel på at bruken av kosttilskudd har gitt bivirkninger eller interaksjoner med legemidler for en av dine pasienter med demens? Eller andre pasienter?
   j. Hva gjør du, eller hva ville du gjort, hvis du oppdaget bivirkninger eller interaksjonsproblematikk relatert til bruk av kosttilskudd hos en av dine pasienter?
   k. Hvordan kan man sikre at personer med demens tar kosttilskudd riktig? (multidose)

4. Hvordan kan man forbedre oppfølgingen av personer med demens som bruker kosttilskudd?
    a. Ville du ønske å benytte en veileder/retningslinje for oppfølging av pasienter med demens som bruker kosttilskudd? Hvorfor? Hvorfor ikke?
    b. Kan reseptformidler/reseptmodul være et verktøy i forhold til kosttilskudd?
    c. Er medikamentgjennomgang (evt takstbruk) et sted hvor det kommer opp?
    d. Plakat på legekontoret?
    e. Tiltak fra helsemyndighetene?

5. Hva forstår du med begrepet ansvar (som i fastlegens ansvar)?
6. Hvor langt synes du fastlegens ansvar går når det gjelder pasientenes bruk av kosttilskudd?
    a. Vurderer du ditt ansvar annerledes for personer med demens enn for kognitivt friske pasienter? Begrunn.
    b. Hva er ikke fastlegers ansvar når det gjelder pasienters bruk av kosttilskudd? Gi eksempler.
    c. Ønsker du å ta ansvar for pasientens sikkerhet når det gjelder bruk av kosttilskudd? Hvorfor/hvorfor ikke?

7. Hva er de viktigste utfordringene med å ta ansvaret for sikkerheten til personer med demens som bruker kosttilskudd?
    a. Kan du tenke deg juridiske forhold som er til hinder?
    b. Kan du tenke deg etiske forhold som er til hinder?
    c. Kan du tenke deg praktiske forhold som kan utgjøre et hinder?
8. Hvor henter du kunnskap om kosttilskudd?
    a. Etter din mening, hvor finner man best produktuavhengig (pålitelig) informasjon om kosttilskudd?
    b. Har du fått reklame for kosttilskudd?
    c. Har du lest om det i Tidsskrift/ikke medisinsk litteratur?
    d. Har du noen nettsteder du bruker? (Relis/NAFKAM)
    e. Lært om det på kurs?
    f. Hvilken undervisning fikk du om kosttilskudd? Er du opplært på studiet til å ta opp kosttilskudd?
    g. Tas det opp i samtaler med kollegaer?

9. Hva tror du flertallet av fastleger mener om at pasientene deres bruker kosttilskudd? Tror du dine holdninger skiller seg fra flertallet på noen måte? I så fall hvordan?
10. Hvis det foreligger få/usikre rutiner rundt håndteringen av bruk av kosttilskudd hos personer med demens, hva er det med legehverdagen som gjør at det blir slik?

Hvis du ikke spør pasientene rutinemessig om de bruker kosttilskudd, hva er grunnen til det?

Avslutning

Er det noe du ønsker å legge til som du synes er viktig for fastlegers håndtering av denne pasientgruppen eller om kosttilskudd, enten egne erfaringer, refleksjoner, annet?