LESS IS MORE

REDUCING LOW-VALUE HEALTHCARE
IN THE NETHERLANDS

EVA VERKERK

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Promotor
Prof. dr. G.P. Westert

Copromotoren
Dr. R.B. Kool
Dr. S.A. van Dulmen

Manuscriptcommissie
Prof. dr. M.G.M. Olde Rikkert
Prof. dr. W.J.J. Assendelft
Prof. dr. H.A.H. Kaasjager (UMC Utrecht)

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CHAPTER 1

General introduction

The focus in healthcare is to deliver the best care for all patients. In light of this endeavor, healthcare research is focused on improving treatments, diagnosing earlier and making care accessible to all patients. With the rising prosperity, these developments are speeding up and more and more care is available and provided. Although this has contributed to our longer and healthier lives, part of the care that is provided has no benefit to the patient. Studies that evaluate established tests, treatments or procedures sometimes discover that they had been ineffective all along.[1] Moreover, care practices that have become obsolete since the development of better alternatives, remain being used.[2] Furthermore, practices that are effective for a particular patient population are provided to a broader or different population.[3] Lastly, the diagnostic boundaries for illnesses have widened, leading to care being provided to patients who do not benefit from it.[4] Hence, many patients are at risk of receiving care that does not benefit them. This care may even cause harm and it wastes limited resources.[5] Reducing the provision of care that does not benefit the patient, so-called low-value care, will improve the quality and safety of care and the sustainability of our healthcare systems. We, therefore, aimed to study how low-value care can be reduced in the Netherlands.

What is low-value care?

Low-value care is described as care that is proven to provide no benefit to the patient, or disproportionate low benefit in relation to its harms, costs, alternatives and the preferences of the patient.[6 7] It can even prompt cascades of testing and treatment that are of uncertain value.[8 9] Medical overuse is an often-used synonym to the use of low-value care.[10] All kinds of care, such as diagnostic tests, treatments and procedures, can be of low value. Examples are urinary catheters for incontinence, convenience, or monitoring in noncritically ill patients; routine preoperative testing before low-risk surgical procedures; and benzodiazepines or other sedative-hypnotics in older adults as first choice therapy for insomnia, agitation, or delirium.[11] Whether care is of low-value or of high-value is determined on an individual level by the care professional together with the patient, based on the best available evidence, the experience of the care professional and the preferences of the patient.[12]

The distinction between low-value and high-value is not always clear.[13] For example, antibiotics are generally not necessary for acute bronchitis, depending on the symptoms, risk factors, and clinical judgement of the physician.[14] As another example, antihypertensive medication reduces the risk of cardiovascular disease effectively in patients with a very high blood pressure. However, the treatment has less effect in patients with mild hypertension and at some point the harming adverse effects exceed the benefits.[15] Where this point is has been the subject of debate.[16] The value of other care practices depends on the patients' preferences, such as curative

or palliative care for patients with serious illnesses.[17] Clearly, there is a grey area in which the net benefit of a practice is uncertain.

Low-value care in a historical perspective

Although this introduction might imply otherwise, discontinuing established care that has been proven ineffective is not a new phenomenon. Obviously, many practices that were common in history are no longer used. This is a part of the evolvement process of clinical practice. For example: bloodletting was used for centuries to cure all kinds of illnesses. It has only in the late 19th century been discredited as a treatment for most ailments, despite evidence appearing in the 16th and 17th century that it had no value.[18]

Around 1990, the growing demand for a better empirical basis of medicine resulted in the introduction of Evidence Based Medicine.[12] Since then, medical practice has been increasingly based on the best available evidence, the experience of the clinician, and the values of the patient. Evidence Based Medicine has stimulated the evaluation of practices, the better reporting of studies, and the generation of systematic reviews and clinical practice guidelines.[12] This has supported the translation of evidence to clinical practice, also for evidence that shows that established care provides no benefit.

An example of low-value care that was stopped following this process is the routine medical screening after starting with the contraceptive pill. With the introduction of the pill in the 1960s, Dutch general practitioners were recommended to screen the users for adverse effects two to four times per year.[19] This screening included a physical examination, measuring blood pressure, several blood and urine laboratory tests, and a pelvic exam.[19] When the adverse effects of the pill turned out to be limited after many years of screening, general practitioners questioned the value of the screening, and stopped practicing it when the new guideline in 1989 advised against it. Other low-value care practices are more resistant. In 1986 a review suggested that shaving the skin before an operation increases the risk of surgical site infection.[20] The authors advised to not remove hair before an operation, and if it is absolutely necessary, to clip it.[20] This was included in the Dutch clinical practice guidelines in 1993. In 2007, a study showed that 88% of the clinics in the south-west part of the Netherlands still routinely remove hair.[21]

Medicine nowadays develops through a process of discovery (introducing a new practice), replacement (replacing current practice with newer, more effective care), and reversal (stopping current practice that is proven to have no benefit).[22] Hence, stopping with the use of low-value care is a natural part of medicine. It has received

an increasing amount of attention in the last 10 years because the pressure on the healthcare budget increased and caused the need to prioritize reducing low-value care. It became important to study its process and promising strategies. This has turned into a new research field focused on low-value care. The rising number of articles and grants on reducing low-value care signify a marked increase in interest in this area.[23]

Identifying low-value care

It is estimated that a significant proportion of delivered care is of low-value, although there are no exact numbers. Around 25% of health care expenses in the United States in 2019 is wasteful, and 9%-12% of this is related to low-value care.[24] The prevalence of individual low-value care practices is found to vary and can reach up to 73%.[5 25] Studies that discover that current practices have no benefit are common: A review of 10 years of publications in a high-impact journal showed that 40% of the studies that evaluated a standard of care concluded that it was inferior to some lesser or prior standard of care.[1] A more recent review found that 14% of all randomized trials in three high-impact journals showed that an established practice was ineffective.[26]

Several studies have detected the use of low-value care in the Netherlands, such as opioids,[27] mammography screening,[28] and diagnostic tests.[29] Some studies also show variation in the prevalence of low-value care. The percentage of patients that receive unnecessary antibiotics for different respiratory tract infection symptoms varied from 1% to 59%.[30] A study on three low-value diagnostic practices showed that most clinicians rarely provided them, but a small portion of the clinicians provided a high number of these low-value tests.[31] This indicates that there is room for improvement.

Some low-value care practices are hard to identify because they can only be deduced from indirect data.[32] For example: the introduction of prostate cancer screening leads to only a small reduction in prostate cancer related mortality.[33] This implies that part of these people are overdiagnosed and would not have died of prostate cancer, but it is hard to identify which specific people. Another indirect sign of overuse is unexpected geographical variation in care delivery, such as variation in rates of hysterectomy for bleeding disorder.[5] These low-value care practices are more concealed.

Currently, more low-value care is being provided than we are aware of: a large part of healthcare is not sufficiently evaluated and, therefore, it is unknown whether these practices are of low-value or of high-value. In 2014, half (52%-55%) of the recommen-

dations from the Dutch guidelines for orthopedics, neurology, and gynaecology was based on limited or insufficient evidence.[34] Systematic evaluation of these practices is necessary in order to generate the evidence for delivering safe and effective care.

Prior to reducing low-value care, it is necessary to identify what it constitutes, and which low-value care practices are still delivered. Nowadays, many low-value care practices are already known. Medical professional societies all around the world have created hundredths of recommendations stating that a specific care practice should be avoided. The 193 clinical practice guidelines for medical specialists in the Netherlands contained a total of 1366 do-not-do recommendations in 2016.[35] Also for general practitioners a list of do-not-do recommendations was created (manuscript in preparation). However, it is unknown if these practices are still used in clinical practice, and a list for nurses was lacking. We aimed to address these gaps in answering the first question of this thesis: **'Which low-value care exists and needs to be reduced?'**

Reducing low-value care

Apart from wasting limited resources, low-value care may cause physical, psychological and financial harm to patients.[5 36] Therefore, no longer providing it has the potential to reduce health care expenses while maintaining or even improving the quality and safety of care. Some low-value care decreases with the passive diffusion of new evidence, while other care practices are less responsive.[22] Often, active implementation is needed to change clinical practice. The implementation of evidence or recommendations that advise against a care practice is often called de-implementation: abandonment of medical practices or interventions that are ineffective and harmful.[37] Low-value care can be replaced by a less invasive or burdensome alternative or by a watch and wait policy. There is little research on what de-implementation entails and how it differs from implementation.[38] Because of this lack of knowledge, clinicians, researchers and policy makers have relied on implementation theory to develop de-implementation strategies.

Reducing low-value care requires an understanding of why it is provided by clinicians and why it is asked for by patients.[39-41] De-implementation can be hindered or facilitated by many factors on the level of the clinician, patient, organization, and society. Several studies have identified these factors, such as patient expectations, efficiency, malpractice fears, clinical uncertainty, lack of time, fear of bad outcomes and difficulty assessing medical records.[42-46] Several psychological mechanisms are also reported to increase the use of low-value care.[47] Lastly, as with any change, reducing low-value care requires clinicians and/or patients to change their behavior, which can be challenging.[38] Even when clinicians are aware of the limited value of a

care practice, they often remain confined by a set of structural forces beyond their control.[48] In order to make a change, it is vital to understand which mechanisms are involved.[41] Therefore, the second question of this thesis is: '**What factors influence the provision of low-value care?**'.

Programs for reducing low-value care

In response to the rising healthcare costs, reducing low-value care appeared on the political agendas of many countries. In 2005, England was the first to start a program focused on this.[49] Since then, the number of national and local initiatives targeting medical overuse has been rising worldwide.[50] The largest of them is the Choosing Wisely campaign, which was initiated in the United States in 2012 and has been adopted by over 20 countries since its launch.[51] Choosing Wisely creates lists of low-value tests, treatments and procedures to stimulate the conversation between physicians and patients and to help patients choose care that is supported by evidence, free from harm and truly necessary.[51] Although the campaign has been a success in terms of awareness created and physicians engaged, two early evaluations of Choosing Wisely recommendations in the United States showed marginal results 1.5 and 2.5 years after their release.[52 53] More research on the effect of the campaigns is needed.

Also in the Netherlands, several programs aiming to reduce low-value care were launched. The Dutch Choosing Wisely campaign ('Verstandig Kiezen') started in November 2012. In 2015, the Awareness project ('Bewustzijnsproject') was initiated to integrate value and cost-consciousness into medical residency programs. Also in 2015, the eight University Medical Centers started a national program called *To do or not to do? Reducing low-value care* ('Doen of laten?'). Its goal was to identify and reduce low-value care, and to generate and disseminate knowledge regarding the process of de-implementation.

Through these programs, many medical societies and clinicians were engaged and motivated to reduce low-value care. However, actual reductions are hard to achieve and it is unknown how we can overcome the challenges to de-implementation.[7] We studied what is needed to reduce low-value care to answer our last question: '**What are promising strategies to reduce low-value care?**'.

Goal and outline of this thesis

The aim of this thesis was to study how low-value care can be reduced in the Netherlands. We answered the following three questions using six studies.

1) Which low-value care exists and needs to be reduced?
   We studied the different reasons for care to be considered of low value (chapter 2), created a list of nursing low-value care practices (chapter 3), and evaluated whether nurses, physicians and general practitioners provide specific low-value care practices (chapters 4 and 5).

2) What factors influence the provision of low-value care?
   We asked care professionals which factors influence the provision of low-value wound care and primary care (chapters 4 and 5). We asked de-implementation experts for key factors that promote low-value care on a national level (chapter 6). Moreover, we asked project leaders of eight multicenter de-implementation projects which factors hindered and facilitated the reduction of low-value care (chapter 7).

3) What are promising strategies to reduce low-value care?
   We hypothesized what the promising strategies could be for the three types of low-value care i.e. inefficient, unwanted or infective care (chapter 2). Also, we asked general practitioners what they need in order to reduce low-value care (chapter 5), and evaluated the strategies of eight de-implementation projects (chapter 7).

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CHAPTER 2

Limit, lean or listen? A typology of low-value care that gives direction in de-implementation

Verkerk EW, Tanke MAC, Kool RB, van Dulmen SA, Westert GP
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Abstract

Background

Overuse of unnecessary care is widespread around the world. This so-called low-value care provides no benefit for the patient, wastes resources and can cause harm. The concept of low-value care is broad and there are different reasons for care to be of low-value. Hence, different strategies might be necessary to reduce it and awareness of this may help in designing a de-implementation strategy. Based on a literature scan and discussions with experts, we identified three types of low-value care.

Results

The type ineffective care is proven ineffective, such as antibiotics for a viral infection. Inefficient care is in essence effective, but is of low-value through inefficient provision or inappropriate intensity, such as chronic benzodiazepine use. Unwanted care is in essence appropriate for the clinical condition it targets, but is low-value since it does not fit the patients' preferences, such as a treatment aimed to cure a patient that prefers palliative care. In this paper, we argue that these three types differ in their most promising strategy for de-implementation and that our typology gives direction in choosing whether to limit, lean or listen.

Conclusion

We developed a typology that provides insight in the different reasons for care to be of low-value. We believe that this typology is helpful in designing a tailor-made strategy for reducing low-value care.

Introduction

Overuse of unnecessary care is widespread around the world and especially prevalent in high-income countries.[1 2] Experts estimate that about 10-30% of all health care practices have little or no benefit to the patient.[3 4] Apart from wasting limited resources, these so-called low-value care practices may cause physical, psychological and financial harm to patients.[1] For example, an unnecessary CT-scan exposes the body to harmful radiation and overuse of antibiotics contributes to antibiotic resistance at population level. Berwick and Hackbarth estimated that between $107 billion and $389 billion was wasted on low-value care in the US in 2011.[5] Reducing low-value care is therefore a step towards the triple aim in healthcare: improving the experience of care and the health of populations, and reducing its costs.[6] Hence, there is an increasing number of initiatives around the world to identify and reduce low-value care,[1 7] the largest of them being Choosing Wisely.[8]

The concept of low-value care is broad and listed low-value services vary, ranging from routine transthoracic echocardiograms[9] to the chronic use of benzodiazepines[10] and curative treatment for patients that prefer palliative care.[11] These cases of low-value care have different contexts and different reasons for being of low-value, enable different perspectives by diverse stakeholders and require different strategies for de-implementation. Just as in implementation,[4] one size does not fit all in de-implementation and tailoring your strategy to the context of the low-value care practice is important. We are convinced that being aware of the reason for care to be of low-value is important in selecting a strategy.

To the best of our knowledge, there is no literature that reports taking this into account in developing a strategy for reducing low-value care. The aim of this paper is to introduce a typology of low-value care that creates awareness of the wide range of low-value care and provides direction in how to reduce it.

What is low-value care?

What low-value care entails depends on the definition of value. Literature shows different definitions for low-value care that contain several elements;[12-18] low-value care is care: that provides minimal or no health benefit; which benefit does not weigh up to the harms; which benefit does not weigh up to the costs; that is less cost-effective than alternative care, and that does not fit the preferences of the patient. There is no definition that encompasses all elements. Therefore, we will use the following definition of low-value care: ‘care that is unlikely to benefit the patient given the harms, cost, available alternatives, or preferences of the patient’. This definition includes care that is low-value from both the patients’ and societal perspective.

Low-value care is also being addressed in other terms, such as overuse, which is often mentioned next to underuse (failing to provide care when it would have produced a favorable outcome) and misuse (selecting high-value care but not delivering to its full potential due to preventable complications).[12] The related terms overtreatment and overtesting indicate the inappropriate delivery of particular types of services.[1] Another related term, overdiagnosis, occurs when people without symptoms are diagnosed with a disease that ultimately will not cause symptoms or early death.[19]

In this paper, we focus on care that is proven to be of low-value and of which the physician can predict it is of low-value at the time of deciding to deliver the specific care practice. We do not focus on care that has unknown effectiveness and care that appeared to be of no value after it had been used. However, determining if a care practice is unlikely to benefit the patient on beforehand can be hard. Often there is a lack of sound scientific evidence, for example because studies lack an appropriate comparator or relevant and long-term outcome measures.[20] Drugs and medical devices can be authorized for the market based on this weak evidence. And even when there is sufficient evidence, using it to predict for an individual patient whether a practice is of low-value or not could also be hard.

Current typologies

We reviewed scientific literature on low-value care of the past ten years and found three papers that describe a typology or framework with different types of low-value care related to the reason for being low-value.[13 21 22] We searched PubMed on 28-03-2017 with the following search strategy and included articles from 01-01-2007: (low-value care[tiab] OR lower-value care[tiab] OR unnecessary care[tiab] OR overuse [tiab] OR overdiagnosis[tiab] OR Medical Overuse[Mesh]) AND (framework[tiab] OR types[tiab] OR typology[tiab] OR classification[tiab]). EWV and SvD screened all articles independently and discussed for final inclusion. See figure 1 for a flowchart of this process. We included articles that describe different types of low-value care related to the reason for being low-value. We excluded papers without typologies and papers with typologies that did not provide insight into the reason for being low-value, such as type of care (diagnostics, treatment or prevention), costs and effects of care, and barriers and facilitators for reducing low-value care. Wennberg identified three types of unwarranted variations in care; effective care, preference-sensitive care and supply-sensitive care.[23] However, these unwarranted variations include both overuse of low-value care and underuse of high-value care, while we focus on care that is proven of low-value.

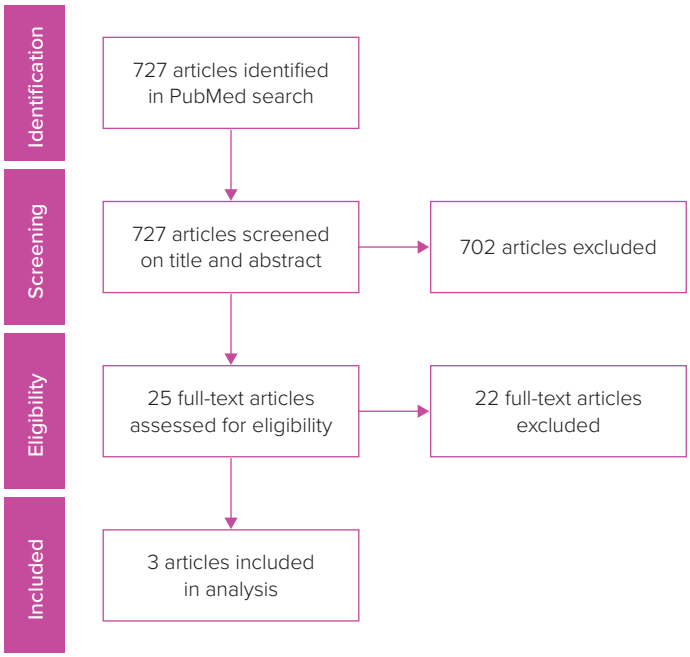

Figure 1 flowchart literature scan

The found typologies describe several reasons for care to be of low-value, such as when care 'occurs too frequently',[13] 'is not clinically indicated for the patient's symptom or diagnosis',[13] 'is delivered in the wrong doses or duration',[21] 'has a cheaper, equally effective alternative'[21] or 'has a close benefit-risk balance in mild cases'.[22]

The typologies all include categories focused on the value of a service from a medical perspective. However, none of the typologies include the option of care being low-value due to the patients' preferences. Since patient preferences are recognized in the definitions of low-value care and evidence based practice, and are recognized by Choosing wisely as being an important component of avoiding overuse,[24] the current typologies do not represent the full spectrum of low-value care. In addition, two typologies include categories that do not match our definition of low-value care,[21 22] We would categorize 'Not receiving a medicine that is clinically needed' as underuse, and 'cancelled procedures' and 'potentially cosmetic interventions' are not necessarily low-value according to our definition. Some categories within the typologies have the same underlying cause for being low-value. For example,

the categories ‘services that are not matched to the patient’s risk of disease’ and ‘when the patient has contraindications that increase the risk of the service’ both represent care whose benefits do not outweigh the risks. Lastly, the typologies do not facilitate the selection of a promising strategy for reducing low-value care. Each typology offers insight in low-value care, but they do not comprise the full spectrum of low-value care and they do not give direction to reducing low-value care. Therefore, we developed a new typology.

Introduction of a new typology

Based on our definition of low-value care and in collaboration with 5 clinicians and researchers with expertise on low-value care or implementation, we created three types of low-value care related to their reason for being of low-value. Figure 2 shows our typology.

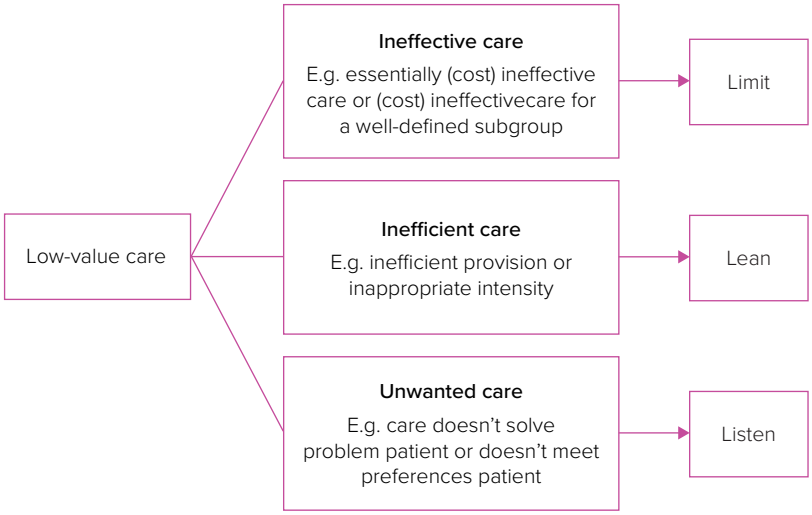

Figure 2 typology of low-value care

The category **ineffective care** is of low-value from a medical perspective. It includes care that is proven (cost)ineffective for a certain condition or which benefit does not weigh up to the harms according to scientific standards, for the majority of the population or a well-defined subgroup. Examples are shaving before an operation, the use of antibiotics in children with upper respiratory tract infections and routine echocardiography for asymptomatic patients.

The category **inefficient care** is of low-value from a societal perspective. It includes care that is in essence effective for the targeted condition, but becomes of low-value through inefficient provision or inappropriate high intensity or duration. Examples of inefficient provision are duplication of diagnostic tests and removing stitches in hospital instead of general practice. Examples of inappropriate intensity are routine use of 'last-resort' antibiotics, chronic benzodiazepine use and prolonged catheterization.

The category **unwanted care,** lastly, is of low-value from the patients' perspective. Like 'inefficient care' it is in essence effective for the targeted condition, but becomes low-value because it doesn't solve the individual patients' problem or doesn't fit the individual patient's preferences. Examples are vaccines and blood transfusions for patients with certain religious beliefs, chemotherapy for a patient that prefers palliative care, or surgery while the patient prefers conservative treatment. This category is probably the least well-known and least well-studied type of low-value care, because it can only be identified and measured by assessing the patient's values.

An example to illustrate this typology is the use of an MRI scan in a patient with a lumbal hernia. An MRI scan may have been low-value because the scan was not indicated (ineffective); because the scan had been done before (inefficient) or because the outcome of the scan wouldn't alter treatment anyway: the patient prefers conservative treatment over an operation (unwanted). Logically, the strategy to reduce unnecessary MRI scans in each of the three options differs.

Using the typology in reducing low-value care

We argue that these three types differ in their most promising strategy for de-implementation. For the category *Ineffective care,* it can be clearly determined which patients do and do not need to receive certain care. This enables macro-level strategies enacted by the government or national institutes with consequences for the whole community, such as market withdrawal or exclusion from the benefit package, which make care inaccessible or unprofitable. These are strong incentives and can be a successful and sustainable addition to a de-implementation process. However, policy changes could be difficult to achieve. Other strategies for reducing ineffective care are incorporation of do-not-do recommendations in clinical practice guidelines and protocols or installing barriers or alerts in electronic patient records when a low-value care practice is ordered. For example, a study installed soft- and hard-stop computer alerts when metformin was ordered inappropriately.[25] The key word for de-implementing this kind of low-value care is 'limit'.

Inefficient care is caused by inefficient organization and lack of cooperation. Market withdrawal or exclusion from the benefit package are not possible, since this care is in essence effective and still needs to be delivered. A promising and sustainable strategy here lies in hospitals or regional networks reorganizing care and facilitating communication between healthcare providers. Duplication of imaging for example might be solved by better information transmission between electronic patient files. Another example is a study that reduced the high intensity of routine laboratory tests by implementing a new ordering system in which each test needs to be ordered individually instead of in groups.[26] The key word for de-implementing this kind of low-value care is 'lean'.

Since *unwanted care* depends on the preferences and values of the patient, limiting or reorganizing care for all patients is not appropriate. A promising strategy for reducing unwanted care is facilitating shared-decision-making and sufficient communication between patient and caregiver. It is important that patients are well-informed before making a decision and empowered to be more involved in their health care, although this could be difficult because it requires time and skills from the caregiver. An example is a study that reduced unwanted prostate cancer screening by providing patients with a decision aid and educating physicians.[27] The key word for de-implementing this kind of low-value care is 'listen'.

Incorporating the reason for care to be of low-value in developing de-implementation strategies is important but not sufficient. Other contextual factors (e.g. local organizational structure, culture, available time and money) play an important role and need to be taken into account in a full-grown strategy. This means that facilitators and barriers that either stimulate or impede wise choices need to be tackled.[28 29] The driving factors can be different for every low-value care practice and can include fear of litigation, financial incentives, pressure from patients or lack of consultation time.[30] Also, combining multiple strategies is generally more effective than a single strategy.[18] Even when taking all these elements into account, achieving sustainable change is hard and takes determination, time and money. This is a challenge we need to face in order to reduce low-value care and improve healthcare.

Conclusion

We have developed a typology with three types of low-value care related to their reason for being of low-value that describe the full spectrum of low-value care according to our definition. Care can be of low-value because it is ineffective, inefficient and unwanted. Recognition of these reasons may help to stimulate the debate on how to reduce low-value care. Since for different types of low-value care, different types of action may be the most promising target for sustainable de-implementation, this typology may help in developing a tailor-made strategy. Low-value care is an increasing problem in western countries and there is an urge to take action. Reducing low-value care increases the quality and safety of care and reduces costs, and should be on the agenda in every country on policy, organizational and professional level. In addition, countries should focus on preventing low-value care by investing in proper research and stricter market authorization. We are positive that this typology will give insight in low-value care and guide health care providers, policy makers and researchers in the challenge of de-implementing low-value care in many countries.

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CHAPTER 3

Low-value care in nursing: A systematic assessment of clinical practice guidelines

Verkerk EW, Huisman-de Waal G, Vermeulen H, Westert GP, Kool RB, van Dulmen SA
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Abstract

Background

Low-value care provides little or no benefit to the patient, causes harm and wastes limited resources. Reducing it is therefore important for safer and more sustainable care.

Objectives

We systematically assessed nursing low-value care practices in Dutch clinical practice guidelines with the aim to facilitate and stimulate nurses to reduce this low-value care.

Methods

We screened Dutch clinical practice guidelines for do-not-do recommendations stating that specific nursing care should be avoided. We combined similar recommendations and categorized them by specialism-related groups of nurses, the settings where care took place, and the kind of care according to the Fundamentals of Care framework.

Results

We found 66 nursing do-not-do recommendations in 125 clinical practice guidelines, for example, 'Do not use physical restraints in case of a delirium'. Most recommendations were relevant for intensive care nurses (n=23) and the hospital care setting (n=49). The majority of recommendations concerned the element safety, prevention and medication of the Fundamentals of Care framework (n=38).

Conclusions

This is the first systematic assessment of low-value nursing care in clinical practice guidelines. The majority of the 66 low-value care practices are not mentioned in other low-value care lists and are therefore new targets for de-implementation. The next step to reducing low-value care should be to create awareness amongst nurses, stimulate the dialogue on de-implementation in practice and facilitate quality improvement projects to quantify and reduce nursing low-value care.

Background

Several studies show that caregivers around the world provide care that is of low value.[1-3] Low-value care is care for which there is evidence that it has no or little benefit to the patient considering the costs, available alternatives, and patient preferences.[4 5] It wastes limited resources and may cause physical, psychological and financial harm to patients.[1] In addition, it wastes time that the caregiver can spend on more effective practices or care left undone. This is especially important in the light of the global nursing shortage.[6] Reducing low-value care is therefore an important step towards safer and more sustainable care.

There have been several efforts to identify and reduce low-value care delivered by medical specialists,[7-9] but there has been less attention to low-value nursing care. Since nurses are the largest part of the workforce in healthcare,[10] there is great potential in improving healthcare by involving and targeting them.[11] In addition, research has shown that low-value care might be highly prevalent in nursing.[12 13] Two well-known examples of low-value care are routine preoperative shaving and prolonged preoperative fasting that are both proven to be more harmful than useful.[14 15]

The first step in reducing low-value care, so-called de-implementation, is to identify what practices could be considered as low-value care. There have been several examples of listing low-value nursing care. As part of the Choosing Wisely campaign, nurses associations in several countries produced lists of practices that nurses and patients should question.[16-18] In the Netherlands, the Dutch Nurses Association published a list with 18 low-value care practices.[19] More recently, the Dutch center for long-term care has published a list of 15 nursing low-value care choices.[20] The low-value care practices on these lists are selected through consensus by professional associations or nurses and scientists.

It is unknown what low-value care practices performed by nurses are represented in current clinical practice guidelines. The goal of this study was to systematically assess the guidelines to identify the nursing low-value care practices described. This list of low-value care practices can be used to increase awareness of low-value nursing care. Reducing low-value nursing care can increase the safety of care and save time and money that can be used for care left undone.

Methods

We searched Dutch clinical practice guidelines for recommendations stating that specific nursing care should be avoided, so-called do-not-do recommendations.

Inclusion of guidelines

We started our search for guidelines with a list of Dutch clinical practice guidelines for nurses developed in 2016.[21] It includes national guidelines that describe nurses as (part of) their target audience and are authorized by the Dutch Nurses Association. We updated this search to April 2017 by including all new guidelines from the database of the Dutch Nurses Association that were authorized by them. We excluded guidelines from 2011 and older to prevent including recommendations based on outdated literature. The database did not contain patient versions of guidelines and local protocols. Guidelines had to be developed for healthcare professionals and content had to be based on a review of scientific literature and consultation of stakeholders. We did not assess the quality of the guidelines, because we aimed to inventory the do-not-do recommendations in currently available guidelines, regardless of their quality.

Screening of guidelines

First, three researchers (EWV, SvD and GH) screened 18 randomly selected guidelines independently for do-not-do recommendations, compared their choices and consulted two other researchers (RBK and HV) until they agreed on the inclusion criteria and their selections were similar. The other guidelines were screened by two of the three researchers independently and any ambiguities were discussed until consensus was reached. Two different methods to screen the guidelines were used, depending on their format: in guidelines with clearly recognizable recommendations or core messages, we read these parts only. In guidelines without distinct recommendations, the entire guideline was screened with search words. We used the same words as for the development of the Dutch specialist do-not-do list: not, no, stop, insufficient, seldom, only, cost, avoid, omit, unnecessary, discourage, dissuade and cease.[9]

Including recommendations

We included do-not-do recommendations that targeted nursing care. We defined a do-not-do recommendation as a recommendation that advises against a practice or advises to not routinely apply that practice. Following a do-not-do recommendation generally leads to less or less intensive care being delivered. We included recommendations that applied to decisions or care practices usually performed by registered nurses and vocational nurses. The physician-level practices performed by advanced practice nurses, such as prescribing medication or ordering a diagnostic test, were not included, because the advanced practice nurses concern only a small part of

the nursing population in the Netherlands. In addition, we excluded recommendations with an advice for the patient rather than a care practice. For example: 'recommend parents to not offer a pacifier to their child in its first two weeks of life, for it can reduce the duration of breastfeeding' (guideline Breastfeeding). Lastly, recommendations relating to the organization of care or substitution of nursing care by other caregivers were not included when they would not lead to less or less intensive care being delivered. For example: 'with discussing difficult subjects with patients, such as bad news or shameful subjects, it is preferred not to let a child translate' (guideline Palliative care for non-western patients). In order to create a list that was easier to read, we combined similar recommendations from the same guideline into one recommendation and formulated the recommendations more concise.

Data-extraction

All do-not-do recommendations were listed in an excel-file. We categorized the do-not-do recommendations in specialty-related groups of nurses corresponding to the Dutch Nurses Association, the settings where care took place and the kind of care according to the Fundamentals of Care. The Fundamentals of Care is a tool for classification of nursing activities developed by Kitson et al.[22 23] It was developed in cooperation with nurses because there was no consistency in the way the fundamentals of care were described in the literature, nor was there consistency in the underlying evidence base.[23] The framework can help in understanding the importance of the fundamentals of care and how they should be provided in daily practice. It is increasingly used in scientific literature as provides nurses with a comprehensive overview of their care activities.[24 25] For each do-not-do recommendation identified, we assessed whether the care should not be offered at all or should not be offered routinely to all patients. We did not extract the level of evidence for the recommendations, because this was reported in a different way in the guidelines or not reported at all.

Results

We identified 156 guidelines from the list of Dutch clinical practice guidelines for nurses and added 23 guidelines to the April 2017 update.[21] After excluding 52 outdated guidelines and 2 duplicates, we included 125 guidelines, as shown in figure 1. After screening the guidelines, we found a total of 76 do-not-do recommendations in 31 guidelines. Most guidelines (n=94) did not contain any do-not-do recommendations. Subsequently, we combined several recommendations that were similar: in five cases, two recommendations were combined into one, in one case we combined three and in one case we combined four. For example, we combined the recommendations 'transdermal administration of opioids is not advised for postoperative pain

treatment' and 'oral administration of opioids is not preferred postoperatively' from the guideline Postoperative pain. This resulted in a total of 66 do-not-do nursing care recommendations, shown in Appendix 1. Examples are 'Do not use physical restraints in case of a delirium', 'Do not use bandages for wounds closed by primary intention' and 'Do not use disinfectants in the daily care of a urethral catheter'. Table 1 shows the distribution of the guidelines and the do-not-do recommendations in recent years.

Table 1 Number of guidelines and recommendations per year

Year	Number of guidelines included	Number of do-not-do recommendations
2012	20	5
2013	26	21
2014	27	19
2015	30	10
2016	20	11
2017	2	0

The majority of these recommendations (n=56) advised to not deliver a certain care practice at all, whereas the others (n=10) recommended either delivering care only when the patients meet specific criteria, or to avoid delivering care routinely.

Figure 2 shows the number of relevant do-not-do recommendations per specialty-related nurse group. Twenty-three recommendations were relevant for one group, whilst 43 recommendations were relevant for two or more groups. For example, the recommendation 'Do not use still water, cold water or commercial refrigerants for burns' (guideline First aid for patients with burns in the acute phase and referral to a Burn Center) was appointed to the two nurse groups 'Ambulance' and 'Intensive care'. 'Intensive care' had the largest number of relevant recommendations (n=23). Thirteen groups had no relevant recommendations, amongst them 'urology', 'rheumatology' and 'diabetes'.

We appointed one or more relevant settings to all recommendations. For example, 'Do not humidify the air for palliative patients with dyspnea' (guideline Dyspnea) was assigned the settings hospital, nursing home, home care and primary care. In total, hospitals were assigned the most relevant recommendations (n=49), followed by nursing homes (n=20), home care (n=12), mental health facilities (n=7) and primary care practices (n=4).

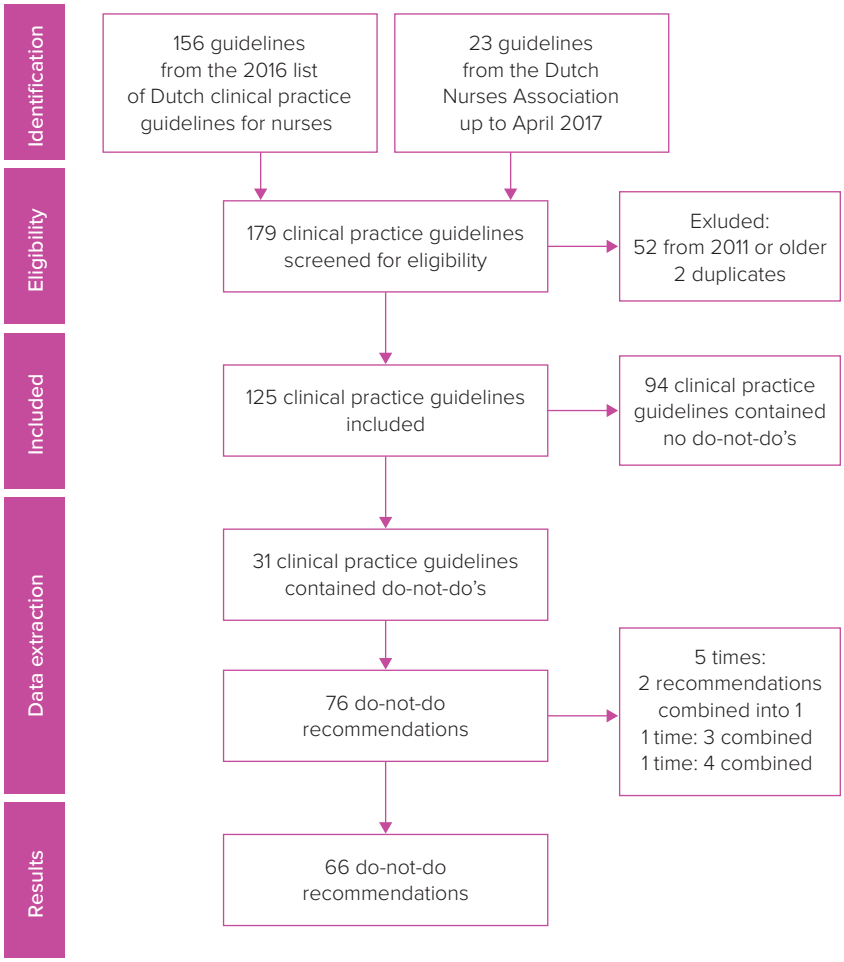

Figure 1 flowchart for guideline search and recommendations selection

Lastly, we appointed one or more Fundamentals of Care to all recommendations. Figure 3 shows the number of do-not-do recommendations per Fundamental of Care. 'Safety, prevention and medication' was the most prevalent fundamental (n=38), for example, 'Do not use physical, mechanical or pharmacological restraints' (practical guidance restraints), followed by 'comfort and pain management' (n=12) and 'elimination' (n=9). Recommendations that did not fit any of the fundamentals (n=3) were appointed 'other'. Four Fundamentals of Care ('expressing sexuality', 'privacy', 'rest and sleep' and 'personal cleansing and dressing') received no relevant recommendations.

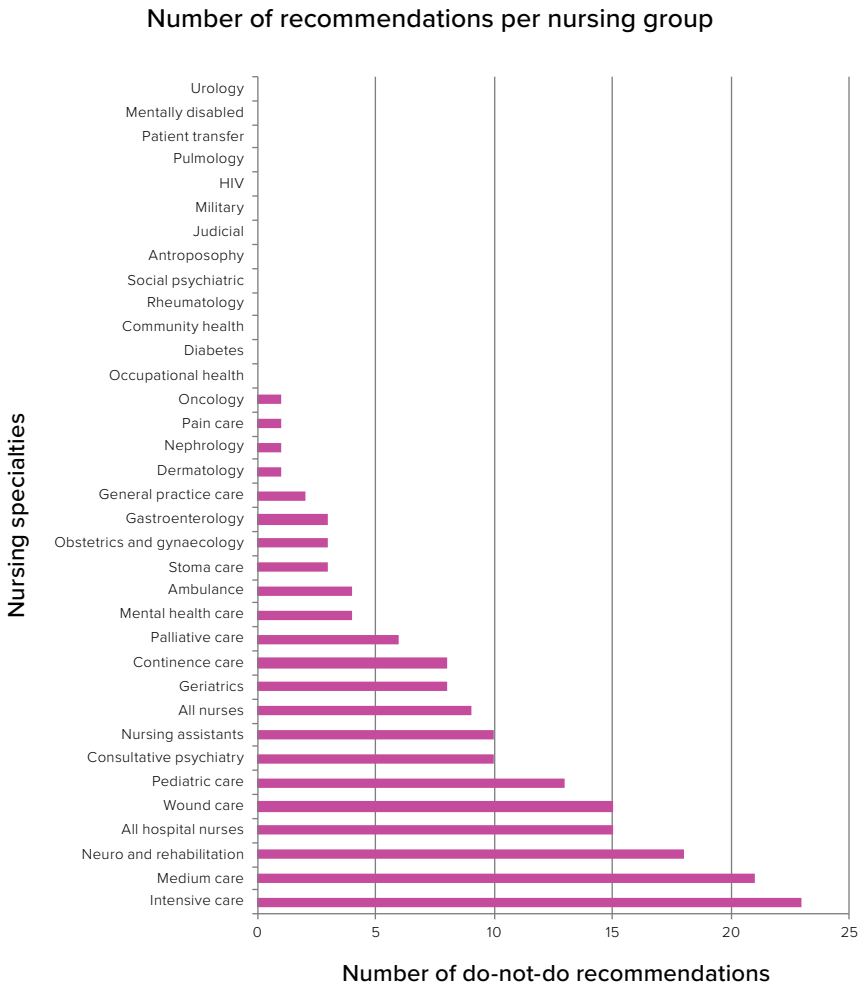

Figure 2 number of do-not-do recommendations per nursing group

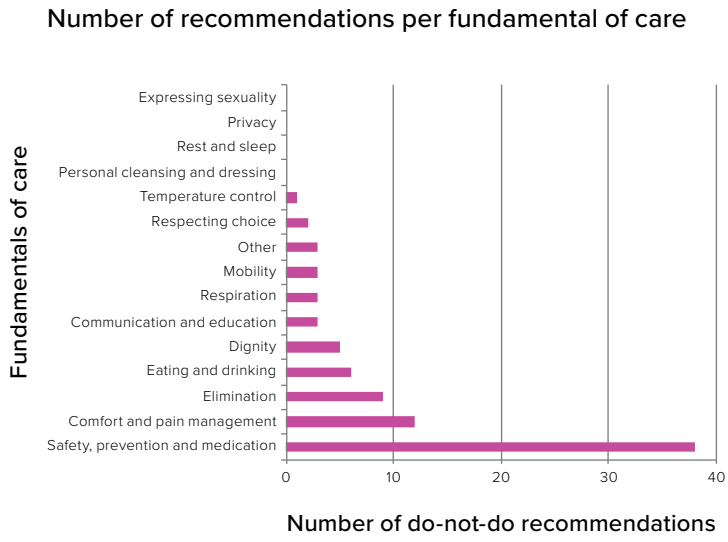

Figure 3 number of do-not-do recommendations per Fundamental of care

Discussion

To our knowledge, this study is the first systematic inventory of low-value nursing care in clinical practice guidelines. We identified 66 do-not-do recommendations for nursing by screening 125 Dutch clinical practice guidelines relevant to nursing practice. Of the 125 guidelines, 94 did not contain any do-not-do recommendations. Most recommendations were relevant for the group of intensive care nurses (n=23), for the hospital care setting (n=49), and concerned the element safety, prevention and medication of the Fundamentals of Care as defined by Kitson (n=38).[23]

There is little overlap of our list of 66 recommendations with the two existing Dutch lists of low-value nursing care and the Choosing Wisely nursing lists.[16-20] Recommendations present on our list and on other lists concern the use of medical restraints [18 19], the auscultation method to verify the position of a feeding tube,[20] the use of urine catheters[19] and bladder washouts.[20] An example of a recommendation from the Choosing Wisely Canada list not present on our list is 'Don't routinely use incontinence containment products for older adults'. There are several explanations for these differences. First, the low-value care practices from the other lists are not always reflected in the clinical practice guidelines as a do-not-do recommendation. For example, the recommendation on one of the lists 'do not change the urine

collection bag daily'[20] is reflected in the guideline Urine discharge as 'change the urine bag weekly', which is not a do-not-do recommendation. Second, we excluded guidelines published before 2012. These outdated guidelines were an important source for some of the other lists. Finally, the recommendations in our list are more specific to a condition than those in other low-value care lists as ours is the result of a systematic search of the guidelines, whereas the others are selected by nurses associations or nurses and scientists based on their experiences, prioritized on relevance for the common nursing daily practice. This difference in the lists indicates that our list of 66 only reflects part of the low-value care practices in nursing care.

A 2017 survey conducted by the Dutch Nurses Association showed that they indicate other low-value care practices than those in our list of 66.[26] The members of the Dutch Nurses association were asked to list their top three unnecessary care practices. The most reported practices by the 598 respondents were: too frequently taking inpatient vital signs; putting on compression stockings; unnecessary practices regarding urinary and intravasal catheters; washing the patient with water and soap daily; and practices that patients can do themselves but that are taken over by nurses. Of these practice categories, our list of 66 recommendations only includes a number of recommendations regarding catheters. The other categories are not represented, possibly for the reasons mentioned above. There is a possibility that nurses are not aware of the recommendations in our list, which indicates that we need to increase awareness.

Our list of 66 is significantly shorter than the 1366 recommendations that were found for the Dutch medical specialist do-not-do list.[9] The fact that for that study 193 guidelines were screened and for this study 125 cannot fully explain this difference. A large part of the medical specialist list (39%) consists of medication-related recommendations, which were excluded from the nursing list. We also noticed while screening that in multidisciplinary guidelines the majority of the recommendations concerned medical specialist care and a limited part nursing care. This might be caused by less emphasis on nursing in the development of the guideline or a lack of scientific evidence for nursing practices that prevent the formulation of firm recommendations. In addition, several nurse-specific guidelines did not follow a structured format with headings as clinical question and recommendations, but rather contained a description of good quality care, often without formulating specific recommendations. This calls for action to professionalize nursing guidelines and to develop a larger body of evidence which will enable the formulation of specific and firm recommendations.

By far the most low-value care practices identified concerned care that is categorized as the fundamental of care 'safety, prevention, and medication', while we found no practices for four other fundamentals ('expressing sexuality', 'privacy', 'rest and sleep' and 'personal cleansing and dressing'). This indicates that de-implementation efforts in the area of safety, prevention, and medication are warranted. This fundamental is very important for the patients' health and has a tremendous influence on patient's experiences and quality of life. Therefore, interventions to convince nurses to stop these practices must be prioritized. The fundamentals with no or few recommendations could be areas with less overuse of low-value care or with fewer recommendations in general.

Limitations and strengths

A major limitation of our list of low-value care practices is that we have not assessed how prevalent these practices are in the Netherlands and it is therefore unknown what do-not-do recommendations call for action. However, for some low-value care practices we know that there is room for improvement: in 2015, 27.3% of patients in long-term care in the Netherlands received a medical restraint;[27] and in 2016, 20.7% of admitted patients had a urinary catheter, of which 5.3% was inappropriate.[28] Before launching de-implementation activities for specific practices on our list, a first step is to identify how often these occur in practice. A second limitation of our study is that it was hard to uniformly include or exclude do-not-do recommendations. Since we experienced that there is a subjective component to selecting recommendations, we decided to independently screen all guidelines with two researchers and discuss the results. Thirdly, the formulation of recommendations in a guideline might be somewhat arbitrary and inconsistent. For example, 'do not clean acute wounds with disinfectants' is a do-not-do recommendation whereas 'clean acute wounds with tap water only' is a positively formulated recommendation. We might therefore have missed known low-value care practices that are not formulated as a do-not-do recommendation. Fourthly, we did not analyze the level of evidence of the recommendations because it was often not reported in the guidelines. Therefore, we cannot distinguish between recommendations with a strong and with a weak evidence base. Recommendations with a weak evidence base could be changed when new studies provide more evidence. Thus, it is possible that some recommendations become outdated in several years. However, we reduced this possibility by only selecting guidelines based on a review of scientific literature and consultation of stakeholders and by only including firmly formulated do-not-do recommendations, thus excluding recommendations as: 'there is not enough evidence to recommend drama therapy for schizophrenia' (guideline Schizophrenia). Lastly, since we excluded guidelines of 2011 or older, we are missing do-not-do recommendations from outdated guidelines. Although this leaves a gap on subjects with outdated guidelines, we found

it more important not to include outdated recommendations that might no longer be according to current scientific knowledge.
A strength of our study is that we have screened all recent national guidelines that were fully or partly for nurses and therefore have covered a large part of nursing care. Since the Dutch Nurses Association is the national organization for all nurses, it is involved in the development of all guidelines that are relevant for nurses in the Netherlands. Their database therefore contains all guidelines relevant to this study. We screened all the guidelines with two researchers independently. By categorizing the recommendations in the nursing groups, the setting and in the Fundamentals of Care, we can target specific groups of nurses with tailored communication on their relevant recommendations.

Implications for practice and research

Our list of 66 do-not-do recommendations provides an indication of the kind of low-value care practices in nursing. It shows 66 low-value care practices as formulated in the guidelines, however, it is not a comprehensive list of all nursing low-value care practices; we only searched recent guidelines and relied on the formulation of the recommendations to include do-not-do recommendations. Nurses mention other low-value care practices, indicating that the problem of low-value nursing care is broader. Our list of 66 is therefore an addition to existing lists and introduces new targets for de-implementation.

This list can be distributed to nurses to be discussed both in their nursing teams and in interprofessional teams to create awareness of low-value care. This can facilitate the reduction of these low-value care practices and ignite the dialogue on the de-implementation of low-value care in nursing and interprofessional teams. An example is a recent campaign created by the Dutch Nurses Association in which infographics and case stories regarding reducing low-value care practices were spread. It can also function as a foundation for quality improvement projects which quantify and reduce nursing low-value care.

Unfortunately, the delivery of low-value care often does not stop upon the appearance of a do-not-do recommendation in a clinical practice guideline.[29-31] In 2007, 88% of hospitals in the Netherlands still shaved routinely before an operation, although the guideline was published 14 years prior and the evidence was known for 21 years.[32] Literature suggests that de-implementation addresses different psychological processes and requires a different approach compared to implementation.[33-35] Successfully de-implementing low-value care requires a targeted approach that takes into account the context and the caregivers and patients that are involved.[33 36]

Although de-implementing is challenging,[36] there are successful examples of nurses' attitude changes, for example, the sacred cow contest where nurses are encouraged to think about their practice and submit low-value care practices.[37 38] If nurses are more aware of this problem and move towards more evidence-based clinical decision-making, the quality of care can be greatly improved especially on nursing-sensitive outcomes.[39] Reducing low-value practices may even give nurses more time to spend on care that is now left undone. Care practices most often left undone are psychosocial support and planning and documentation, such as comforting the patient, developing nursing care plans and educating the patient.[40] Since this care left undone is associated with poor patient outcomes, such as a higher mortality, and with adverse nurse outcomes, such as reduced job satisfaction and increased turnover, spending more time on this care can improve the quality of care.[40-42]

Conclusion

We have developed a list of 66 low-value care practices for nursing care. Most practices concerned the domain safety, prevention and medication, are relevant for intensive care nurses and are delivered in the hospital. The majority of these practices are not mentioned in other low-value care lists. This paper therefore introduces new targets for de-implementation. These could be spread to create awareness for low-value care amongst nurses, ignite the dialogue on low-value care in nursing and inter-professional teams and facilitate projects to quantify and reduce nursing low-value care.

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Appendix 1 66 do-not-do recommendations for nursing care

Recommendation	Nursing group	Fundamental of care	Guideline (year)
Do not use auscultation to verify the position of the feeding tube.	Gastroenterology All hospital nurses	Nutrition and hydration	Addendum guideline tube feeding of the Dutch Nursing Association (V&VN) (2012)
Do not use physical restraints like side rails or immobilization.	Palliative care	Safety, prevention and medication	Practical guidance Refusal of nutrition and hydration (2014)
Do not screen comprehensively on vulnerability, only when this is indicated by a short screening tool.	General practice care	Safety, prevention and medication	Practical guidance frail elderly (2014)
Do not use physical, mechanical or pharmacological restraints.	Consultative psychiatry Geriatrics All hospital nurses	Safety, prevention and medication Dignity Respecting choice	Practical guidance restraints (2013)
Do not fixate with a belt restraint, only in emergencies.	Consultative psychiatry Geriatrics All hospital nurses	Safety, prevention and medication Dignity Respecting choice	Practical guidance restraints (2013
Do not choose breathing exercises to affect an anxiety disorder.	Consultative psychiatry	Respiration, Comfort and pain management	Guideline anxiety disorders (2013)
Do not choose therapeutic touch for anxiety disorders.	Consultative psychiatry	Communication and education	Guideline anxiety disorders (2013)
Do not force nourishment in anorexia nervosa when this is not feasible and meaningful.	Palliative care	Nutrition and hydration Comfort and pain management Dignity	Guideline anorexia nervosa and weight loss (2014)
Do not weigh anorexia nervosa patients routinely.	Palliative care	Nutrition and hydration Comfort and pain management	Guideline anorexia nervosa and weight loss (2014)
Do not reduce tube feeding in phases but stop immediately.	Palliative care	Nutrition and hydration	Guideline anorexia nervosa and weight loss (2014)
Do not weigh before and after breastfeeding.	Obstetrics and gynecology	Nutrition and hydration	Guideline breastfeeding (2015)
Avoid moisturizing bandages in case of Candida infection in breastfeeding.	Obstetrics and gynecology	Safety, prevention and medication	Guideline breastfeeding (2015)

Do not use a nipple cap when a baby is not able to breastfeed after childbirth.	Obstetrics and gynecology	Nutrition and hydration	Guideline breastfeeding (2015)
Do not use physical restraints in case of a delirium.	Consultative psychiatry Geriatrics Intensive care Medium care Neurology and rehabilitation Gastroenterology All nurses	Safety, prevention and medication Comfort and pain management Dignity	Guideline Delirium (2013)
Remove materials such as catheters and drains in case of a delirium.	Consultative psychiatry Geriatrics Intensive care Medium care Neurology and rehabilitation	Safety, prevention and medication Comfort and pain management	Guideline Delirium (2013)
Do not use a screening instrument in GP care when suspecting a depression.	General practice care	Safety, prevention and medication	Guideline Depression (2013)
Do not use the AQ-10 to recognize signals and symptoms of autism spectrum disorders.	Consultative psychiatry Mental health care	Other	Guideline Diagnosis and treatment of autism spectrum disorders in adults (2013)
Choose normal saline, soap and water or chlorhexidine 0.1% for burns and do not choose other antiseptics.	Ambulance care Intensive care	Safety, prevention and medication	Guideline First aid for patients with burns in the acute phase (1st 24 hours) and referral to a Burn Center (2014)
Do not use still water, cold water or commercial refrigerants for burns	Ambulance care Intensive care	Safety, prevention and medication	Guideline First aid for patients with burns in the acute phase (1st 24 hours) and referral to a Burn Center (2014)
Do not use colloid solutions for burns in the first 24 hours.	Ambulance care Intensive care	Safety, prevention and medication	Guideline First aid for patients with burns in the acute phase (1st 24 hours) and referral to a Burn Center (2014)
Do not use cream or other topical dressings for burns.	Ambulance care Intensive care	Safety, prevention and medication	Guideline First aid for patients with burns in the acute phase (1st 24 hours) and referral to a Burn Center (2014)

Appendix 2 Continued

Recommendation	Nursing group	Fundamental of care	Guideline (year)
Do not suction mucous when there is no excessive production.	Intensive care Medium care	Respiration	Guideline End-of-life care for ICU-patients, nursing care (2014)
Do not give a sponge bath to children with fever.	Pediatric care	Temperature control	Guideline Fever in acute care for children 0-16 years (2013)
Do not use a screening instrument in other settings as mental health care to identify opiate addiction.	Mental health care	Safety, prevention and medication	Guideline Opiate addiction (2013)
Do not give opioids subcutaneously, transdermally, orally or intramuscularly for postoperative pain.	Intensive care Medium care Pain care All hospital nurses	Safety, prevention and medication	Guideline Postoperative pain (2012)
Do not choose social skills training for schizophrenia.	Consultative psychiatry Mental health care	Communication and education	Guideline Schizophrenia (2012)
Do not use the Comprehensive Assessment of At Risk Mental State (CAARMS) or the Structured Interview for Prodromal Syndromes (SIPS) to prevent psychosis.	Consultative psychiatry Mental health care	Safety, prevention and medication	Guideline Schizophrenia (2012)
Do not use first-void urine for sexual transmitted disease diagnostics.	Dermatology	Other	Guideline sexual transmitted disease for secondary care (2013)
Do not use a catheter to irrigate a stoma.	Gastroenterology Stoma care	Elimination	Guideline stoma care (2015)
Do not use enzymatic agents in cleaning a venous ulcer.	Wound care	Safety, prevention and medication	Guideline venous pathology (2014)
Do not use honey or zinc extract in the treatment of ulcer cruris.	Wound care	Safety, prevention and medication	Guideline venous pathology (2014)
Do not routinely use (local) antiseptics for ulcers	Wound care	Safety, prevention and medication	Guideline venous pathology (2014)
Do not use silver, povidone iodine, peroxides, ethacridine lactate, mupirocine, chlorhexidine and fucidic acid if an antibacterial agent is considered.	Wound care	Safety, prevention and medication	Guideline venous pathology (2014)

Do not use horse chestnut extract when treating venous ulcers.	Wound care	Safety, prevention and medication	Guideline venous pathology (2014)
Do not immobilize patients with spinal metastases.	Oncology	Comfort and pain management Mobility	Guideline spinal metastases (2015)
Do not clean wounds closed by primary intention.	Wound care Intensive care Medium care Pediatric care Neurology and rehabilitation All hospital nurses	Safety, prevention and medication	Guideline wound care (2013)
Do not use baths as wound cleaning.	Wound care Intensive care Medium care Pediatric care Neurology and rehabilitation All hospital nurses	Safety, prevention and medication	Guideline wound care (2013)
Do not use bandages for wounds closed by primary intention.	Wound care Intensive care Medium care Pediatric care Neurology and rehabilitation All hospital nurses	Safety, prevention and medication	Guideline wound care (2013)
Do not change silicone foam dressing daily for wound care.	Wound care Intensive care Medium care Pediatric care Neurology and rehabilitation All hospital nurses	Safety, prevention and medication Comfort and pain management	Guideline wound care (2013)
Do not use antiseptics in aqueous solutions for leaking wounds.	Wound care Intensive care Medium care Pediatric care Neurology and rehabilitation All hospital nurses	Safety, prevention and medication	Guideline wound care (2013)
Do not use chlorine compounds such as Edinburgh University solution of lime [EUSOL] (when other antiseptics are available).	Wound care Intensive care Medium care Pediatric care Neurology and rehabilitation All hospital nurses	Safety, prevention and medication	Guideline wound care (2013)

Appendix 2 Continued

Recommendation	Nursing group	Fundamental of care	Guideline (year)
Do not clean acute wounds with disinfectants.	Wound care Intensive care Medium care Pediatric care Neurology and rehabilitation All hospital nurses	Safety, prevention and medication	Guideline wound care (2013)
Do not use antiseptics for wounds closed by primary intention.	Wound care Intensive care Medium care Pediatric care Neurology and rehabilitation All hospital nurses	Safety, prevention and medication	Guideline wound care (2013)
Do not use gauze or impregnated gauze for wounds closed by primary intention.	Wound care Intensive care Medium care Pediatric care Neurology and rehabilitation All hospital nurses	Safety, prevention and medication Comfort and pain management	Guideline wound care (2013)
Do not use hydrocolloids or film dressings for wound care or with topical corticosteroids.	Wound care Intensive care Medium care Pediatric care Neurology and rehabilitation All hospital nurses	Safety, prevention and medication Comfort and pain management	Guideline wound care (2013)
Do not use infection prevention practices for fellow residents of a patient with a MDR bacterial infection.	Nursing assistants	Safety, prevention and medication	Infection prevention guideline multiple drug resistant (MDR) bacteria (2014)
Do not apply hand hygiene on gloved hands.	All hospital nurses	Safety, prevention and medication	Infection prevention guideline means for personal protection (hospitals) (2015)
Do not perform screening tests (Barthel Index, Canadian Occupational Performance Measure COPM) in patients who are independent in daily life.	Neurology and rehabilitation	Other	Standard of care Stroke/TIA (2012)

Do not use physical, mechanical or pharmacological restraints for patients with traumatic brain injury.	Intensive care Medium care Neurology and rehabilitation	Safety, prevention and medication Comfort and pain management	Standard of care Traumatic brain injury (2014)
Do not prescribe bed rest for patients with traumatic brain injury.	Neurology and rehabilitation Medium care	Mobility	Standard of care Traumatic brain injury (2014)
Do not mobilize patients with traumatic brain injury obligatory.	Neurology and rehabilitation Medium care	Mobility	Standard of care Traumatic brain injury (2014)
Do not perform a bladder washout.	Continence care Nursing assistants Stoma care All nurses	Elimination	Infection prevention guideline Urine discharge (2016)
Do not use disinfectants in the daily care of a urethral catheter.	Continence care Nursing assistants All nurses	Elimination	Infection prevention guideline Urine discharge (2016)
Do not use soap, rinse washing or disinfectant in the daily care of a suprapubic catheter.	Continence care Nursing assistants All nurses	Elimination	Infection prevention guideline Urine discharge (2016)
Do not empty bedpans/urinals/ measuring cups manually in a toilet or automatic bedpan washer.	Continence care Stoma care Nursing assistants All nurses	Elimination	Infection prevention guideline Urine discharge (2016)
Do not disconnect a closed urine catheter system.	Continence care Nursing assistants All nurses	Elimination	Infection prevention guideline Urine discharge (2016)
Do not reuse a disconnected urine drainage bag.	Continence care Nursing assistants All nurses	Elimination	Infection prevention guideline Urine discharge (2016)
Do not place an indwelling urine catheter for incontinence or pressure ulcers.	Continence care Nursing assistants All nurses	Elimination	Infection prevention guideline Urine discharge (2016)
Do not use a condom catheter for wounds.	Continence care Nursing assistants All nurses	Elimination	Infection prevention guideline Urine discharge (2016)
Do not continue neurological assessments when the maximum score on the Glasgow Come Scale is reached.	Pediatric care Intensive care Medium care	Safety, prevention and medication	Standard of care Traumatic brain injury in children (2016)

Appendix 2 Continued

Recommendation	Nursing group	Fundamental of care	Guideline (year)
Do not use physical, mechanical or pharmacological restraints for children with traumatic brain injury.	Pediatric care Intensive care Medium care	Safety, prevention and medication Comfort and pain management	Standard of care Traumatic brain injury in children (2016)
Remove materials such as catheters and drains in case of a delirium.	Consultative psychiatry Geriatrics Intensive care Medium care Neurology and rehabilitation	Safety, prevention and medication	Addendum guideline Dementia as comorbidity in the hospital (2016)
Do not humidify the air for palliative patients with dyspnea.	Palliative care Intensive care Medium care Geriatrics	Respiration	Guideline dyspnea (2015)
Do not administer iron supplements and levodopa at the same time.	Geriatrics Neurology and rehabilitation	Safety, prevention and medication	Guideline nursing care in Parkinson's disease (2015)
Do not give instructions while practicing care on the patient.	Geriatrics Nursing assistants	Communication and education	Guideline nursing care in Parkinson's disease (2015)
Do not use physical, mechanical or pharmacological restraints in palliative care during end stage renal failure.	Nephrology Palliative care	Safety, prevention and medication Comfort and pain management Dignity	Guideline palliative care during end stage renal failure (2017)

CHAPTER 4

Low-value wound care: are nurses and physicians choosing wisely? A mixed methods study

Verkerk EW, Huisman-de Waal G, Overtoom LC, Westert GP,
Vermeulen H, Kool RB, van Dulmen SA

Submitted

Abstract

Background

The Choosing Wisely Campaign aims to stimulate conversations about unnecessary tests and treatments. In 2014, five Choosing Wisely recommendations for acute wound care were released in the Netherlands.

Aims

We aimed to evaluate nurses' and physicians' current adherence to the Choosing Wisely recommendations for acute wound care, and the barriers and facilitators to improve this.

Methods

We performed a mixed methods study and sent a survey to nurses and physicians to assess their awareness of and adherence to the recommendations, followed by interviews on the barriers and facilitators. In addition, patients were interviewed.

Results

The survey was completed by 171 nurses and 71 physicians. Awareness varied between the five recommendations and ranged from 62% to 89% for nurses and 46% to 85% for physicians. However, up to 15% of the nurses and 28% of physicians were aware but did not adhere to the recommendations in practice. We interviewed 17 nurses, 6 physicians and 20 patients. Barriers to adhering to the recommendations were lack of knowledge, the work environment, and perceptions of patients' preferences. Repeated attention, cost-consciousness and an open culture facilitated the implementation.

Linking evidence to action

Although the majority of the nurses and physicians were aware of the recommendations, not all of them adhered to them in practice, because they experience barriers in their work environment, knowledge, and perceptions. Targeting these barriers is necessary for further implementation. Wound care experts could play an essential role in this.

Introduction

Overuse of low-value care has been recognized as a major problem in healthcare in recent years.[1] Low-value care provides no benefit for the patient, wastes resources and can cause harm.[2] In 2012, the US Choosing Wisely Campaign was started with the aim to stimulate the conversation about unnecessary tests, treatments and procedures. Since then, the campaign has spread to more than 20 countries.[3] As part of this campaign, professional societies produce lists of recommendations that advise against practices used in their discipline for which there is evidence of overuse and significant potential harm or cost. Adhering to these recommendations is specifically valuable for nurses who suffer from an increasing work load: stopping with unnecessary care creates room for essential nursing activities.[4]

The Netherlands launched its Choosing Wisely campaign in 2013. One of its lists presents five recommendations for acute wound care, that are based on the multidisciplinary guideline Wound care from 2013 (see box 1).[5] The recommendations apply to acute wounds caused by surgery or trauma. Adhering to these recommendations not only saves costs on saline, cleanser, and bandages, it also results in better wound care for the patient. Cleaning wounds with tap water leads to fewer infections than cleaning with saline.[6] Also, there is no difference in wound healing between covered and uncovered wounds, and between different types of bandages.[7] Hence, it is recommended to not use bandages on a wound closed by primary intention, and if a bandage is necessary to use simple gauzes. Early removal of dressings from surgical wounds may even result in shorter hospital stay.[8] Lastly, providing instructions to patients reduces the risk of surgical site infection.[9]

Both the guideline and the five Choosing Wisely recommendations were disseminated amongst the wound care specialists and by the developing organizations through websites and newsletters. It is unknown to what extent the five recommendations are currently known by nurses and physicians, to what extent they adhere to them, and why. The aim of this study was to evaluate nurses' and physicians' awareness of and adherence to the five Choosing Wisely recommendations for acute wounds, and their perceived barriers and facilitators for implementation in the Netherlands.

Box 1 Choosing Wisely recommendations on acute wound care

The recommendations apply to acute wounds caused by surgery or trauma and are:

1. Do not clean the wound with saline; cleaning is only necessary in case of a dirty open wound, and lukewarm tap water is sufficient.
2. Do not soak the wound in cleanser; soaking the wound in cleaning products such as washing soda or bath products increases the risk of infection and slows down the healing.
3. Do not use bandages on a wound closed by primary intention; covering a surgically closed wound does not reduce the risk of infection and changing bandages can be painful. A bandage is only necessary when the wound leaks, when clothing creates friction or when the patient does not want to see the wound.
4. Do not use expensive bandages when gauze suffices; a non-adhesive gauze suffices for most wounds. Additional dressings can be applied to leaking wounds. For skin transplants, hydrocolloid or film is recommended.
5. Do not discharge a patient without giving instructions; a patient with a surgically closed wound may take a short shower 24 hours after surgery. Instruct the patient on what to do when signs of infection appear and when and how he can use the operated body part.

The development of the underlying guideline and selection of these five Choosing Wisely recommendations is described in Ubbink 2014.[5]

Methods

Design

We performed a mixed methods study comprising of two components with equal priority.[10] First, we performed a cross-sectional study using an online survey among nurses and physicians about the awareness of and adherence to the five recommendations. Second, we performed semi-structured interviews with nurses and physicians about their perceived barriers and facilitators for adhering to the recommendations. After identifying their assumptions about the patients' preferences, we performed semi-structured interviews with patients with an acute wound. With equal priority, each component provides an important contribution to the aim of the study. The benefit of this approach is that the survey gives us insight into the current awareness and practice, whereas the interviews give us insight into the experiences and motives behind this.

Setting

We evaluated the awareness of and adherence to the five Choosing Wisely recommendations for acute wounds in the emergency and surgery departments in Dutch hospitals. We included both outpatient and inpatient care in the surgery department. In the Netherlands, both nurses and physicians are involved in wound care. Generally, the physician determines the treatment policy and performs the surgical procedures, while the nurse provides the daily wound care and chooses the dressing. In addition, most hospitals have one or more nurses who are specialized in wound care, so-called wound care experts, that can be consulted on this subject. Departments have local work instructions that operationalize the Dutch national guidelines.

Survey

The online survey was developed in several feedback rounds with the authors of this paper. An expert group on acute wound care, with two nurses, two physicians, and a patient representative, ensured the questions were clear and complete and confirmed face validity. In order to prevent socially desirable responses, we first asked for their current practices in wound care, and subsequently introduced the recommendations and asked for their awareness of and adherence to them.

In November 2017, we asked the hospital-based wound care experts, registered at the Dutch Nurses Association, by e-mail if they were willing to contribute to our study. In December 2017 and January 2018, a reminder was sent. Those who signed up were asked to send the survey to 30 nurses in their hospital at random: 10 nurses from the emergency department, 10 from outpatient surgery and 10 from inpatient surgery. In addition, they were asked to send the survey to 5 physicians working at one of these three departments. When we received no or few responses from a hospital, we asked the wound care expert in question to repeat sending the survey. In order to reach more physicians, an open invitation to the survey was published in the newsletter of the Dutch Association for Emergency Department Physicians. At the end of the survey, professionals could leave their email address or phone number if they were willing to participate in an interview. Appendix 1 shows the flow of our survey.

Data were analyzed with SPSS 25. Descriptive statistics were used to describe the awareness and current practice of the nurses and physicians. Missing values were handled by pairwise deletion and correction for clustering within hospitals was not possible because of the low number of respondents per hospital. The response rate for both methods of recruitment could not be calculated because the privacy law hampered us looking in the e-mail databases of the nurses and emergency physicians associations and seeing how many nurses and physicians received the invitation.

Semi-structured Interviews

We developed an interview guideline for nurses and physicians by selecting relevant themes from a checklist for identifying determinants of practice.[11] Nurses and physicians who completed the survey and signed up to participate in an interview were contacted by a researcher. We used purposive sampling to select professionals from different departments and hospitals. An informed consent form was emailed and oral consent was recorded. The primary researchers and two research assistants interviewed the professionals telephonic and face-to-face. All interviews were audio-taped. New interviews were scheduled until no new themes emerged and saturation was reached according to all interviewers.

The interviews were fully transcribed. Three researchers coded the interviews using an inductive thematic analysis.[12] In this approach, the analysis is data driven and themes are constructed without a pre-existing frame. The researchers started by giving initial codes to relevant quotes. Subsequently, all codes were grouped into categories and subcategories derived from the data through constant comparison and review. Three researchers coded the first four interviews independently and discussed the results until consensus was reached. All subsequent interviews were coded by one researcher after which the codes were checked by another and discrepancies were discussed. In forming the categories, the researchers regularly discussed and rearranged the quotes and codes. Atlas-Ti 8.0.34 was used for coding and analyzing.

After identifying the professionals' assumptions about the patients' preferences, we interviewed patients with an acute wound on their experience with wound care and their perspective on the five recommendations. We developed the patient interview guide based on the first few care professional interviews. In 3 general hospitals and 1 university hospital, we interviewed patients aged 18 or older with an acute wound that were just discharged from the emergency or surgery department. The interviewers visited each hospital one day and all eligible patients on that day were invited by their care provider to participate. After written informed consent, we performed the face-to-face, semi-structured interviews in the hospital. The method of analysis was equal to the interviews with professionals.

Ethical approval

The research protocol was sent to the local Research Ethics Committee, who judged that ethical approval was not required under Dutch National Law.

Results

Survey

Wound care specialists from 14 hospitals (12 general and 2 university hospitals) responded to our request and forwarded the link to the online survey, on which 171 nurses and 22 physicians responded. There was a large variation in response between the 14 hospitals, despite several reminders to the wound care specialists. From two hospitals, we only received one response. In another hospital, the survey was completed by 27 nurses and 5 physicians. The invitation in the newsletter for emergency department physicians yielded an additional 49 responses from 30 hospitals. In total, 171 nurses and 71 physicians from 35 hospitals responded to our survey. Respondent characteristics are shown in Appendix 2. Figure 1 and table 1 provide an overview of the awareness of and adherence to the Choosing Wisely recommendations for nurses and physicians. Appendix 3 presents detailed results.

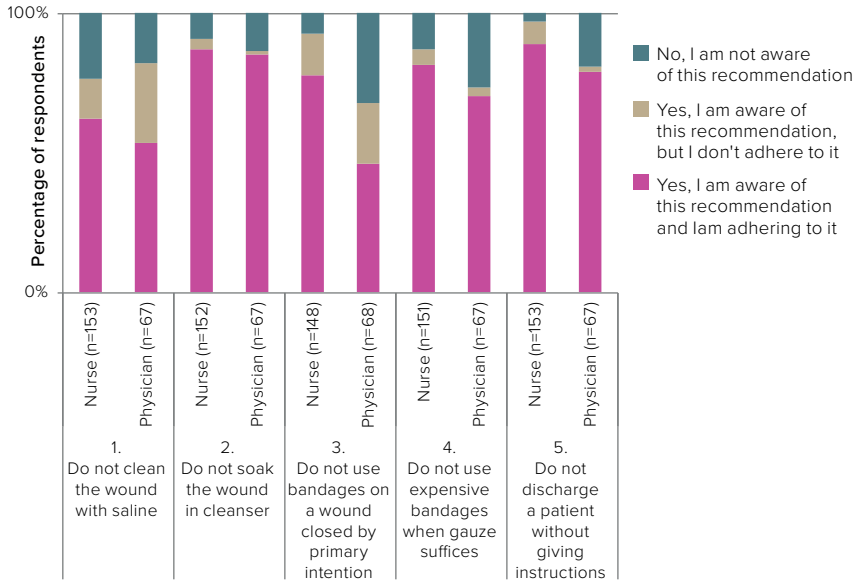

Figure 1 Awareness of and adherence to the Choosing Wisely recommendations

Table 1 Current wound care practice and awareness of and adherence to the Choosing Wisely recommendations

	Nurses	Physicians
How do you clean an acute wound?†	N=163	N=68
Tap water	65.0%	79.4%
Saline or sterile water	57.1%	57.4%
Cleaning products	1.2%	4.4%
I don't use products to clean acute wounds	6.1%	0.0%
Do you soak acute wounds in cleanser?	N=149	N=67
Always	0.0%	0.0%
Mostly	0.7%	0.0%
Rarely	12.8%	14.9%
Never	86.6%	85.1%
Do you put a bandage on a wound healing by primary intention?†	N=159	N=68
Always	15.7%	48.5%
When the wound leaks	76.7%	41.2%
If the patient asks for it or prefers it	43.4%	30.9%
If clothing creates friction	44.0%	32.4%
Never	3.1%	0.0%
What bandages do you use on wounds closed by primary intention that do not leak?†	N=160	N=68
No bandage	46.9%	8.8%
Simple bandages (band-aid, gauze)	57.5%	88.2%
Expensive bandages (silicone, hydrocolloid)	10.6%	10.3%
Do you give wound care instructions to the patient before discharge?	N=160	N=68
Yes	85.6%	100.0%
No	7.5%	0.0%
Sometimes	6.9%	0.0%
1. Do not clean the wound with saline	N=153	N=67
Yes, I am aware of this and I adhere to it	62.1%	53.7%
Yes, I am aware of this, but I do not adhere to it	14.4%	28.3%
No, I am not aware of this recommendation	23.5%	17.9%
2. Do not soak the wound in cleanser	N=152	N=67
Yes, I am aware of this and I adhere to it	86.8%	85.1%
Yes, I am aware of this, but I do not adhere to it	3.9%	1.5%
No, I am not aware of this recommendation	9.2%	13.4%

Table 1 Continued

	Nurses	Physicians
3. Do not use bandages on a wound healing by primary intention	N=148	N=65
Yes, I am aware of this and I adhere to it	77.7%	46.2%
Yes, I am aware of this, but I do not adhere to it	14.9%	21.5%
No, I am not aware of this recommendation	7.6%	32.3%
4. Do not use expensive bandages when gauze suffices	N=151	N=67
Yes, I am aware of this and I adhere to it	81.5%	70.1%
Yes, I am aware of this, but I do not adhere to it	5.3%	3.0%
No, I am not aware of this recommendation	13.2%	26.9%
5. Do not discharge a patient without giving instructions	N=153	N=67
Yes, I am aware of this and I adhere to it	88.9%	79.1%
Yes, I am aware of this, but I do not adhere to it	7.8%	1.5%
No, I am not aware of this recommendation	3.3%	19.4%

†multiple answers were possible

When asked about their current wound care practices, most respondents report that they use tap water to clean an acute wound. However, more than half (also) uses saline or sterile water, which contradicts recommendation 1. Almost no respondents soak acute wounds in cleanser, which is in accordance with to recommendation 2. Contradictory to recommendation 3, 16% of the nurses and half of the physicians always use bandages on a wound healing by primary intention. Only 10% of the nurses and physicians use expensive bandages, and almost all give wound care instructions to the patient, which shows good adherence to recommendations 4 and 5.

When we presented the recommendations, the percentage that report that they know them and adhere to them varies between 62% to 89% for nurses and 46% to 85% for physicians. In addition, 4% to 15% of the nurses and 2% to 28% of the physicians knew the recommendations but did not adhere to them. Recommendations 1 and 3 were the least adhered to. Lastly, 3% to 24% of the nurses and 13% to 32% of the physicians did not know the recommendations. Nurses most often did not know recommendation 1, whereas physicians most often did not know recommendation 3 and 4.

The most frequent responses to the question how implementation could be improved were education in wound care and improving wound care policy on their department. Our results indicate that nurses from the emergency department are less likely to know the recommendations compared to the surgery department. However, due to

the small number of emergency department nurses, this could not be tested for statistical significance. The awareness of and adherence to the recommendations is likely to vary between hospitals, but this could also not be tested. The percentage of missing values for the questions regarding the awareness of and adherence to the recommendations varied from 9% to 12% of the initial respondents.

Semi-structured Interviews

We interviewed 23 professionals of the 53 survey respondents that offered to participate in an interview. Participant characteristics are shown in Appendix 4. We identified seven main categories of barriers and facilitators: knowledge, attitude, habits, practical environment, social environment, policy, and expected preferences of the patient. Table 2 presents relevant quotes.

Table 2 Quotes from the interviews

Theme	Quote
Knowledge about wound care	"When I suspect that the wound is contaminated with micro-organisms I always clean with disinfectant."– nurse from the surgery department
Attitude of nurses and physicians	"If you have years of experience with something and that is going to change, you first have to see the scientific evidence and experience that it is better before you change that." – physician employed on the surgery and emergency department
Habits of nurses and physicians	"Traditionally, I have always learned to clean a wound with this soapy disinfectant and that is still the way I work." – nurse from the emergency department
Practical work environment	"Hospitals are not always adapted to the use of tap water when saline is in bottles and you have to go find a tap to get tap water." – wound care specialist
Social environment	"You don't have to convince me, I use the bandage that the surgeon tells me to use" – nurse from the surgery department
Policy on department	"We now know from the wound care experts that we no longer have to clean with saline and that tap water is sufficient, but because we have to work according to our instructions and those still recommend saline" – nurse from the surgery department
Patient's (expected) preferences	"I trust my doctor because I assume that physicians know what they are doing" – patient from the emergency department

Knowledge. Several nurses and physicians indicated that they did not know (some of) the recommendations, mainly 1 and 3. In addition, we found that a lack of knowledge about wound care was a barrier for accepting and applying them. The

wound care specialist can help to improve this knowledge. Soaking a wound in cleanser used to be common practice, but it is now well known that this impairs wound healing. Repeated attention for this subject has helped.
Attitude. Some respondents needed to see the scientific evidence that underpins recommendations 1 and 3 in order to trust them. Others needed to experience for themselves that cleaning with tap water does not result in more infections. Furthermore, some found it important to act cost-conscious while others did not. Nurses and physicians agree that wound care instructions are important for optimal healing, which motivates them to adhere to recommendation 5. The patients' comfort is also very important to them, which sometimes leads to them using more expensive bandages.

Habits. As with many behaviors, habits are hard to change. For recommendation 1 and 3, care providers learned to use cleaners and bandages during their education and many have done this for years. Their habit facilitates adhering to recommendation 5: most nurses and physicians routinely provide wound care instructions to the patient.

Practical work environment. The work environment plays an important role in adhering to recommendations 1, 4 and 5. Whether a nurse or physician chooses tap water or saline depends for a big part on which is closer by or easier to use. Some reported that tap water is difficult to obtain on their department, while the bottles with saline are easily accessible. The type of bandage that they use depends on what is available on the dressing cart. Reminders in their work environment and the fact that adhering to recommendations 2 and 3 saves time facilitates their implementation.

Social environment. Generally, physicians leave the choice of wound care products to the nurse, but they sometimes ask nurses to deviate from recommendations 1 to 4, for example to use expensive bandages instead of simple gauze. Some nurses subsequently discussed this with the physician and sometimes they decided together to follow the recommendation. An open culture in which it is possible to give feedback to colleagues helps to adhere to the recommendations. In some departments, wound care and the prices of bandages were regularly discussed.

Policy. Regarding the wound care policy on their department, some nurses and physicians had work instructions that were outdated and conflicted with the recommendations. Others did not describe wound care or were unclear. Some nurses and physicians even stated that they did not know the work instructions on their department.

Patient. Nurses and physicians often use bandages or clean with disinfectant or saline because they assume that this is what their patients prefer.
For the patient interviews, one patient declined to participate, which left 20 patients that were interviewed face to face. We found that some patients prefer a bandage on their closed wound because they want to protect it. A few patients preferred a disinfectant or expensive bandages, but most have no specific preferences regarding their wound care. Patients trust their care providers' expertise and would accept having their request denied if their provider explained that this is better for their wound.

Discussion

This study demonstrates that the majority of the nurses and physicians are aware of the five Choosing Wisely recommendations for acute wounds. Recommendations 1 and 3, regarding cleaning acute wounds and covering closed wounds, are the least known. Several nurses and physicians that are aware of the recommendations do not adhere to them in practice, especially for recommendations 1 and 3. Further implementation is important, as adhering to the recommendations improves the quality of wound care and reduces costs. We found seven categories of barriers and facilitators which can be used to improve implementation: knowledge about wound care, attitude, practical and social environment, habits, the (expected) preferences of patients, and policy.

The results indicate a lower implementation of the recommendations in emergency care nurses, and this is recognized in a study in Spain.[13] The authors suggest that decision making and avoiding low-value care might be harder on this department.[13] For some subjects, we found a discrepancy between the reported current practice and adherence to the recommendations. For example, few physicians soak acute wounds in cleanser and all of them provide wound care instructions to the patient, but 13% and 19% of the physicians report that they are not aware of recommendations 2 and 5. It is possible that respondents were not aware of the specific recommendations, but nevertheless were used to deliver care according to them. The percentage of respondents that were not aware might therefore be an overestimation. It should be noted that we have not assessed wound care practices before the release of the recommendations, so we do not know how much the Choosing Wisely campaign has contributed to their implementation.

An evaluation of Choosing Wisely recommendations amongst nurses in Spain also found that implementation is well, but there is room for improvement. Seven of the 38 recommendations they evaluated needed further implementation, and the recommendation regarding covering a closed wound was most disagreed with (21% of the respondents).[13] Current literature also supports our finding that there could be a gap between being aware of the recommendations and applying them in daily practice. Only part of the US physicians sees the campaign as a legitimate source of guidance.[14] In Canada, 88% of the physicians were aware of the campaign, but only 30% was able to describe ≥3 of the recommendations.[15] A study in Spain found that even though nurses agree with a recommendation, adherence can be low.[13]

Limitations and Strengths

The strength of our study is the mixed methods design that allows us to integrate the results of the survey with the interviews. By knowing to what extent nurses and physicians know and follow the recommendations and why, we are able to formulate recommendations regarding further implementation. A limitation of our study is that there might be selection bias. Probably, wound care specialists that have spread the recommendations in their hospital were more likely to contribute to our study. Also, although we tried to reduce selection bias by introducing the survey as an assessment of current wound care practices and not yet mentioning the recommendations, nurses and physicians that are interested in wound care are probably more likely to both know the recommendations and respond to our survey. Therefore, our survey results are probably an overestimation of the implementation. Possible selection bias could not be monitored because we had no insight into the e-mail database of the Dutch Nurses Association and the Dutch Association for Emergency Department Physicians. A second limitation is the possibility of socially desirable responses in the survey and the interviews. Nurses and physicians might have found it hard to admit they were not aware of the recommendations or do not follow them and why. This could also have led to an overestimation of the adherence.

Implications for Research and Practice

We recommend several actions to improve the implementation of the recommendations. Implementation should start with increasing the awareness of recommendations 1 and 3 and providing scientific evidence underlying the recommendations. Since care professionals are motivated to provide good care, it helps to emphasize that cleaning with tap water results in fewer infections and removing bandages can be painful. Furthermore, their work environment and local policy should facilitate the adherence to the recommendations. Tap water and simple gauzes should be made easily accessible. The awareness of the costs of wound care products should be increased. In addition, professionals should learn that not all patients prefer cleaning

with disinfectant or a bandage and that if they initially do, they trust their care providers' advice. A specialized nurse in wound care on every department could stimulate the uptake of the recommendations.

This study showed that for these recommendations, increasing awareness is not enough for successful implementation, because physicians and nurses are hindered by several practical barriers. It is therefore important to identify the barriers and facilitators and target those in a tailored approach to implement Choosing Wisely recommendations.[4] [16] Further research into the costs and harms associated with low-value wound care could help to establish the need for change, for example by analyzing hospital data.[17] [18]

Conclusions

Although the majority of the nurses and physicians are aware of the Choosing Wisely recommendations, some of them do not adhere to the recommendations in practice. The recommendations regarding cleaning acute wounds and covering closed wounds are the least known and adhered to. In order to increase implementation, barriers regarding knowledge, practical work environment and presumed preferences of the patient need to be tackled. Repeated attention for the recommendations, cost-consciousness and an open culture on the department facilitate the implementation.

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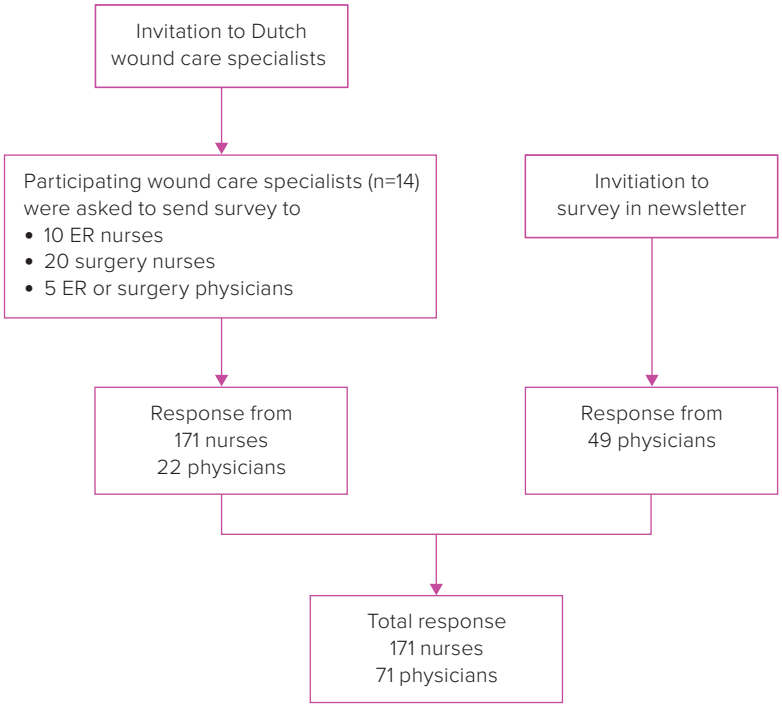
Appendix 1 Flowchart survey



Appendix 2 Characteristics of the respondents to the survey

	Nurses (N=171) N (%)	Physicians (N=71) N (%)
Type of hospital		
Academic hospital	19 (11.1%)	9 (12.9%)
General hospital	152 (88.9%)	61 (87.1%)
Department/ job		
Wound care expert	16 (9.4%)	-
Emergency department	24 (14.0%)	54 (76.1%)
Surgery department	127 (74.3%)	2 (2.8%)
More than one department	4 (2.3%)	15 (21.1%)
Mean age		
Mean age (min-max)	40.6 year (22-65)	39.1 year (28-58)
Gender		
Woman	154 (90.1%)	42 (59.2%)
Job experience		
Less than one year	6 (3.5%)	6 (8.5%)
Between one and five year	29 (17.0%)	25 (35.2 %)
Between five and ten year	34 (19.9%)	22 (31.0%)
Between ten and twenty year	46 (26.9%)	12 (16.9%)
More than twenty year	56 (32.7%)	6 (8.5%)

Appendix 3 Current wound care practice and awareness of and adherence to the Choosing Wisely recommendations

	Nurses				Physicians
	Emergency department	Surgery department	Wound care experts	Total[b]	Total
How do you clean an acute wound?[a]	N=22	N=121	N=16	N=163	N=68
Tap water	50.0%	67.8%	81.3%	65.0%	79.4%
Saline or sterile water	63.6%	58.7%	37.5%	57.1%	57.4%
Cleaning products	0.0%	0.8%	0.0%	1.2%	4.4%
I don't use products to clean acute wounds	0.0%	5.0%	18.8%	6.1%	0.0%
Do you soak acute wounds in cleanser?	N=22	N=107	N=16	N=149	N=67
Always	0.0%	0.0%	0.0%	0.0%	0.0%
Mostly	0.0%	0.9%	0.0%	0.7%	0.0%
Rarely	4.5%	11.8%	0.0%	12.8%	14.9%
Never	95.5%	85.0%	100.0%	86.6%	85.1%
Do you put a bandage on a wound healing by primary intention?[a]	N=23	N=117	N=15	N=159	N=68
Always	47.8%	10.3%	13.3%	15.7%	48.5%
When the wound leaks	56.5%	82.1%	66.7%	76.7%	41.2%
If the patient asks for it or prefers it	43.5%	44.4%	33.3%	43.4%	30.9%
If clothing creates friction	47.8%	43.6%	40.0%	44.0%	32.4%
Never	4.3%	2.6%	6.7%	3.1%	0.0%
What bandages do you use on wounds closed by primary intention that do not leak?[a]	N=23	N=117	N=16	N=160	N=68
No bandage	21.7%	49.6%	62.5%	46.9%	8.8%
Simple bandages (band-aid, gauze)	78.3%	55.6%	43.8%	57.5%	88.2%
Expensive bandages (silicone, hydrocolloid)	34.8%	6.8%	6.3%	10.6%	10.3%

Do you give wound care instructions to the patient before discharge?	N=23	N=117	N=16	N=160	N=68
Yes	82.6%	88.0%	68.8%	85.6%	100.0%
No	4.3%	7.7%	12.5%	7.5%	0.0%
Sometimes	13.0%	4.3%	18.8%	6.9%	0.0%
1. Do not clean the wound with saline	N=23	N=113	N=15	N=153	N=67
Yes, I am aware of this and I adhere to it	34.8%	66.4%	80.0%	62.1%	53.7%
Yes, I am aware of this, but I do not adhere to it	30.4%	11.5%	6.6%	14.4%	28.3%
No, I am not aware of this recommendation	34.8%	22.1%	13.3%	23.5%	17.9%
2. Do not soak the wound in cleanser	N=22	N=114	N=14	N=152	N=67
Yes, I am aware of this and I adhere to it	72.7%	88.6%	100.0%	86.8%	85.1%
Yes, I am aware of this, but I do not adhere to it	9.0%	3.5%	0.0%	3.9%	1.5%
No, I am not aware of this recommendation	18.2%	7.9%	0.0%	9.2%	13.4%
3. Do not use bandages on a wound healing by primary intention	N=22	N=109	N=15	N=148	N=65
Yes, I am aware of this and I adhere to it	45.5%	80.7%	86.7%	77.7%	46.2%
Yes, I am aware of this, but I do not adhere to it	9.0%	16.5%	13.3%	14.9%	21.5%
No, I am not aware of this recommendation	36.4%	2.8%	0.0%	7.6%	32.3%
4. Do not use expensive bandages when gauze suffices	N=23	N=111	N=15	N=151	N=67
Yes, I am aware of this and I adhere to it	69.6%	85.6%	66.7%	81.5%	70.1%
Yes, I am aware of this, but I do not adhere to it	4.3%	3.6%	20.0%	5.3%	3.0%
No, I am not aware of this recommendation	26.1%	10.8%	13.3%	13.2%	26.9%
5. Do not discharge a patient without giving instructions	N=23	N=113	N=15	N=153	N=67
Yes, I am aware of this and I adhere to it	82.6%	88.5%	100.0%	88.9%	79.1%
Yes, I am aware of this, but I do not adhere to it	13.0%	8.0%	0.0%	7.8%	1.5%
No, I am not aware of this recommendation	4.3%	3.5%	0.0%	3.3%	19.4%

[a]multiple answers were possible

[b]4 nurses worked on multiple departments and are therefore only in the total set of nurses and not in the separate departments.

Appendix 4 Characteristics of the interview participants

	Professionals (N=23) N (%)	Patients (N=20) N (%)
Job		
Nurse	17 (73.9%)	-
Physician	6 (26.1%)	-
Department		
Wound care expert	4 (17.4%)	-
Emergency department	8 (34.8%)	5 (25.0%)
Surgery department	8 (34.8%)	15 (75.0%)
More than one department	3 (13.0%)	-
Mean age		
Mean age (min-max)	41.4 year (23-62)	45.8 year (20-70)
Gender		
Woman	15 (65.2%)	5 (25.0%)
Interview duration		
Mean interview duration (min-max)	22 minutes (12-38)	8 minutes (5-21)

CHAPTER 5

Dentifying and de-implementing low-value care in primary care: the GP's perspective - a cross-sectional survey

Kool RB, Verkerk EW, Winnemuller LJ, Wiersma T, Westert GP,
Burgers JS, van Dulmen SA
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Abstract

Objective
General practitioners have an important role in reducing low-value care as gatekeepers of the health system. The aim of this study was to assess the experiences of Dutch general practitioners regarding low-value care and to identify their needs to decrease low-value primary care.

Design
We performed a cross-sectional study.

Participants
We sent a survey to 500 general practitioners.

Setting
Primary care in the Netherlands.

Primary and secondary outcomes
The survey contained questions about the provision of low-value care and on clinical cases about lumbosacral spine x-rays in patients with low back pain and vitamin B12 laboratory tests without an evidence-based indication. We also asked general practitioners what they needed to reduce low-value care.

Results
A total of 182 general practitioners (37%) responded. 67% indicated that low-value care practices are regularly provided in general practice. 57% of the general practitioners have seen negative consequences of low-value care, in particular side effects of medication. The most provided low-value care practices are medication prescriptions such as antibiotics and laboratory tests such as vitamin B12 tests. The most-reported drivers are patient-related. General practitioners want to maintain a good relationship with their patients by offering their patients an intervention instead of watchful waiting. Lack of time also plays a major role. In order to reduce low-value care, general practitioners suggested that educating patients on the value of tests and treatments might help. Supporting general practitioners and other healthcare professionals with clear guidelines as well as having more time for consultation were also mentioned by general practitioners.

Conclusion
General practitioners are aware of providing unnecessary care despite their role as gatekeepers and have reasons for this. They need support in order to change their practice. This support might consist of better education of healthcare professionals and providing more time for consultation. Local and national media, such as websites and television, could be used to educate patients while guidelines could support professionals in reducing low-value care.

Introduction

Healthcare professionals and policymakers are struggling with identifying and reducing low-value care practices.[1] Low-value care can be defined as care that provides minimal or no benefit, considering the harms, the costs, alternatives and the preferences of the patient.[2] Low-value care could create unnecessary burden and risk of harm and waste resources. The volume of low-value care differs between countries, healthcare providers and practices.[3-5]

There have been several initiatives to reduce low-value care such as the Choosing Wisely campaign, that have reached many countries worldwide.[6] This campaign provided lists with do-not-do recommendations that can be converted into action.[7-11] Participating countries are increasingly focusing on de-implementing the low-value practices addressed in the recommendations.[12] De-implementation of these practices is challenging because there are many factors that drive physicians to deliver low-value care.[13] Therefore, it is important to know the specific needs of physicians to reduce low-value care practices.

While limiting low-value care is a responsibility for all healthcare professionals, it may be particularly relevant for general practitioners (GPs). In several countries, GPs are gatekeepers of the health system. They have an important role in educating patients on unnecessary tests, treatments, procedures or referral to a specialist. Because GPs are crucial in preventing low-value care across healthcare systems, it is important to know the factors that help GPs to prevent overuse.

Studies have focused until now on barriers for GPs to avoid low-value-care. In two US surveys, GPs indicated that time constraints, patient preferences and fear for malpractice suits are a major barrier for reducing overuse.[14 15] A study in Spain among GPs, nurses, and paediatricians identified also lack of time as a crucial barrier, next to insufficient patient information.[16] A Swiss survey showed that GPs saw the specific request of patients as the most important barrier; time constraints and fear for malpractice suits were hardly mentioned.[17] A Dutch study identified the demand-satisfying attitude and the available diagnostic facilities as the most prominent barriers for GPs to avoid low-value care practices.[18] None of these studies specified the practical needs of GPs to reduce low-value care in practice. Identifying the specific support needed will enable selecting strategies for reducing low-value care in primary care. The aim of this study was to identify the experiences of Dutch GPs towards low-value care and their needs to decrease low-value primary care.

Methods

Design and setting

We performed a cross-sectional study using a postal survey among GPs in the Netherlands. The Netherlands has a strong primary care system compared to other countries.[19] GPs are often the first healthcare provider that the patient visits. They provide continuous, person-centred care for a wide range of conditions, and only refers a minority of patients for specialist care. Patients have to pay the first 385 euro of their health care expenses every year, also for tests and imaging ordered by the GP. Consultation of a GP is always free for patients.

Questionnaire

We developed a questionnaire based on previously developed surveys that were used for questioning GPs on low-value care.[14 15 17 18] The position of the items was randomly assigned. The usability of the survey was tested by three GPs from our own network by filling in the questionnaire and giving verbal feedback. Based on this feedback, we adapted the wording on some occasions in order to make the questions easy to understand, and not too offensive against GPs. In the invitation letter sent to the GPs, we defined low-value care as care that does not benefit the patient due to the lack of effect in relation to its harms, alternatives, or costs. The survey contained open and closed questions in three parts. The first part contained general questions about the provision of low-value care. The second part contained two clinical cases and specific questions about how GPs could be facilitated to decrease low-value care. We selected two cases with robust evidence of being of low-value and high prevalence in Dutch GP practice: lumbosacral spine X-rays in patients with low back pain without alarming symptoms and vitamin B12 laboratory tests without an evidence-based indication. Dutch GP guidelines clearly advise against both low-value care practices. The third part of the survey included demographic variables of the respondent. See Appendix 1 for an English version of the survey.

Procedure

A random sample of 500 GPs was drawn from a database of 11,834 GPs working in the Netherlands in 2016 administered by the Netherlands Institute for Health Services Research. In October 2018, we sent an invitational letter with a postal survey and a reply envelope. Two weeks later, we sent a reminder to the non-responding GPs.

Analysis

Differences between the study population and all Dutch GPs regarding age, gender, and practice setting were analysed using the chi-square test. Descriptive statistics were used to describe the most common low-value care according to GPs and to

describe the factors which affect low-value care. Because of missing values, not all denominators are the same. Relations between respondents' gender, age and practice setting, and their responses on the questions 1, 3, 4 and 6 of the first part of the questionnaire, and questions 1 and 3 of both cases were tested using the chi-square test. If >20% of the cells had an expected count less than 5, the Fisher's exact test was used. We analysed the relation between the respondents' gender, age and practice setting and whether they marked each of the 11 drivers of question 3 as an important reason for providing low-value care. We used Bonferroni correction for multiple testing. We also determined whether GPs that receive more requests from patients deliver more of these healthcare practices. Therefore, we analysed the relations between the number of patient requests for an x-ray or vitamin B12 test and the number of these tests ordered by GPs using Spearman's correlation coefficients. In the analyses, missing values were less than 5% and were handled by listwise deletion. Data were analysed with SPSS 25. One author (EWV) read all texts of the open questions and categorised them. Another researcher (RBK) also read all texts and checked the categorisation. When he disagreed, the two authors discussed until consensus was reached.

Ethical accountability

The Research Ethics Committee of the Radboud University Nijmegen Medical Center judged that ethical approval was not required under Dutch National Law (study number 2018-4798).

Patient and Public Involvement

No patient involved.

Results

Respondent characteristics

Of the sample with 500 GPs, 489 GPs received the survey; 11 surveys were returned unfilled because they were sent to the wrong address. Of the 489 GPs, 182 (37%) answered the survey. The characteristics of responding GPs and of the reference group of all Dutch GPs[20] are presented in table 1. Chi-square tests show no difference in age (p=0.065) and gender (p=0.879) between the respondents and all Dutch GPs. There is a significant difference in practice setting (chi-square test χ^2=16.51 p<0.001) that shows that GPs from solo practices are overrepresented in our study population.

Table 1 Characteristics of the responding GPs and Dutch national average of GPs

Characteristics		Responding GPs (N=182)	All Dutch GPs (N=9,898)
Age	<35 years	16 (8.8%)	1075 (10.9%)
	35-44 years	55 (30.2%)	3011 (30.4%)
	45-54 years	52 (28.6%)	2816 (28.5%)
	55-64 years	50 (27.5%)	2785 (28.1%)
	>64 years	9 (4.9%)	211 (2.1%)
Gender	Male	85 (46.7%)	4679 (47.3%)
	Female	97 (53.3%)	5219 (52.7%)
Practice setting	Solo practice	51 (28.0%)	1689[1] (17.0%)
	Two-GP practice	55 (30.2%)	3888[1] (39.1%)
	Group practice	76 (41.7%)	4378[1] (44.0%)

[1] N=9955

Experiences with low-value care

Almost all GPs (175/176=99.4%) responded that low-value care is provided in the general practice. Two-third responded that it occurs regularly or often (117/176=66.5%). We found no significant relations between this reported frequency of low-value care and the respondents' gender, age in categories, and practice setting (Fisher's exact tests p=0.153, p=0.208, and p=0.067). Half of the responders (99/175=56.6%) have experienced negative consequences of low-value care for their patients such as side effects of medications, complications after procedures and unnecessary anxiety among patients due to coincidental findings by diagnostic tests. Significant relations between experiencing negative consequences and gender, age, and practice setting of the GPs were lacking as well (chi-square tests p=0.532, p=0.758, and p=0.340). Ninety-three percent of the GPs discuss the issue of low-value care with colleagues.

When asked for the five most frequent low-value care practices, the responding GPs reported a total of 737 practices (see table 2). The prescription of unnecessary medication was most frequently mentioned (196/737=26.6%). Within the category medication, antibiotics was by far the most frequent (106/196=54.1%), but also benzodiazepines (9/196=4.6%), opioids (8/196=4.1%), and vitamin supplements (8/196=4.1%) were mentioned several times. Low-value laboratory tests were mentioned by a quarter of the responding GPs (183/737=24.8%) and were often not specified. If specified, vitamin (17/183=9.3%) and PSA (12/183=6.6%)tests were the most frequently mentioned. 141 practices (19.1%) concerned a variety of 19 types of referrals that are often of low-value, of which referrals to the physical therapist (14/141=9.9%) were the most frequent. Regarding imaging (135/737=18.3%), x-rays (88/135=65.2%) in case of low-back pain or osteoarthritis were the most frequent. Several GPs (49/737=6.6%) reported administrative tasks, such as filling in forms or phone calls to arrange for example home care devices. Other care practices (24/737=3.2%) were other diagnostic tests such as echocardiography for chest pain, and procedures such as minor cosmetic surgery.

Table 2 Most provided low-value care in the general practice mentioned by GPs.

Most provided low-value care	Number and percentage of all reported low-value care practices (N=737)[1]
Medication	196 (26.6%)
Laboratory tests	183 (24.8%)
Referral	141 (19.1%)
Imaging	135 (18.3%)
Administrational tasks	49 (6.6%)
Extra consultation	9 (1.2%)
Other	24 (3.2%)

[1] multiple answers were possible

Drivers for providing low-value care

As shown in table 3, the largest drivers for providing low-value care were the wish to maintain a good relationship with their patient (138/182=75.8% of all GPs), and the need (or wish) to offer the patient an intervention (95/182=52.2%). Time constraints also play a large role in providing low-value care: 101/182=55.5% of the responders indicated that lack of time forces the GP to provide low-value care. A fifth (33/182=18.1%) of the respondents also reported other reasons for providing unnecessary care, such as reassuring the patient, finding a compromise with the patient, lack of energy

to start a discussion, and the request of another health care professional. Chi-square tests and Fisher's exact tests showed no significant relations between the respondents' gender, age, and practice setting and any of the drivers, after Bonferroni correction for multiple testing.

Table 3 Drivers for providing low-value care

Drivers for providing low-value care	Number of GPs mentioning the specific driver (N=182)[1]
Maintaining a good relationship with the patient	138 (75.8%)
Time pressure	101 (55.5%)
Wanting to offer the patient something	95 (52.2%)
Clinical uncertainty	42 (23.1%)
Other reasons	33 (18.1%)
Availability diagnostic tools	21 (11.5%)
Fear of claims	18 (9.9%)
Request of the patient	17 (9.3%)
Action is routine	13 (7.1%)
Lack of knowledge	8 (4.4%)
It takes a lot of time to get in touch with a specialist	5 (2.7%)

[1] multiple answers were possible

Cases

About 70% (127/181) of the respondents had received a request for an x-ray of the spine of at least one patient in the past two weeks. Most GPs (147/181=81.2%) indicated that they were regularly or often able to convince the patient that an x-ray is not necessary. Only 17.1% (31/181) was sometimes able to convince the patient and no GPs reported that they could never convince the patient. As you can see in table 4, almost half (80/181=44.2%) of the GPs had requested one or more x-rays of the lumbosacral spine in the previous two weeks. The majority of this group had ordered 1 or 2 x-rays during this period, just two GPs had ordered 6 x-rays or more. The median number of x-rays is 0.0 (InterQuartileRange (IQR) =0-1). The number of requests for an x-ray by patients in the past 2 weeks was significantly related to the number of x-rays ordered by GPs in the past 2 weeks (Spearman r_s=0.432, P<0.001). We found no significant relations between the number of x-rays ordered and gender, age, and practice setting (Fisher's exact tests p=0.318, p=0.465, and p=0.440).

Table 4 Provision of not recommended lumbosacral spine x-ray and vitamin B12 laboratory tests in the last two weeks.

	Lumbosacral spine x-ray (N=181)	Vitamin B12 tests (N=180)
0 times	101 (55.8%)	46 (25.6%)
1-2 times	72 (39.8%)	75 (41.7%)
3-5 times	6 (3.3%)	36 (20.0%)
≥6 times	2 (1.1%)	23 (12.8%)

74.5% (134/180) of the GPs had also received a question from one or more patients demanding a vitamin B12 laboratory test in the past two weeks. 12.8% (23/180) had even received the request regularly (6 times or more in two weeks), with outliers of 20-40 times in two weeks. 74.4% (134/180) of the respondents had unnecessarily ordered one or more vitamin B12 laboratory tests in the past two weeks. The median number of vitamin B12 tests is 2.0 (IQR=0-3). The number of requests for a vitamin B12 test by patients in the past 2 weeks was significantly related to the number of tests ordered by GPs in the past 2 weeks (Spearman r_S=0.610 P<0.001). We found no significant relations between the number of vitamin B12 tests ordered and gender, age, and practice setting (chi-square test P=0.708, Fisher's exact test P=0.722, and chi-square test P=0.563). Compared with the x-ray for low back pain it was more difficult for GPs to convince patients that a laboratory test for vitamin B12 is not necessary. Only 9.1% (16/176) of the participants indicated that they often succeeded in convincing the patients to refrain from a vitamin B12 test. A large proportion of the GPs sometimes (86/176=48.9%) or never accomplished this (13/176=7.4%).

GPs' actions already done to reduce overuse

132 GPs (132/178=74.2%) indicated that they had done something to reduce low-value care. We found no significant relations between providing low-value care and respondents' gender, age, and practice setting (chi-square test p=0.259, Fisher's exact test p=0.626, and chi-square rest p=0.229). When asked what their actions were, 76 GPs (76/178=42.7%) answered that they had taken more time during consultation to inform patients. 16 GPs (16/178=9.0%) had already started to pay more attention to not ordering low-value tests and diagnostics. Others had introduced testing C-reactive protein (CRP) in their GP practice to exclude infections and to reassure patients, avoiding unnecessary use of antibiotics. Some GPs had followed education to avoid low-value care.

Table 5 Needs of GPs regarding the reduction of lumbosacral spine x-rays and vitamin B12 tests.

	Needs to reduce lumbosacral spine x-rays (N)	Needs to reduce vitamin B12 tests (N)
More time for the consult	53	16
Better explanation from physician	22	29
More knowledge of the physician	15	16
Better information on internet and especially 'Thuisarts.nl'[1]	15	13
Information campaign for the public	13	10
I don't have any needs/I don't see the problem with these practices	12	10
More knowledge of the physical therapist	9	0
More physicians that discourage low-value care	7	7
Improved information materials	6	3
Culture change	6	2
Better medical and physical examinations	5	0
More consistency in seeing the same physician for a better relationship	4	0
No longer reimbursing care	3	3
Improved communication skills of physicians	3	0
Braver physicians	2	1
Feedback information on frequency of low-value care	2	1
Less biased information from the media and commercial clinics	1	21
More clear statements in guidelines	1	8
Changes in organisation	1	5
Attention in professional journals	1	0
Fixed income for physicians	1	0
Protection against complaints	1	0
This is a hype and it will fade	0	5
More research	0	5
Available alternative	0	1
Total number of needs	183	156

[1]Thuisarts is a Dutch national health information website for the general public, developed by the Dutch College of GPs, see www.thuisarts.nl.

Needs of GPs to reduce low-value care

When asked what was needed to reduce low-value care, 153 GPs indicated one or more needs to reduce lumbosacral spine x-rays, totalling 183 needs, and 144 GPs one or more needs regarding vitamin B12 tests, totalling 156 needs. All needs are categorized and presented in table 5, and the most interesting results are described here. Regarding their organisational needs, GPs suggested that it is important to have more time available and that GPs should take this time for a good explanation to the patient. Some GPs think that the national guidelines could be better formulated or that it would help if all physicians would discourage low-value care. In addition, local organisational changes were suggested such as reminders in the ordering system, removing vitamin B12 tests from order sets, and cancelling specific vitamin B12 consultation hours. Regarding their knowledge needs, GPs thought that more education of GPs, specialists, and physical therapists could also help. Some GPs indicated that it would help to receive feedback information on their use of low-value care and to improve their communication skills. Regarding the patients' demand for these care practices, GPs stated that they are supported by better patient education beyond the doctor consultation, using improved information materials, clearer information on websites such as the Dutch health information website 'Thuisarts.nl' (home doctor) or information campaigns for the public. With regard to vitamin B12 laboratory tests, some GPs indicated that it is a hype and that they expect it will fade. Many GPs noted that there is a lot of unreliable information about this subject on the internet. Removal of this information could help. Furthermore, several GPs suggested that if low-value care would not be covered by the patients' health insurance, fewer patients will demand unnecessary care. Finally, several GPs reported that they have no needs or feel that there is nothing wrong with a non-indicated x-ray or vitamin B12 test now and then.

Discussion

Our survey showed that Dutch GPs indicate that they regularly provide low-value care. Half of the GPs have seen negative consequences of low-value care, in particular side effects of medication, and the majority has taken action to reduce low-value care. We found no significant relations between GPs experiences, attitude and provision of low-value care and gender, age, and practice setting. The most common low-value care practices in primary care are medication and laboratory tests. GPs specified the support needed, which should target patients, the organisation of care, and GP's knowledge and skills. Information campaigns for the public using local and national (social) media, information materials or websites such as the website for patients of the Dutch College of General Practitioners could be

used to educate patients, while clear clinical practice guidelines could support professionals in reducing low-value care.

Comparison with existing literature

From some previous studies, we know that GPs indicate that time constraints are an important barrier in educating patients about low-value care practices.[14 16 18] Buist et al also identified the providers' fear of patients being dissatisfied as a key barrier in reducing low-value care for GPs. This is understandable for the US for-profit healthcare system. In the Dutch GP care, where there are hardly any commercial motives for GPs, the preference of the patient is apparently also a strong motivator in ordering low-value care practices.

Despite the fact that the Netherlands has a strict antibiotic policy and Dutch doctors prescribe less antibiotics than their colleagues in most other countries,[21] Dutch GPs stated that they are still too often prescribing antibiotics. In addition, GPs indicated that unnecessary x-rays of the lumbosacral spine and vitamin B12 tests are performed regularly. Previous literature has shown that low-back pain imaging is also a phenomenon hard to defeat in other countries.[22]

In our study, only 10% of the GPs mentioned fear of claims as a reason for low-value care. This is remarkably lower than other studies have mentioned. In the UK, for example, 98% of the responding GPs in a survey study indicated that they tried to avoid patient complaining by for example increased diagnostic testing, increased referrals and increased follow up.[23] In a more recent US study, 31% of the primary care clinicians claimed that fear of litigation was a barrier to reducing overuse.[14] In another US study on perception of the Choosing Wisely recommendations, 73% of the primary care physicians believed the current medical malpractice system to be a barrier to reduce overutilization of services.[15]

Strengths and limitations

Our results are based on a sample that was comparable with the national distribution of GPs in the Netherlands so selection bias will probably be limited and the results may be generalizable for the Dutch GPs. We also avoided socially desirable answers by asking GPs for how much low-value care was provided in general and not specifically in their own practice, except for the two cases. Another strength of the study is that we kept the recall bias limited by asking GPs about low-value care practices only in the past two weeks.

A limitation of our study is the risk of non-responding bias. GPs who do not recognize themselves in the subject of low-value care practice are probably less likely to

respond to the questionnaire. As a result, the amount of low-value care could be overestimated, because only GPs who are worried about the subject might have responded. There is also a risk of availability bias because we mentioned some examples of low-value care in the survey, specifically, antibiotics for upper respiratory tract infections. This could have contributed to the high number of GPs that wrote down antibiotics as one of the five most provided low-value care practices.

Implications for research and practice

GPs expect that improvement in patients' knowledge of high- and low-value care helps them to refrain from unnecessary care. Although biased information on the internet cannot be restricted, patients can be educated by GPs in the local setting and by national professional and patient organisations. In the Netherlands, a public information website on health issues (www.thuisarts.nl), developed by the Dutch College of GPs, is one of the best-visited websites in the country with approximately 250,000 visits per day. The website has also impact on patients' behaviour: a study showed a decline of 12% in primary care consultations, especially those by telephone, two years after the launch of the website, compared with no change in a reference group.[24] This website might pay more attention to low-value care practices and emphasize the recommendations to be reluctant with some healthcare practices. For example, the website recently added a decision aid on PSA screening to its content, helping older men to decide whether they want a PSA test or not. Providing information brochures on specific low-value care practices that the GP can give to the patient during a consultation can help the patient to make a well-informed decision. Also, information campaigns for the general public have proven to be effective in reducing low-value care, in particular the public view on low back pain.[25] [26] In the Netherlands, there have been no information campaigns regarding overuse except for antibiotics in 2016. It might be interesting to research whether a campaign could influence the requests GPs receive of patients to order for example vitamin tests.

Although only a few GPs reported that lack of knowledge drives them to provide low-value care, several GPs suggested more education of healthcare professionals to help GPs to provide less low-value care. A recent Dutch interview study on barriers and facilitators for reducing orders for vitamin B12 tests showed that the most important facilitator for vitamin-test reduction was updating GPs' knowledge about test indications and their awareness of their own testing behavior.[27] However, de-implementation research has shown that educating might not be enough for reducing low-value care and achieving a sustained reduction.[13] It is also important that strategies for reducing low-value care should target different stakeholders and contain different interventions not only targeting knowledge but also attitude and

behaviour. Educating healthcare professionals alone might not be the strongest change strategy, especially in relation to more system focused strategies such as forcing functions and automation.[28]

More time per consultation to explain and convince a patient that a test or treatment is not necessary might also be an effective strategy. There are several pilot studies in the Netherlands with extra consultation time for GPs with convincing results.[29] The time per consultation in primary care, which varies considerably per country, is also a quality indicator for the World Health Organisation and the International Network for the Rational Use of Drugs.[30]

In general, it is remarkable that GPs mention several 'external' drivers for reducing low-value care such as time pressure and the demands of patients, and hardly any 'internal' factors such as lack of knowledge of GPs. Only a few GPs mentioned training of their own communication skills as a need for reducing overuse. Communication skills are a crucial tool in dealing with 'the demanding patient'.[31] In addition, healthcare professionals assume that patients have all kinds of requests, but in reality, it is frequently not the case.[32] Therefore, it might be worthwhile investigating the needs of GPs in skills to handle low-value care requests. A self-reflective debate within the GP profession might help to specify the need for training of skills. Such an internal debate within the profession might also clarify the meaning of low-value care. Some of the GPs mentioned practices that are not low-value care according to the given definition, such as administrative tasks. Apparently, the concept of low-value care was not clear for all GPs. This warrants a clear explanation and the use of examples when this concept is used in communication.

Some GPs mentioned stopping coverage by health insurance as an effective intervention to reduce low-value care. In practice, this might be complex and ineffective because in most cases the care is not of low-value for the whole patient group but only for a part of them. Moreover, patients already pay a part of the healthcare themselves in the Netherlands.

Finally, in order to facilitate GPs in reducing low-value care practice, it might be helpful to provide feedback information by assessing the volume and variation of low-value care among practices, preferably with data from electronic patient records. Feedback on performance data and practice variation could help to create awareness of GPs to prioritize their actions to reduce low-value care. This could be included in audit and accreditation programs.

Conclusion

GPs are aware that they provide low-value care despite their role as gatekeepers. They experience several drivers, mainly their relationship with the patient and lack of time. GPs have taken action to reduce low-value care, but need more support in order to change their practice. This support might consist of better patient education, training of healthcare professionals and providing more time for consultation. Education and clear clinical practice guidelines could support professionals in reducing low-value care as well as educating patients by information campaigns for the public using local and national media, such as websites and television.

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Appendix 1 Survey

Part 1: Experiences with low-value care

1. How often is low-value care delivered in the primary practice?
    1. Never
    2. Sometimes
    3. Frequently
    4. Often

2. Which 5 specific low-value care practices (referrals, laboratory diagnostics, medication prescriptions or imaging) do you think occur most frequently in general practice? Consider, for example, the prescription of antibiotics for upper respiratory tract infections.
    .....

3. What do you think are the most important reasons for GPs to provide low-value care? (enter up to 3 options) (multiple choices possible)
    - ☐ Maintaining a good relationship with the patient
    - ☐ Wanting to offer the patient something
    - ☐ Clinical uncertainty
    - ☐ Lack of knowledge
    - ☐ Time pressure
    - ☐ Fear of claims
    - ☐ Action is routine
    - ☐ It takes a lot of time to get in touch with a specialist
    - ☐ Availability of diagnostic tools
    - ☐ Other reason, namely...

4. Have you observed negative consequences for the patient (side effects, burden on the patient or complications) as a result of low-value care?
    1. No
    2. Yes, namely ...

5. I discuss the issue of low-value care with colleagues
    1. Never
    2. Sometimes
    3. Frequently
    4. Often

6. Are you actively trying to reduce low-value care?
   1. No
   2. Yes, namely by...

Part 2: Cases

Case 1 – X-ray of the Lumbosacral spine for nonspecific low back pain without alarming symptoms

> *Guideline Dutch GP Association Non-specific low back pain*
> Additional examination: Imaging for non-specific low back pain is not recommended

1. In the past two weeks, how often have you ordered an X-ray of the Lumbosacral spine for patients with non-specific low back pain?
   .....
   If 0, then go to question 3.

2. What are the main reasons why you ordered an X-ray of the lumbosacral spine for patients with non-specific low back pain? (enter up to 3 options) (multiple choices possible)
   - ☐ Maintaining a good relationship with the patient
   - ☐ Wanting to offer the patient something
   - ☐ Clinical uncertainty
   - ☐ I do not agree with the recommendation
   - ☐ I was not aware of the recommendation
   - ☐ Applying for an x-ray is routine
   - ☐ Time pressure
   - ☐ Fear of claims
   - ☐ It takes a lot of time to get in touch with a specialist
   - ☐ Other reason, namely... ..

3. In the past two weeks, how often have patients with non-specific low back pain asked for an X-ray of the lumbosacral spine?
   .....

4. How often do patients with non-specific low back pain who initially want imaging, agree with the proposal not to make an X-ray of the lumbosacral spine after explanation?
   1. Never
   2. Sometimes
   3. Frequently
   4. Often

5. What do you think is necessary for GPs to request less X-rays of the lumbosacral spine for patients with non-specific low back pain?
   .....

Case 2 –Vitamin B12 tests

Guideline Dutch GP association – vitamin B_{12}-tests
The GP may consider ordering a vitamin B12 test in case of:
- anemia
- neurological symptoms (in particular paraesthesias and ataxia)
- deficient nutrition and diseases that lead to reduced absorption of vitamin B12.
(Routine) ordering of vitamin B12 tests with long-term use of metformin, proton pump inhibitors, cognitive impairment and general complaints such as fatigue or muscle weakness without other indications for a vitamin B12 deficiency is not recommended

1. In the past two weeks, how often have you ordered a vitamin B12 test for patients for whom this is not recommended in the guideline?
   .....
   If 0 times, then go to question 3

2. What are the main reasons why you ordered a vitamin B12 test that is not recommended by the guideline? (enter up to 3 options) (multiple choices possible)
   - ☐ Maintaining a good relationship with the patient
   - ☐ Wanting to offer the patient something
   - ☐ Clinical uncertainty
   - ☐ I do not agree with the recommendation
   - ☐ I was not aware of the recommendation
   - ☐ Time pressure
   - ☐ Fear of claims
   - ☐ A vitamin B12 determination is routine
   - ☐ It takes a lot of time to get in touch with a specialist
   - ☐ Other reason, namely...

3. How often in the past two weeks have patients asked for a vitamin B12 test?
   .....

4. After explanation, how often do patients agree with refraining from a vitamin B12 test?
   1. Rarely
   2. Sometimes
   3. Regularly
   4. Often

5. What do you think is needed so that GPs order less vitamin B12 tests?
   .....

Part 3: Characteristics general practitioner

1. What is your age?
   .....

2. What is your gender?
   1. Male
   2. Female

3. What is your work situation?
   1. Practice owner
   2. Employed by another GP
   3. Acting GP

4. Which type of practice do you work for?
   1. Solo practice
   2. Duo practice
   3. Group practice
   4. Health center

5. How many years have you been a practicing doctor?
   1. <5 years
   2. 5-10 years
   3. 10-20 years
   4. 20+ years

6. What is present in the practice where you work?
   - ☐ Blood tests
   - ☐ Rapid testing (eg CRP)
   - ☐ Echo
   - ☐ Spirometry
   - ☐ Pharmacy
   - ☐ ECG

CHAPTER 6

Key factors that promote low-value care: Views of experts from the United States, Canada, and the Netherlands

Verkerk EW, van Dulmen SA, Born K, Gupta R, Westert GP, Kool RB

Submitted

Abstract

Background

Around the world, policies and interventions are used to encourage clinicians to reduce low-value care. In order to facilitate this, we need a better understanding of the factors that lead to low-value care. We aimed to identify the key factors effecting low-value care on a national level. In addition, we highlight differences and similarities in these three countries.

Methods

We performed 18 semi-structured interviews with experts on low-value care from three countries that are actively reducing low-value care: the United States, Canada, and the Netherlands. We interviewed 5 experts from Canada, 6 from the United States, and 7 from the Netherlands. Eight were characterized as organizational leaders or policy makers, 6 as low-value care researchers or project leaders, and 4 were both. The transcribed interviews were analyzed using inductive thematic analysis.

Results

The key factors that promote low-value care are the payment system, the pharmaceutical and medical device industry, fear of malpractice litigation, biased evidence and knowledge, medical education, and a 'more is better' culture, although there are several diffences between these countries in their payment structure, and industry and malpractice policy.

Conclusions

Policy makers and researchers that aimed to reduce low-value care have experienced that clinicians face a mix of interdependent factors regarding the healthcare system and culture that lead them to provide low-value care. Better awareness and understanding of these factors can help policy-makers to facilitate clinicians and medical centers to deliver high-value care.

Background

Overuse of low-value care is a global problem that places a strain on healthcare systems.[1] These low-value care practices harm patients and stress the limited healthcare resources. In the United States, an estimated 75.7 to 101.2 billion dollars were spent in 2019 on overtreatment or low-value care.[2] Reducing low-value care is therefore a necessary step towards reaching the triple aim of healthcare: improving healthcare and population health while reducing costs.[3]

In many countries, the number of national and local initiatives targeting low-value care is rising.[1] The largest of them is the Choosing Wisely® campaign, which has been adopted by over 20 countries since its launch.[4] The United States first initiated the campaign in April 2012, followed by the Netherlands in November 2012 and Canada in April 2014. Other key initiatives have developed by Costs of Care Inc, the Lown Institute, and the High-value Practice Academic Alliance.[5-7] Several initiatives show success in reducing low-value care.[8-11] Others show less success; they sometimes cannot or can only temporarily overcome the factors that lead to the problem.[12-14] Therefore, experts suggest changing systems rather than trying to change clinicians to create greater reductions in low-value care delivery.[15]

In order to create a system that facilitates the delivery of high-value care, it is vital to understand what factors lead to low-value care and through what mechanisms.[14] There have been multiple studies that identify factors experienced by clinicians, or factors that lead to a specific low-value care practice. However, few studies focus on national-level factors that promote the delivery of many types of low-value care. Saini et al. described factors leading to overuse and underuse on the global, national, regional and local level including available resources, social and political contract, the state of scientific knowledge, the configuration and capacity of the delivery system, and financing mechanisms.[16] The authors suggested that achieving high-value care requires an understanding of and attentiveness to all these dimensions.[16] Pathirana et al. found in literature that culture, the health system, industry and technology, professionals' knowledge and fears, and patients' expectations can lead to low-value care.[17] These studies describe many factors that limit high-value care, and an assessment of the key factors can help policy makers prioritize their improvement efforts in daily practice. Since 2012, the Choosing Wisely campaigns have worked on reducing low-value care, and their experiences and knowledge can provide insight into this complex problem.

In order to support countries in prioritizing their actions aimed at reducing low-value care, we aimed to identify and deepen the knowledge on the key factors effecting low-value care by interviewing experts from three leading Choosing Wisely countries: the United States, Canada, and the Netherlands. In addition, we highlight differences and similarities in these three countries.

Methods

We performed semi-structured interviews with experts on low-value care from three countries: the United States, Canada, and the Netherlands. These three countries have increased awareness of low-value care, engaged societies and clinicians, improved medical education and stimulated quality improvement efforts.[14 18 19] Each country has a different healthcare system. The United States has a mix of public and private financing, while Canada and the Netherlands have predominantly publicly financed health systems. In the United States and Canada the central federal government takes part in guiding national trends in healthcare delivery though programs as Medicare and Medicaid, while a large part of the healthcare policy is made by the provinces and territories or states. In the Netherlands, the central government manages primary and secondary care policy.

Participants

We selected from our professional networks a convenience sample of 20 policy-makers and researchers with experience in identifying and reducing low-value care, distributed over the three countries. This was defined as having led at least one initiative to reduce low-value care, having evaluated such initiatives, or being responsible for reducing low-value care in an organization. We used purposive sampling to include experts from different institutes and programs and with different experiences. For example, we selected experts involved in the Choosing Wisely campaigns, researchers that focus on low-value care, and leaders of various organizations that aimed to reduce low-value care. All experts were invited to participate and received information about the interviews by email. Eighteen of 20 experts gave oral consent to participate.

Interview Guide

The interviews started with an open-ended question on what factors promote low-value care practices according to the expert's experiences. The factors that emerged were further explored with follow-up questions. Next, they were asked about a list of factors that influence low-value care in order to remind the expert of potential factors. From Saini et al.,[16] we selected national and global level factors of

low-value care. We added factors thought to be relevant from the determinants of practice of Flottorp et al.[20] Lastly, we asked experts what they believed to be the most important factors. All authors discussed this interview guide until they reached consensus. The interviewer tested the guide by interviewing a project manager from Choosing Wisely Canada. We added additional factors that emerged during the interviews in subsequent interviews. The final interview guide can be found in Appendix 1.

Data Collection

We conducted face-to-face interviews with five Dutch experts and three Canadian experts and ten telephone interviews. One author (EWV) performed and audio-recorded all the interviews from August 2017 to December 2017. No new information emerged from the last two interviews and saturation was reached.

Analysis

We used the qualitative data analysis software Atlas.ti 8.0.34 to analyze the transcribed interviews using inductive thematic analysis. In this approach, the analysis is data-driven to guide researchers to create overarching themes without a pre-existing frame.[21] The analysis started by giving initial codes to relevant quotes. EWV and SAvD independently coded three interviews and discussed their coding until they reached consensus. EWV coded subsequent interviews and discussed her analysis regularly with SAvD. Subsequently, they grouped codes into categories derived from the data through continuous comparison and review. Based on the data, EWV and SAvD first selected the most important factors. All authors discussed the categories and selection of key factors through several rounds of discussion. The authors only included factors that promote low-value care on a national or global level. This was defined as factors that are related to national policy or that promote the delivery of many types of low-value care. Factors that were related to local policy, that promote the delivery of a specific low-value care practice, or act on a micro level were excluded. Examples of excluded factors are ‘shared decision making’, ‘sharing medical records or test results between providers’, and ‘predicting value of care for individual patient’. National-level factors that were reported but excluded because they were not seen as key by most participants were for example ‘primary care’, ‘performance measures’, and ‘cost sharing by patients’.

Results

Of the 18 experts, 5 (28%) were from Canada, 6 (33%) from the United States, and 7 (39%) from the Netherlands. Eleven (61%) experts had a background as a clinician. Eight (44%) were characterized as organizational leaders or policy makers, 6 (33%) as low-value care researchers or project leaders, and 4 (22%) were both. Twelve (67%) experts were male, and 1 Dutch expert had studied low-value care in the United States. Appendix 2 shows the characteristics of each expert. The analysis resulted in seven factors that promote low-value care, categorized into three themes (Figure 1). Table 1 shows sample quotes per factor.

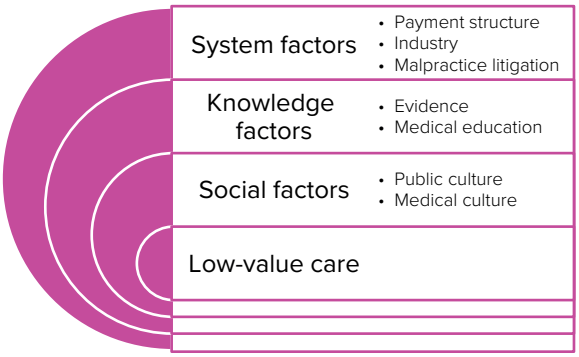

Figure 1 Seven Key Factors that Promote Low-Value Care

System Factors

Payment Structure

According to most experts, payment structure emphasizing volume over value impacts the uptake of de-implementing low-value care initiatives. The experts described that fee-for-service payment models are a barrier to reducing this low-value care as clinicians have concerns about their ability to sustain revenue. With clinicians incentivized to do and bill for more, some focus efforts on protecting the viability of their jobs and their specialty. Some, however, even in light of these barriers advocate for the reduction of low-value care. For example, a Choosing Wisely recommendation from the Netherlands aims to reduce unnecessary x-rays for acute abdominal pain. One expert observed that this was resisted due to the risk that it may lead to several radiologists losing their jobs. Depending on the payment structure, generating revenue is sometimes not a direct factor for clinicians, but an indirect factor through the managers who want to maintain organizational financial health. Also, there exist

risk that low-value care can increase when new care practices, especially new technologies, are reimbursed before the cost-effectiveness is evaluated. Two experts reported that Canada is more restrictive towards new technologies than the United States.

Industry

According to the experts, the pharmaceutical and medical device industry has a powerful influence promoting the use of potentially unnecessary care. In addition to their direct contact with clinicians, they also exercise influence through education and guidelines. Experts shared that clinicians face advertising, which can lead them to believe that the product provides high-quality care. Product developers fund medical research and education, which can lead to biased knowledge. An expert mentioned a lawsuit that was initiated by the industry to encourage the use of opioids, and another expert mentioned the provision of a research fund as a reward for the use of their products. The industry can also influence political decisions to increase product sales. After it was announced that an orphan drug would not be reimbursed in the Netherlands for its high cost and lack of clinically relevant effect, the company that produced it put forward patient stories in the media, resulting in a re-evaluation and eventual reimbursement of the drug.

Patients are also exposed to direct or indirect marketing. Whereas direct marketing of drugs is prohibited in Canada and the Netherlands, marketing the disease is legal. Companies raise awareness on for example prostate cancer and recommend the public to go to their doctor, increasing the necessary but also unnecessary use of their product. According to the experts, patient organizations sometimes receive financial support from the industry, which can help these organizations to support the patient population. It, however, also places them at risk of providing biased information to patients or the interests for which they advocate. For example, one expert described when a diabetes association argued for tighter hemoglobin a1c control, which would lead to more medicine being used.

Malpractice Litigation

Most experts agree that many clinicians are afraid of being sued by or getting complaints from patients and, therefore, practice defensive medicine and deliver more care. They described that a lawsuit is very upsetting personally and causes significant stress for clinicians. This fear can lead them to order more tests, procedures, or treatments that are unnecessary but provide additional documented evidence in support of their clinical decisions to prevent such lawsuits. Several Dutch experts suggested that malpractice lawsuits are less frequent in the Netherlands, possibly because the claims are lower, and therefore there might be less defensive

medicine. According to the experts, it is not only the lawsuit but also the fear of making a mistake and having dissatisfied patients that motivate clinicians to overuse tests, procedures, or treatments.

Knowledge Factors

Evidence

Several experts reported that the evidence for many tests, procedures, and treatments overestimates their effects in the real world. This bias is caused by publication bias, the ambition of researchers, and industry-sponsored research. An expert reported that the design of trials can be tainted by the wish to get favorable outcomes, making the evidence from these trials unreliable. In addition, it takes time for knowledge (biased or unbiased) to reach clinical practice. Clinicians need strong and solid evidence to accept that a care practice does not help the patient, when they have believed otherwise for years or when it makes sense that they work, based on pathophysiological reasoning. An expert stated that this biased evidence is not country-specific but affects the whole world.

Medical Education

Several experts said that, traditionally, medical education has been about thoroughness, which is now embedded in clinical practice patterns. Students are rewarded for being thorough but not for stewardship. This leads to the 'more is better' culture. Even practicing clinicians face potentially biased continued medical training that is sponsored by industry. Some experts also shared that clinicians work autonomously and rarely receive feedback so there is a lack of accountability mechanisms, although two experts reported that the United States has well-organized feedback systems in place, for example for antibiotic prescriptions. Experts expressed that more independent education and individual performance feedback could be vital tools to change clinician behavior.

Social Factors

Public Culture

According to the experts, public culture is a significant factor promoting low-value care. Some individuals in the public hold assumptions, perceptions, and values in which more care and new technology is better, which lies in conflict with low-value care reduction efforts. This culture can be attributed to the quality of the information that is available to the public. This information includes overestimated benefits of treatment, underestimated harms, medicalized symptoms, anecdotal stories of missed diagnoses, and potentially biased industry-sponsored advertising. According to several experts, the society is less willing to accept risks or uncertainty. Several experts believed that this culture is a worldwide phenomenon. As a result of this,

some patients request care from their clinician. It can be hard to reassure patients and explain to them that more care is not always better. Not all clinicians have the skills to have this conversation in a time-efficient way. An expert from the United States reported that low-value care is harder for United States citizens to understand, because there is also a lot of underuse and accessibility problems.

Some experts argue that this factor is overestimated because many low-value care practices are not requested, such as routine lab tests for hospitalized patients. They also suggest that clinicians often misinterpret patients' expectations and assume that they want care without asking them. Clinicians may be unconsciously driving the decision more than is sometimes assumed. Two Dutch experts reported that people in the Netherlands do not want care if it is not necessary. They suggest that this is attributable to their Calvinistic nature and attitude that pain is part of life.

Medical Culture

Similar to the public, experts discussed that clinicians overestimate the benefits of treatments, underestimate the harms, and are influenced by anecdotal stories about rare diseases. The industry, fear of litigation, medical education and biased evidence contribute to this culture. Many clinicians are hooked on new technology and have the tendency to be 'better safe than sorry' to avoid uncertainty. An expert reported that not doing anything can feel counter-intuitive. Clinicians, also, desire to provide high-quality care and a positive experience for patients, which can guide them to meet patients' wishes. Without the time for further conversation about care options, this can lead to decision-making supporting low-value care. The clinicians' roles can be conflicting: they are expected to show compassion and support and to do what is in the patients' best interest. An expert from Canada reported that medical centers in the United States and clinicians in private practice compete with each other to attract patients. They, therefore try to meet their wishes to obtain additionally requested labs and imaging, whereas in Canada this pressure from competition is less common. A Dutch expert agreed with this and stated that clinicians in the Netherlands are more used to withhold care from patients.

Table 1 Sample Quotes from Experts

Category	Factor	Quote
System factors	Payment structure	"Somebody gets paid for doing that care, and if you're reducing it you're affecting people's income. And they can mount very powerful campaigns against you." – expert nr 8 from Canada "There are certainly people who are ordering unnecessary tests because simply it increases their payments from their salary. (…) It's not like there is any downside to you as a physician in fact there is only upside. So I think the bigger issue of fee for service in the system that we have is that it just provide, it doesn't provide any counterbalance to the drive to get more testing. And so having you know value based payments or other models that at least provide some external counterbalance to it." – expert nr 4 from the United States
	Industry	"They can push in a lot of ways, through patient organizations, for example. (..) they will talk to the press, to politicians, and to increase pressure they will give stories from patients that show how terrible their disease is." – expert nr 16 from the Netherlands "They'll give money to the Canadian diabetes association. And they'll argue for tighter hemoglobin a1c control. Let's not use 8,5 in the elderly, but use 7,5 in the elderly. Well what does that mean? We will have to treat more people and use drugs." – expert nr 11 from Canada
	Malpractice litigation	"The risk of a doctor walking into an office tomorrow and doing something to a patient that causes a lawsuit is very low. But the potential consequence of that scares the crap out of most doctors which is why the practice the way they do it" – expert nr 11 from Canada "A frequent complaint is that a patient was diagnosed too late or incorrectly. (…) Giving each patient that has a cough an X-ray to detect lung cancer might prevent you from missing that one patient, but you might make 100 unnecessary X-rays in the process. As a clinician you are almost never sued for what you have done, but more often for what you did not do or did too late." – expert nr 17 from the Netherlands
Knowledge factors	Evidence	"I think it's a huge problem because almost all major clinical trials at the ultimate stage before approvals are funded by commercial sponsors and commercial entities." – expert nr 4 from the United States "A hospital reports that they operate less on inguinal hernias since they have better conversations with patients, I believe about 10%. (…) But we need to study the effects thoroughly before applying this more widely. (…) We might find out in a few years that these people end up with much bigger problems." – expert nr 17 from the Netherlands

	Medical education	"...you wanna be thorough and show the attending physician that you thought of all these diseases and you ruled them out. (...) It's just baked in like, you get rewarded for being thorough and thinking maybe this is rare disease..." – expert nr 10 from Canada "I think what drives a lot is the training. That insists upon no a stone unturned. Nothing, you know, you wanna nail down the diagnosis. You need as many tests as you can." – expert nr 1 from the United States
Social factors	Public culture	"There is a tendency to help. Clinicians want to mean something to a patient, and the patient does not want to leave without a prescription with the idea that at least something has been done." – expert nr 18 from the Netherlands "I would say it's the lack of health literacy around the benefits and harms of a treatment. People don't know. I mean people, everyone. Patients, doctors, hospitals administrators, politicians, health officials, they have an overblown sense of the benefit and an underappreciative sense of the harms when it comes to a lot of treatments." – expert nr 8 from Canada
	Medical culture	"I think in the end most doctors just want to do the right thing for their patients right and they don't want the patients to have a bad outcome." – expert nr 5 from the United States "We don't always evaluate the efficacy and sometimes people assume that all innovation is good innovation. People assume that anything new has to be good and that is unfortunately not the case." – expert nr 7 from Canada

Discussion

Our study identified key factors that promote low-value care: a fee for service payment system, the pharmaceutical and medical device industry, the fear of being sued, the biased knowledge on care, medical education in which clinicians are trained to act, and the 'more is better' culture in the general public and in clinicians. The experts suggested that these factors have a synergistic relationship and that especially the industry strengthens the other factors. These factors are seen as the most important in all three countries, although the experts report several diffences in their payment structure, industry and malpractice policy, and culture regarding low-value care.

Our study highlights the most important national level factors from the wide range that was identified by Saini et al.[16] Whereas they conclude that the available resources, social and political contract, state of scientific knowledge, configuration of the system, and financing mechanisms influence the provision of care, the experts that we interviewed put more emphasis on the 'more is better' culture and fear of malpractice litigation. In addition, our analysis resulted in a different categorization than Saini et al. This could be explained by the focus of our study on overuse of low-value care and on the national level, as compared to Saini et al.'s focus on both overuse and underuse on all levels. Also, our study assessed experiences of experts in the field, whereas Saini et al. drew their findings from literature. Several studies have identified barriers to reducing low-value care experienced by clinicians, such as patient expectations, efficiency, other doctors, malpractice fears, clinical uncertainty, lack of time, fear of bad outcomes and difficulty assessing medical records.[19 22-25] Several of these barriers are reflected in the national-level factors that this study identified.

Implications for Research and Practice

These seven factors can impact clinicians' practices and are vital to consider when reducing low-value care. Choosing Wisely appeals to clinicians' values and motivation to provide high-quality care, but it is implemented in a system and culture that impedes this. Therefore, it is crucial that we target these factors to enable the successful reduction of low-value care practices. Although creating this change can be challenging and requires policy and system changes, it potentially has a large, long-term impact on the provision of low-value care and the sustainability of our healthcare systems. Table 2 suggests several policy-related strategies per key factor. Below, several policies are discussed.

Table 2 Examples of promising policy-related strategies per factor

Category	Factor	Examples of promising policy-related strategies
System factors	Payment structure	• Moving from pay for performance toward other payment structures, such as capitation or value-based payment • No longer reimbursing low-value care • Fixed income for physicians
	Industry	• Restricting industry ties in research and education
	Malpractice litigation	• Reducing malpractice fear by protecting clinicians from the burden of a complaint
Knowledge factors	Evidence	• Stimulating transparency on industry ties and independent research
	Medical education	• Improving education on the harms of care • Rewarding stewardship • Providing individual performance feedback on low-value care
Social factors	Public culture	• Information campaigns on low-value care • Supporting clinicians to educate their patients
	Medical culture	• Increasing awareness on culture and psychological preconceptions that drive low-value care

With policy adjustments, healthcare systems are better supported to reduce low-value care by addressing these factors.[17 26-28] For example, moving from pay for performance toward other payment structures, such as capitation or paying for quality instead of quantity can remove the pressure on clinicians to generate volumes.[29] Most physicians in the United States and Canada receive a fee for service, while in the Netherlands, half of the specialists is salaried and general practitioners receive a capitation fee per registered patient. The United States is trying to shift towards value-based payment.[30] The predominantly capitated National Health System (NHS) in England,[31] and no longer reimbursing care in Canada[13] have shown to reduce low-value care use. In addition, local strategies such as global budgets for hospitals,[32] a fixed budget contract between hospital and insurer and fixed income for specialists,[33] and a cost accounting and shared savings program[34] have potential to reduce low-value care.

The influence of the pharmaceutical and medical device industry could be further restricted so patients and clinicians can base their decisions on unbiased and independent information. The United States and New Zealand are two of the few countries that still allow direct to consumer advertising. Regarding the marketing to clinicians, the United States already improved the transparency of payments with the

Physician Payments Sunshine Act in 2010, although it has yet to be shown that disclosure affects marketing practices or the opinion of consumers.[35 36] Other opportunities lie in restricting industry ties in research and education.[37] It is important to note that, while the industry is considered to be an important promotor of low-value care, it also does a lot of good things to reduce underuse and improve the quality of care.

Studies confirm that malpractice concerns are a reason to provide low-value care.[22 24 25 38] As the experts in this study suggested, the Netherlands has a high claim rejection rate and relatively low payments compared to other countries.[39] Nevertheless, Dutch physicians still experience fear of complaints.[40] Also, although the number of lawsuits in the United States has been decreasing in the past 20 years, the practice of defensive medicine has continued.[41] It is suggested that defensive medicine is self-reinforcing and research on how to break this mindset is necessary.[41]

Several other researchers also recognize that medical and public culture promote low-value care.[27 42 43] Unfortunately, this national or maybe even global culture is hard to recognize and change.[42] On an organizational level, the High-Value Care Culture Survey can help to identify areas for improvement within the local culture.[44] This survey has shown that training environment and reimbursement models are associated with high-value care culture.[45 46] The lack of good evidence and our trust in the pathophysiological mechanism was also recognized as a reason for the use of treatments that lack benefit for the patient.[47] Ubel and Asch suggested that awareness of the psychological preconceptions that drive low-value care can help clinicians to resist them.[48] Regarding the public, their awareness of and responses to low-value care could be improved through the media.[49] A review suggests that engaging patients within the patient-clinician interaction helps to reduce low-value care.[50]

With this paper, policy makers can gain an understanding of the key factors that lead to low-value care, which can help them to select solutions. As the antibiotic case in Box 1 illustrates, since there is not one factor that leads to low-value care alone, there is no single solution to address it. Depending on the magnitude of the factors and the country's health system, further research can be undertaken and policy interventions can be considered. Quantifying the importance of the factors in each country would enable further research into country differences.

Box 1 The case of inappropriate antibiotic use

Case: Antibiotics
Antibiotic is often targeted in studies that focus on reducing low-value care.[8] Inappropriate antibiotic use can cause adverse effects, wastes resources, and encourages antimicrobial resistance. Cognitive biases, pressure from patients, and lack of time promote antibiotic use.[51]

Interestingly, there is a considerable difference in the levels of antibiotic prescriptions between countries.[52] This can be caused by several dimensions of culture,[53] such as the way people deal with authority and uncertainty,[54] promotional efforts of pharmaceutical companies, and reimbursement policies.[52 55]

Several policies have increased antibiotic stewardship. In 1997 Belgium limited the reimbursement of antimicrobial prophylaxis, which led to a sustained reduction,[56] and these results were also found in Denmark.[57] Also, restrictions on the marketing of pharmaceutical companies,[58] and an increase in the number of general practitioners[59] were related with less antibiotic prescriptions.

This case shows that for one low-value care practice there can be many factors that explain the variation between countries. Improving appropriateness of care is possible and understanding these factors within a specific country can help to develop succesful interventions.

Strengths and Limitations

A strength of our study is that through the Choosing Wisely network, we had the opportunity to interview experts with extensive experience with low-value care and de-implementation. A limitation of our study is that we did not quantify the importance of the factors identified, but this is an opportunity for further evalution especially through country comparisons. Secondly, the factors that the experts described could be observed by them in practice, but since most of them keep up with medical literature, their responses could partly be a reflection of the literature. Thirdly, the experts mainly referred to low-value care delivered by physicians. This study cannot estimate whether low-value care in other disciplines, such as nursing or paramedics, is due to other factors. Fourthly, our convenience sample of experts might not be representative of experts more broadly. Lastly, our results are based on experiences in three high-income countries. The presence and magnitude of factors differ between countries and health care systems. We, therefore, might have missed themes relevant to other, especially low and mid-income, countries.

Conclusions

The key factors promoting low-value care on a national level are the fee-for-service system, the pharmaceutical and medical device industry, fear of malpractice litigation, biased evidence and knowledge, medical education and the 'more is better' culture. These factors are seen as the most important in the United States, Canada and the Netherlands, although there are several differences in their payment structure, industry, and malpractice policy. Policy makers and researchers that aimed to reduce low-value care have experienced that clinicians are motivated to provide high-quality care for their patients, but they act in a system and culture that impedes this. Better awareness and understanding of these factors, and how other countries approach them can help clinicians to resist them and policy-makers to better support clinicians and medical centers to deliver high-value care to their patients.

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Appendix 1 Interview guide

I. Introduction
   1. Introduction
   2. Confirm consent
   3. Recap study aim and purpose
   4. Establish terminology:
      a. low-value care= care that is proven of little or no value to the patient
      b. de-implementation= the process of reducing use of low-value care
      c. nationwide= factors that are present in the whole country, that apply to many low-value care practices

II. Participant's background
   5. Current function and involvement in the de-implementation of low-value care

III. Factors

   I will first ask an open ended question on barriers and facilitators that you have experienced, and then we will go through several themes.
   6. Open question: What nationwide factors promote low-value care in the US/ Canada/the Netherlands in your experience?
   7. Opinion of several themes and influence on low-value care
      a. Accessibility of care for patients
      b. The general practitioner/primary care physician
      c. The healthcare payment model
      d. Malpractice liability
      e. Performance measures or other health care quality control systems
      f. Political stability or instability
      g. The availability of data and measuring low-value care
      h. The approval of new technologies
      i. The pharmaceutical and medical device industry
      j. Patient and consumer organizations
      k. Health care provider organizations
      l. Training and education of clinicians
      m. Advertising for patients and care providers
      n. General beliefs and values of the public
      o. Attitude of clinicians
      p. Receptivity of change
      q. Prioritization of de-implementation
      r. Is there anything missing?
   8. Most important factors for your country?

IV. End interview
   9. Anything else?
   10. Who else would be interesting to talk to?
   11. Thanks!

Appendix 2 Characteristics of the experts that participated

	Country	Clinician (is or has been a health care professional)	Organizational leader/ policy maker (can make health care policy or leads an organization)*	Low-value care researcher/ project leader (has led a project to reduce lvc or studied an aspect of lvc)*
1	US		X	
2	US			X
3	US	X	X	
4	US	X	X	X
5	US	X		X
6	US	X		X
7	CAN	X	X	
8	CAN			X
9	CAN		X	
10	CAN	X	X	X
11	CAN	X		X
12	NL/US	X		X
13	NL		X	
14	NL		X	
15	NL	X	X	X
16	NL		X	X
17	NL	X	X	
18	NL	X	X	

*Characterized by the authors

CHAPTER 7

What lessons can be learnt from a Dutch national programme to reduce low-value care?

Verkerk EW, van Dulmen SA, Westert GP, Hooft L, Heus, P, Kool RB,
To do or not to do programme collaborators
Submitted

Abstract

Background

Reducing the overuse of care that is proven to be of low value increases the quality and safety of care. We aimed to identify lessons for reducing low-value care by looking at: 1) The effects of eight de-implementation projects. 2) The barriers and facilitators that emerged. 3) The experiences with the different components of the projects.

Methods

We performed an effect and process evaluation of eight multicentre projects aimed at reducing low-value care. A total of 40 hospitals and 198 general practitioners in the Netherlands participated. The eight projects each reduced a type of low-value care. These are: inhaled corticosteroids; surveillance CT scans; knee arthroscopies and MRIs; intravenous and urinary catheters; vitamin D and B12 tests; diagnostic laboratory tests; surveillance after low-risk basal cell carcinoma; and upper gastro-intestinal endoscopies.

Results

Five out of the eight projects resulted in a reduction of low-value care, ranging from 11.4% to 34.5%. The remaining three projects did not perform better than their control group. The projects observed no negative consequences of their strategy. The most important barriers were a lack of time, an inability to reassure the patient, a desire to meet the patient's wishes, financial considerations, and a discomfort with uncertainty. The most important facilitators were support amongst clinicians, knowledge of the harms of low-value care, and a growing consciousness that more is not always better. Repeated education and feedback for clinicians, patient information material, and organisational changes were valued components of the strategy.

Conclusions

Successfully reducing low-value care is possible in spite of the powerful barriers opposing it. The projects managed to recruit many hospitals and general practices and five of them achieved significant results without measuring negative consequences. Based on our findings, we offer practical recommendations for reducing low-value care successfully.

Introduction

Reducing care proven to be of low value is a universal and persistent challenge.[1] Such low-value care, also called medical overuse, provides no, or very little, benefit to the patient if one takes into consideration its potential harm, costs, alternatives, or patient preferences. In addition it also wastes resources.[2] The term de-implementation is increasingly being used to describe a move away from ineffective or harmful medical practices.[3] Such reduction of low-value care can increase the quality and safety of care. However, reducing low-value care has proven to be difficult and knowledge about de-implementation is scarce.[4] We know that strategies comprising many different components, and which address both patients and clinicians, have the potential to reduce overuse. However, the underlying mechanism in play is unclear and further experimentation and evaluation is needed.[2 5]

Several publications describe lessons learnt so far from de-implementation. A review found that involving physicians from the beginning is of great importance.[6] Another study evaluated eight de-implementation projects in a hospital and found that support from the hospital board was a key to their success.[7] Further in-depth knowledge of de-implementation, including its impact and the barriers and facilitating factors involved, is needed to determine what is necessary for successful de-implementation.[8]

In 2015, we started a nationwide programme in the Netherlands, comprised of eight multicentre de-implementation projects that we prospectively monitored and evaluated. This paper describes the lessons learnt from them and aims to contribute to the knowledge on de-implementation in clinical practice by answering three questions:

- What effects can be achieved by a multicentre de-implementation project?
- What barriers and facilitating factors might be encountered in de-implementation?
- What are the effective components of a de-implementation project, and why?

Methods

We monitored and evaluated, prospectively, eight multicentre de-implementation projects in the Netherlands from June 2016 to October 2018. This study was part of a national programme called ‘To do or not to do? Reducing low-value care’, described in box 1.

Box 1 Programme description

In 2015, the university hospitals in the Netherlands joint forces and received a grant from the Dutch Ministry of Health, Welfare and Sport to coordinate a national programme called 'To do or not to do? Reducing low-value care'. Its goal was to identify and reduce low-value care and to generate and disseminate knowledge about the process of de-implementation. The programme launched eight multicentre projects, each one coordinated by one of the eight university hospitals. These were aimed at reducing practices deemed low-value care and observing the challenges of de-implementation in practice. The programme was designed to be both top-down and bottom-up. As such it was supported by all the key players, the clinicians, patients, providers, insurers, and government. Representatives of these players were united in an advisory board. The de-implementation initiatives themselves were initiated and led by clinicians.

The projects' selection

Staff members of the eight Dutch university hospitals applied for grants for de-implementation projects. In January 2016, 42 de-implementation proposals were submitted. An independent committee of researchers selected eight proposals, based on their societal impact, quality of design, feasibility, sufficient evidence for the low-value care, and variation in specialty.

Support from the programme

The eight project teams received support from a central team, comprising the authors of this paper. Every three months, we scheduled meetings with each project team to monitor their progress and to support them. At the start, the teams received guidance on de-implementation based on the Grol and Wensing Implementation of Change Model,[9] and on the preliminary findings of the two literature reviews. The guidance recommended three steps: performing a problem analysis to identify potential barriers to, and factors for facilitating de-implementation; developing a tailor-made strategy based on the problem analysis; and performing a process evaluation after de-implementation. During the programme, we organised five invitational conferences for the team members of all projects in order to discuss the theoretical background regarding, for example, behavioural change; and also to exchange knowledge and experiences.

The projects' structure

The projects' structure can be found in Table 1. Six projects aimed at reducing low-value hospital care and two projects focused on low-value primary care. Each project leader chose a design and approach that fitted their project best, resulting in a diversity of study designs and strategies. All projects evaluated the effect of the

de-implementation strategy on the delivery of care. Six projects also measured the unintended effects of the strategy on patient outcomes and/or the use of other care. All project teams performed a structured process evaluation. All projects obtained ethical approval before the start of their study. Several projects are described in more detail in other papers.[10-15]

Evaluation

We used the Medical Research Council (MRC) framework for process evaluation of complex interventions.[16] This framework helps to analyse why, and how, the planned intervention has led to the effect observed. We evaluated, using this framework, three components of the projects: 1) the effects of the projects on clinical practice; 2) the contextual barriers and facilitating factors that emerged; and, 3) the experiences of the project leaders and the participating clinicians and patients with the different components of the projects.

For the first component, we report the quantitative outcomes of the eight projects on the volume of low-value care and on other outcomes that were measured. For components 2 and 3, EWV performed a qualitative analysis using Atlas.ti version 8.4.20 of the project teams' experiences and evaluations. We collected data on this using logbooks, reports, and interviews. The project teams kept a logbook and delivered a report on their results and evaluation. In May 2018, two researchers from the coordinating team (EWV and PH) interviewed the project leaders of the eight teams. The interviews included open-ended questions about the barriers and facilitating factors, their experiences with different components of their project and their lessons for other project leaders. Reports of the audiotaped interviews were sent to the project leaders for correction and confirmation.

EWV analysed and classified the barriers and facilitators reported in the logbooks, reports and interviews using the framework of the determinants of change.[9] This framework identifies individual health professional factors, patient factors, professional interactions, incentives and resources, and social, political and legal factors. The coding and description of results were verified by PH and discussed until consensus was reached. We added one category (low-value care related), and three sub-categories (interaction with patient, interaction with clinician, patient environment) to this framework. This was because some factors that we identified did not fit in the existing categories. We also analysed the projects' experiences with the different components of their project reported in the logbooks, reports and interviews.

Table 1 Overview of the eight projects

Project	Reduction in the inappropriate use of:	Setting	Problem analysis data source	Design
1	Inhaled corticosteroids (ICS) for patients with mild COPD.	Five primary care cooperation groups, with a total of five pharmacists and 40 general practices.	Focus group interviews with clinicians and patients.	A before-and- after study with a national control group.
2	Surveillance CT scans for patients cured of lymphoma.	Nine hospitals' haematology wards.	A survey among clinicians and patients.	A before-and-after study with a national control group.
3	Knee arthroscopies and MRIs for orthopaedic patients aged 50 or older.	Thirteen orthopaedic centres.	Interviews and surveys among clinicians and patients.	A difference-in-difference design with a national control group.
4	Intravenous and urinary catheters.	Seven hospitals' internal medicine and nonsurgical subspecialty wards.	A survey among patients and observations in clinical practice.	A before-after- study with an interrupted time series analysis.
5	Vitamin D and B12 tests.	Twenty-six primary care health centres, with a total of 158 general practitioners.	Experience from an earlier pilot study.	Cluster randomised study comparing two interventions.
6	Diagnostic laboratory tests.	Four hospitals' internal medicine wards.	Experience from an earlier pilot study and a survey among clinicians.	A before-after- study with an interrupted time series analysis and a control group of 19 hospitals.
7	Surveillance visits for patients cured for basal cell carcinoma.	Three hospitals' dermatology wards.	Interviews and focus group interviews with clinicians and patients.	An uncontrolled before-and-after study.
8	Upper gastrointestinal endoscopies for dyspeptic patients.	Four hospitals' gastroenterology wards.	Focus group interviews with clinicians and patients.	A randomised controlled trial.

De-implementation strategy	Effect evaluation data source	Process evaluation data source
Education of GPs and pharmacists. Publications in patient and professional magazines. Selection of patients whose use of ICS was potentially unnecessary. Patient information.	National database.	Survey among clinicians and patients.
Education of haematologists. Patient information (leaflet). Presentation at a patient association conference.	National database.	Survey among clinicians.
Appointing clinical champions. Education of orthopaedic specialists. Patient information (leaflet). Feedback.	National database.	Survey among clinicians.
Appointing clinical champions. Education of physicians and nurses. Use of educational materials (poster, pocket card). Patient information (leaflets). Competitive feedback. Changes in the structure of medical records.	Patients' medical records.	Observations in clinical practice.
Education of GPs and feedback in intervention groups A and B. Patient information (leaflet, video clip and poster) in intervention group B only.	Regional database.	Interviews with clinicians and patients.
Conferences for physicians. Increased supervision of residents. Education of physicians. Feedback. Changes in the ordering system.	Hospital registries.	Survey among clinicians.
Personalised patient information.	A survey among patients.	Interviews with clinicians and patients.
Interactive e-learning for patients.	Patients' medical records.	A survey among patients.

Results

First, we report the quantitative outcomes of the eight projects on the volume of care. Then, we report the results of our qualitative evaluation of the barriers and facilitating factors for de-implementation, and the experiences of the project leaders and the participating clinicians and patients with the different components of the projects.

Effects on clinical practice

The quantitative effects of the projects are shown in Table 2. Five projects (4, 5, 6, 7, 8) showed a positive effect of the de-implementation strategy. Projects 4, 5, 6 and 7 observed a reduction in the volume of care or low-value care after de-implementation, compared to before. Project 6 also collected data from a concurrent control group and found a larger reduction in the intervention group compared to the control group. In Project 8, patients who were referred for an upper gastrointestinal endoscopy were randomised between receiving an e-learning package or receiving care as usual. 39% of the intervention group choose to undergo the endoscopy compared to 82% of the control group. Project 5 compared two interventions and found a larger reduction in the group that received the additional patient information.

Three projects (1, 2, 3) found no effect of the de-implementation strategy. Project 1 found a significant reduction in the control group, compared to no difference in the intervention group. Project 2 found no change in both groups. Lastly, project 3 found a reduction in low-value care in both the intervention and the control group, but no difference between these groups. Where measured, the projects found no negative effects of the de-implementation on use of other care and patient outcomes.

Barriers and facilitating factors for de-implementation

The project teams found multiple factors that either hindered or facilitated the de-implementation of their low-value care practices. All the factors are presented in Table 3. Below, we describe the most frequently reported factors.

Regarding the factors that relate to the low-value care, evidence or a lack of it, and a consensus amongst clinicians, were the most frequently mentioned factors facilitating or barring de-implementation.

A major barrier related to individual health professionals was a lack of knowledge about the low-value care. The knowledge and a belief that the care's harms outweigh its benefits facilitated de-implementation. For example, getting reminded on the fact that urinary catheters cause discomfort and lead to infections, motivated clinicians to

remove them more promptly. Another major barrier is the clinicians' fear of missing disease, and discomfort with uncertainty. In addition, clinicians felt that by providing the low-value care they were meeting their patient's wishes, or were able to reassure them. On the other hand, they were motivated to reduce low-value care by a focus on improving patient care.

Patients' knowledge of the potential harm, lack of benefit, and cost of low-value care, facilitated its reduction. For example, when patients with chronic obstructive pulmonary disease (COPD) heard in a focus group about the lack of benefit of inhaled corticosteroids, they wanted to reduce them immediately. However, de-implementation was hindered by frightening stories or incorrect information on the internet. Patients were sometimes afraid of a disease, such as gastric cancer when they had dyspepsia, and wanted reassurance. A lack of trust in, or suspicion of, their clinician also hindered de-implementation.

Regarding the professional interactions, de-implementation was hindered by a lack of support and trust, and a lack of coordination and collaboration. For example, it was sometimes unclear which clinician was responsible for reducing the low-value care. The convenience and high accessibility of the low-value care also hindered de-implementation. For example, the use of standard laboratory packages in the medical ordering system. The growing consciousness among clinicians that more is not always better, and good collaboration and support, facilitated the de-implementation.

Regarding incentives and resources, de-implementation was hindered by a lack of time, both for communicating with the patient and for participating in the project. It takes more time not to provide low-value care, for example because patients need to be taught how to check their own skin for cancer in order to reduce follow-up visits to the dermatologist. A potential reduction of revenue was also a barrier to de-implementation in many projects. Clinicians felt hindered to reduce procedures that are reimbursed, such as surveillance visits and insertion of a catheter. In addition, several hospitals and clinicians did not participate in a project because of a fear of reduced revenue.

Table 2 The effects of eight projects on clinical practice

Project	Sample size	Primary outcome(s)	Secondary outcome(s)	
		Low-value care volume	Patient outcomes	Use of other care
1	1645 COPD patients in the intervention group and 446,012 patients in the control group.	No reduction in the intervention group in the number of ICS/ICS-LABA distributions per COPD patient in 3 months. There was an 11.4% reduction in the control group, which was statistically significant (p=0.001).	The number of prednisolone and antibiotics per patient reduced nationally. This indicates no increase in exacerbations.	The use of bronchodilators (LAMA/LABA) per patient reduced nationally.
2	391 patients with lymphoma in the intervention group and 22267 in the control group post de-implementation.	No reduction in the intervention group and no reduction in the control group in the number of CT scans per patient per year.	-	-
3	56,554 patients with degenerative knee complaints in the intervention group and 192,670 in the control group.	Reduction over time in both the intervention and control group, for both the percentage of patient with degenerative knee complaints who receive an MRI, and the percentage of patients with degenerative knee complaints who receive arthroscopic surgery. No statistically significant difference between groups for both outcomes.	-	-
4	324 patients with a urinary catheter before and 398 patients post de-implementation. 1665 patients with an intravenous catheter before and 1912 patients post de-implementation.	A 25.6% reduction in the percentage of patients with a urinary catheter that is inappropriate (from 32.4% to 24.1%; p=0.013). Time-series analysis was not statistically significant. A 34.5% reduction in the percentage of patients with an intravenous catheter that is inappropriate (from 22.0% to 14.4%; p<0.001). Time-series analysis confirmed this reduction (p=0.011).	The percentage of patients with a catheter-related infection, length of hospital stay, and mortality rate showed no change.	-

5	13 GP practices in intervention group A and 13 GP practices in intervention group B, with a total population of 195,000 patients.	A 23% reduction in the number of vitamin D tests in both groups (from 17.527 to 13.447). This reduction of 22 tests per 1000 patients was significant (p<0.001). A 23% reduction in the number of vitamin B12 tests in both groups (from 12,304 to 9891). This reduction of 12 tests per 1000 patients was significant (p=0.003). Additional patient information in intervention group B resulted in a 10% extra reduction of vitamin D tests compared to group A, and a non-significant 4% extra reduction of vitamin B12 tests.	The mean test results of vitamin D and vitamin B12 did not change.	The number of vitamin D and B12 prescriptions decreased after the de-implementation strategy.
6	130,920 patient contacts in the intervention group (4 hospitals) and 519,544 contacts in the control group (19 hospitals).	A 11.4% reduction in the intervention group (from 11.0 to 9.7) and an 2.4% increase in the control group (from 10.9 to 11.2) in the number of laboratory diagnostics per patient contact. Three of the four intervention hospitals showed a statistically significant change in slope (P<0.001, P=0.03, P<0.001).	Apart from a decrease in outpatient visits in one hospital, the length of hospital stay and rate of outpatient visits did not change in all four hospitals.	Three hospitals showed data of other diagnostics. Radiology use decreased in one hospital. Microbiology use decreased in one and increased in another hospital. Nuclear medicine decreased in two hospitals.
7	473 patients with BCC before de-implementation and 195 after.	A 13.2% reduction in the number of BCC-related dermatology visits per patient within one year of diagnosis (from 1.59 to 1.38) in the intervention group. This change was statistically significant (P<0.001).	There was no change in the patients satisfaction with their physician, the hospital, and the information provided. Also, there was no change in their perceived health.	The number of BCC related visits to a GP did not change.
8	62 patients with dyspepsia in the intervention group and 57 patients in the control group.	39% of patients with dyspepsia in the intervention group underwent an upper gastrointestinal endoscopy, compared to 82% in the control group. This difference was statistically significant (P<0.001).	The severity of symptoms and the quality of life improved in both groups equally. Rates of anxiety declined in the intervention group but not in the control group.	-

LABA, Long-acting β adrenoceptor agonists; ICS, Inhaled corticosteroids; COPD, Chronic obstructive pulmonary disease; BCC, basal cell carcinoma.

Table 3 The barriers to, and factors facilitating, de-implementation.

Category	Sub-category	Barriers	Facilitators
Factors related to low-value care.		Uncertainty about care being of low-value (+3, 4). A lack of consensus among clinicians (+6, *3). A lack of alternatives (+8). Conflicting information (*5).	Sufficient evidence (+1, 6). An alternative available (*5).
Individual health professional factors.	Knowledge and skills	A lack of knowledge about the lack of benefit (+8), the alternatives (+1), and the burden and side effects of lvc (+4, 6) . A lack of trust in one's own skills (+7). Experience that lvc helps (*3, 5).	Knowledge of the burden and side effects of lvc (+1, 8, *4). Knowledge of lvc (*3, 5).
	Cognitions	Fear of disease (+1, 4, *8) and of missing things (+6, 8). A discomfort with uncertainty (+2, 4, 8). A lack of willingness to adhere to guidelines (+3, 4). Lack of priority (*1, 4). A belief that the evidence does not apply to their patient population (*3, 8). Stopping lvc can increase the burden on the patient (+4). A concern that patients will go to other clinics for lvc (*3).	Belief in improving patient care by reducing lvc (*3, 5, 8). Enthusiasm (+6, *8). Motivation to educate junior doctors (+6). Focus on quality and safety (+6). Agreement with lvc (+3). Intellectually challenging to reduce lvc (+6). Improved patient examination (+1). Motivation to achieve good results (*5).
	Routines and characteristics	The persistence of a habit or routine (+4, 6, *5).	Usually adhere to guidelines (+3, 8, *3).
	Interaction with the patient	The perceived preferences of the patient (+7, 8). The desire to offer the patient something (+8). The expectation that the patient will keep requesting lvc (+8, *8). An inability to reassure the patient (+2). An inability to deal with patients with apparently more knowledge of lvc (*5). Keeping up a good relationship with the patient (*5).	Having a long relationship with the patient(*5).

Patient factors.	Knowledge and skills	A lack of knowledge about symptoms (+8). Frightening/wrong information on the internet or social media (+8, *5). A lack of trust in one's own skills (+7, *7).	A reduction in the burden and side effects of lvc (+1, 4, 8, *8). A lack of any noticeable benefit of lvc (+1). Trust in one's own skills (+7). Use of trustworthy sources of information (+8). Knowledge of lvc (+3, *3).
	Cognitions	A search for reassurance (+2, 8). Fear of disease (+1, 7, 8, *5). A suspicion that saving cost is a priority (+1, 6). A preference for lvc (+3, *7). Expectations of receiving lvc(+2). A belief in the value of lvc (*5). Patients desire for a solution to their symptoms (*8).	A preference for receiving as little care as possible (+1, *8). A preference for an alternative to lvc (+7, 8). Reduction in costs (+1, 7).
	Environment	A patient's environment produces pressure(+3, *5, 8) . Lvc is requested by an employer (*3).	Support from the patient's environment for the lvc alternative (+3).
	Routines and characteristics	Immigrants; well-educated patients demand lvc (*5). A fear of change (+1).	Being elderly(+3).
	Interaction with clinician	Having already been referred for lvc by a GP (*8). A lack of trust in the clinician (+1, 8).	Some patients may ask the clinician if lvc is really necessary (+4)'. Having a good conversation with the clinician (+2).
Professional interactions.	Team processes and communication	It is unclear which professional has responsibility for reducing lvc (+4, 6). A lack of support among colleagues (+6, 8). A lack of trust in colleagues (+7). The GP's autonomy in decision-making without a specialist (*8). Differences in the policies of professionals (*3). Multiple clinicians can order lvc (*5).	Good collaboration between colleagues (+7). Support from clinician organisations (+7, 8). The enthusiasm of colleagues (*6). Other professions advocating the same message (*5).

Table 3 Continued.

Category	Sub-category	Barriers	Facilitators
Professional interactions.	Organisational structure and capacity for change	The convenience of standard laboratory packages (+6). Easy access to lvc (+8, *8). The rapid turnover of junior physicians (+6, *6). The difficulties of arranging meetings (*3). The presence of temporary doctors (*5)	
	Leadership and organisational culture	A fear of questioning a colleague's policy (+4). A belief that it is inappropriate to deny patients care (+1).	The subject has become a trend among clinicians (+7, 8, *1, 3, 8).
Incentives and resources.	The availability of necessary resources	Reducing lvc can lead to more work (+4, 6) or a longer admission (+6). Not providing lvc costs more time (+4, 7, 8). A lack of time for patients or for participating in the project (+6, *1, 5, 6, 8).	
	Financial incentives and disincentives	Lvc is reimbursed, therefore reducing it reduces revenue (+4, 6, 7, *2, 3, 6, 8). Minimal cost savings by reducing lvc (+6, *5, 6). The argument for saving societal costs cannot be used because patients pay for lvc (*5).	Reducing lvc creates room for other patients (+4). The existence of waiting lists, so space from reducing lvc is filled up (*8).
Social, political and legal factors.		Publishing the lvc rate will give the hospital a bad name(*2).	

Lvc = low-value care; + = identified before de-implementation; * = identified after de-implementation

Experiences with strategy components

Below, we describe the experiences reported frequently by the project teams, the target clinicians, and the patients regarding the different components of their de-implementation projects. Table 4 shows all experiences.

Educating clinicians was seen as a useful component of the de-implementation strategy as it enabled them to receive up to date information about the low-value care and its side effects. Project 5 included a second educational meeting which focused on practising on a simulated patient, and project 3 showed and discussed a video on communicating with a patient, which helped clinicians to explain to the patient that the care is of low-value. However, meetings were sometimes either hard to schedule, or could not be attended by all the clinicians. It helped to use existing structures such as weekly meetings. Clinicians found educational material, such as a pocket card, useful. We noted that a lack of repetition contributed to falling back into old patterns. Some terminology, such as 'unnecessary care', and the focus on costs, caused resistance amongst clinicians.

Two projects appointed clinical champions in the hospitals participating in order to bring the subject regularly to the attention of their colleagues and to spread further the educational materials or feedback reports. The way clinical champions fulfilled their role varied. Some spread the messages more actively than others. Clinical champions who left the department or worked in a laboratory had less influence because they did not work near the target group.

Giving feedback to clinicians offered insight into the prevalence of low-value care, and comparing their own performance to those of their peers motivated them to perform better. Some clinicians' first reaction was scepticism towards the validity of the data. After reassurance that the data is valid, these clinicians were able to acknowledge that there was room for improvement and were willing to improve. Some projects found the data collection for the feedback time-consuming or even impossible to achieve in time.

Patient information was a valuable de-implementation strategy component, especially in the projects where the patient was an important factor, such as in the reduction of surveillance visits after basal cell carcinoma. However, some factors regarding the spread and content of the material may have limited its effect in other projects. Distribution of the material to patients was not always optimal. Some clinicians considered the information too difficult for patients to understand. Lastly, some clinicians reported that, contrary to its aim, the video clip and poster on vitamin testing in the waiting room led to more requests for vitamin tests, especially for general practices with low pre-intervention rates of vitamin tests.

Table 4 Experiences with strategy components

Strategy component	Implementation	Mechanism of impact
Education	Six projects provided education for clinicians about Ivc (1, 2, 3, 4, 5, 6). Two aimed at improving communication skills (3, 5). Educational meetings were hard to schedule (3,4). Not all clinicians could be present (2, 3, 5). In one project, an e-learning method was used as a replacement (5). Using existing structures helped attendance (1, 4).	Educational meetings for clinicians were useful (1, 2, 3, 5, 6). Education helped to explain Ivc to patients (5). Information about side effects (1) and scientific evidence (6) was useful. Educational meetings helped to create a consensus (3). Clinicians fell back into old patterns because of a lack of repetition (5). Educational material was useful (4, 6). The terminology used caused resistance (1, 3).
Clinical champions	Two projects appointed clinical champions (3, 4).	Clinical champions who left the department, or worked in the laboratory instead of near patients, had less influence (3, 4).
Feedback	Five projects gave feedback to clinicians (1, 3, 4, 5, 6). One project was not able to collect feedback data per hospital promptly(2). Data collection for feedback was time consuming (4, 6). It took a while before any improvement was visible in the data (6).	Comparing their results to peers (5, 6) and seeing improvements in their own performance (6), motivated clinicians. Some clinicians' first response was scepticism towards the validity of the data (4). Clinicians did not always discuss Ivc with selected patients because they felt it would cost too much time (1).
Patient information	Seven projects used patient information (1, 2, 3, 4, 5, 7, 8). One project stimulated the spread of patient information in the hospitals that participated, but this failed (6). Some clinicians did not distribute educational material as well as they could have (2, 4, 5). The hospital that requested only digital and not printed material did not distribute it to patients (3).	Patient information was useful (3, 5). Patients liked to re-read information (7). Some clinicians felt the information would be difficult for patients (4). Clinicians noticed that the information led to more requests for Ivc (5). Some patients did not read the e-learning because they felt it would it would cost a lot of time (8).
Organisational changes	Two projects implemented organisational changes, such as improvements in ordering systems or patient records (4, 6). Changing the ordering system is difficult and slow (6).	Organisational changes helped to change previously held routines (4, 6). Routine attention helped clinicians to remember the message (6).
Financial incentives	One project tried to arrange a shared savings contract with insurers, but this could not be achieved within the time frame of the project (3).	

Organisational improvements in ordering systems or the structure of electronic patient records helped to break habits, although implementing these changes was difficult and took a long time. According to the clinicians, giving routine attention to the subject helped them to remember the message.

Lessons regarding project organization

The project leaders reported that they found it very valuable to perform a problem analysis and so achieve greater insight into the context surrounding the practice of low-value care. They used this information to tailor their de-implementation strategy to meet the needs of clinicians and patients and to tackle the barriers that they experience. The problem analysis also created support for the upcoming strategy amongst the target group. Several project leaders also thought that having a clinician in their project team was essential for recruiting hospitals or GPs and for providing the education. Lastly, some project leaders found it challenging to collect the right data for evaluating their strategy, because routine hospital or GP data was time-consuming to acquire, was not up-to-date, or provided insufficient detail to distinguish low-value from high-value care.

Discussion

Statement of the principal findings

Five out of the eight projects found a reduction of low-value care following their de-implementation strategy. Their relative reductions varied from 11.4% to 34.5%. Two of these five projects compared their results to a control group and found greater reductions in the intervention group. The remaining three out of the eight projects found no effect of the de-implementation strategy. Where measured, the projects found no negative effects of the strategy on the use of other care and patient outcomes.

A lack of time for the patient, an inability to reassure the patients, a desire to meet the patients' wishes, and the financial consequences, were frequent barriers to successful de-implementation experienced by clinicians. Both clinicians and patients were hindered by their fear of disease and their search for reassurance, and facilitated by knowledge of the harm associated with low-value care. Reducing low-value care is easier when it is well supported by the evidence and consensus amongst clinicians. The current growing consciousness that more is not always better motivated clinicians to reduce low-value care. Improved collaboration between professions, improved accessibility of the alternative to low-value care, and media attention can help to reduce low-value care.

Repeated education on the low-value care and on patient communication, and feedback were highly valued components of the de-implementation strategies. However, a lack of time to participate in the projects, and difficulties with the availability of data, hindered them. Patient information was highly valuable when the low-value care was requested by patients. Choosing the right message and content appeared to be crucial for successful patient information. Organisational changes helped to break habits.

Comparison with other literature

Five of our eight projects reduced low-value with relative reductions of 11.4% to 34.5%. The scale of these effects are comparable to the effects found in a systematic review of de-implementation studies.[2] This review found a higher rate of success; 90% of the studies found a positive effect of their intervention.[2] Publication bias and inclusion of mostly single centre studies might have contributed to the review's success rate.

Of the three projects in the current study that observed no effect of the de-implementation strategy, one did show a significant reduction in the control group, and one showed equal reductions in both the control and intervention group. Both projects reported that the low-value care they targeted received a lot of attention from clinicians nationally, which could have blurred the effect of the strategy and explain the reduction that they found across the country. A comparable dissemination process has resulted in a reduction in two out of seven low-value care practices.[17] This could suggest that dissemination of recommendations including publicity can be sufficient for reducing a part of low-value care.

The aforementioned systematic review also found that multicomponent interventions, addressing both patients and clinicians, have the greatest potential in reducing low-value care.[2] Two of our projects which targeted only patients achieved significant reductions in low-value care. This suggests that a single intervention can be effective. Furthermore, Colla and colleagues concluded that supporting clinical decisions, performance feedback, and provider education are promising strategies.[2] Our study confirms this while adding providing patient information as another. Additionally, in our practical recommendations (Panel 2), we provide conditions for the success of these strategies.

The barriers to reducing low-value care cited most frequently in literature are patient expectations, fears of malpractice lawsuits, a lack of time, and uncertainty.[18-22] In our eight projects, a fear of malpractice was not identified as a barrier. This might indicate that malpractice claims have a smaller influence in the Netherlands compared to

other countries. Other studies confirm this. Just ten percent of GPs in the Netherlands provide low-value care because of a fear of claims[23] compared to 50%-73% of the primary care physicians in the United States.[22] Fear of malpractice did not emerge at all in our study, possibly because of clinicians' socially desirable responses.

Our study is the first that combines the lessons from multiple multicentre de-implementation projects. It is complementary to the study by Stinnett-Donnelly and colleagues that described the lessons from local de-implementation projects in one medical centre.[7] They found that, apart from the cost savings, the value of a project, such as the reduction in patient harm, promotes de-implementation. They also showed that more controversial care practices among clinicians require more effort to de-implement, and that data collection could be labour intensive.[7] They suggested that support from the hospital board can prevent conflict around a reduced revenue.[7] We confirmed their findings and identified more lessons regarding both the barriers and facilitating factors, and the promising components of a de-implementation project.

Strengths and limitations

The strength of our study is the prospective design, which enabled us to observe the project leaders' experiences throughout all steps of the projects. Another strength is that we were able to combine their experiences since the projects had the same structure even though they were performed in different regions and targeted different practices. However, this diversity can also be a limitation with regard to their comparability.

The validity of our results depends on the quality of the methodology used in the eight projects. It should be noted, therefore, that looking at the effects on clinical practice, four projects did not compare their intervention to a concurrent control group. It cannot be known, therefore, to what extent their reduction in low-value care can be attributed to a national trend instead of to the de-implementation strategy adopted by the project. For this reason, our results might overestimate the effects of a de-implementation strategy.

The projects' method and time point of identifying the barriers and factors facilitating de-implementation varied. It is possible that some projects missed relevant factors. Regarding the experiences with different components of the projects, the results are based on the evaluation and subjective experiences of the project leaders. Other project leaders may have different experiences. While we accept that we may have missed some barriers, facilitating factors, and experiences, we are confident that we have identified the most important ones.

Implications for research and practice

Many hospitals and general practices in the Netherlands participated in the eight projects. This has amounted to the prevention of tens of unnecessary endoscopies and dermatology visits, hundreds of unnecessary catheters, and thousands of unnecessary vitamin and laboratory tests. The next step is to sustain these results and spread them to other hospitals in the Netherlands. The changes that our projects achieved should transcend their project setting and become a permanent part of clinical practice. However, few de-implementation projects evaluate long-term sustainability and more knowledge on this is required.[3]

The costs saved to Dutch society associated with a reduction in low-value care are hard to achieve and measure. Some savings can only be realised by reducing equipment and personnel which is hard to realise in the short term. Also, the costs associated with all potential unintended consequences of the strategy, such as an increase in the use of other care, should be monitored. Further research is necessary into the potential for cost savings.

Our findings can support clinicians and researchers in leading more successful de-implementation initiatives by providing examples of the barriers, facilitating factors, and valuable components drawn from our eight de-implementation projects. We have combined their results and experiences and translated them into practical recommendations for de-implementation projects (Box 2).

Box 2 Practical recommendations for de-implementation projects

Practical recommendations for de-implementation projects based on our evaluation are:

- To reduce only low-value care that has sufficient evidence of, and consensus amongst clinicians around that it is of low value. When the field is not ready for de-implementation, you risk provoking discussions amongst clinicians and achieve less or no effect.
- Perform a problem analysis of the low-value care practice you are aiming to reduce and study the context of your project. Then tailor the de-implementation strategy to the barriers and facilitating factors you find.

Some tips about specific parts of the strategy are:

- Educating clinicians and improving their communication skills can be useful, especially when existing meetings are used and the message is repeated.
- Provide regular feedback if data are easily available in order to motivate clinicians to reduce their use of low-value care.

- Provide information material for patients when they request the low-value care, while ensuring it is the right length, has the right message, and is distributed by clinicians.
- Promote organisational changes such as providing tools to support clinical decision-making in order to challenge previous patterns of practice.
- Be aware that a lack of time and a loss of revenue can be major barriers to de-implementation. There may be no easy solution to these.
- Focus on improving the quality and safety of care instead of saving costs. Clinicians and patients are motivated to reduce low-value care when they learn about its burden and harm.
- Be aware that reducing low-value care can evoke fear and uncertainty in clinicians and patients.

Conclusion

Successfully reducing low-value care is possible in spite of the powerful barriers opposing it. The eight de-implementation projects managed to recruit many hospitals and general practices. Five of these achieved significant results without measuring negative consequences. We offer practical recommendations for reducing low-value care successfully and preventing patient harm. These include: reduce only low-value care that is supported by sufficient evidence; tailor the strategy to counter the barriers; use repeated education and feedback for clinicians; provide carefully developed patient information when patients request the low-value care; and adapt the organisation to support the change.

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CHAPTER 8

General discussion

The main aim of this thesis was to study how low-value care can be reduced in the Netherlands. We answered three questions: 1) which low-value care exists and needs to be reduced?, 2) what factors influence the provision of low-value care?, and 3) what are promising strategies to reduce low-value care? In this chapter, I will start summarizing the findings per question and discuss the main results in light of recent literature. Next, I will discuss the broader context of our findings using three themes that are relevant in moving forward with reducing low-value care, namely 1) The difference between de-implementation and implementation; 2) Frameworks for reducing low-value care; and 3) Effects of reducing low-value care on quality and costs. Lastly, the implications of this thesis are discussed. The chapter ends with concluding remarks.

Which low-value care exists and needs to be reduced?

A first step in reducing low-value care is to identify what low-value care constitutes, and what low-value care practices are delivered. We studied the different reasons for care to be considered of low-value and found that care can be of low value because it is either medically ineffective, inefficiently provided, or unwanted by the patient (chapter 2). Because an overview of low-value care for nurses was lacking, we created a list with 66 low-value care practices for nurses, based on a systematic assessment of 125 Dutch clinical practice guidelines (chapter 3). This list can be used to create awareness on low-value care, evaluate its prevalence, and initiate de-implementation. To evaluate whether specific low-value care practices are delivered in clinical practice, we sent surveys to nurses, physicians and general practitioners. Chapter 4 shows that most nurses and physicians (62%-89%) knew that five wound care practices are of low-value. However, up to 15% of the nurses and 28% of the physicians still practiced them. The cleaning of acute wounds with something other than tap water and covering closed wounds with a bandage require further de-implementation. Chapter 5 shows that almost all general practitioners (99%) were aware that low-value care is provided in primary care. Unnecessary antibiotics, vitamin and PSA tests, and X-rays were most frequently provided. 74% of the general practitioners reported to have done something to reduce it. However, many still choose care that is not recommended, such as an X-ray of the lumbosacral spine (44%) or a vitamin B12 test (74%).

The studies that we conducted provide new opportunities to reduce low-value care in the Netherlands. In prioritizing and selecting low-value care practices for further review or even de-implementation, several criteria are proposed, such as costs, potential impact, disease burden, and sufficient evidence.[1] In our studies, we found that evaluating the underlying evidence and the actual use of the practice are crucial.

Sufficient underlying evidence is important for selecting what low-value care needs to be reduced. England's National Institute for Health and Clinical Excellence (NICE) experienced that a 'not recommended' decision requires more certainty around harm or lack of benefit than a recommendation that a practice could be used.[2] This is in part due to the challenges to withdraw a previously available option.[2] Also, discontinuing care can be hindered by fear of compromising the patients' health by missing diseases or undertreating them. It is important to only de-implement care when there is compelling evidence that this is safe, and to communicate this evidence to clinicians.

Evaluating the actual use of the low-value care in clinical practice, as we have done in chapters 4 and 5, is also important for selecting what low-value care needs to be reduced. Not all low-value care is still provided: clinicians could have stopped providing it once the evidence was known or the guideline recommended against it. Determining the prevalence of low-value care is also important because clinicians in the United States tend to pick care for de-implementation that is already hardly used.[3] In addition, when the data shows significant variation in volume between care providers, studying the cause of this variation can give insight in promising de-implementation strategies and lead to a more efficient approach in which only high-users are targeted. Data on the volume of low-value care can also be used to inform clinicians, and as a baseline against which to test the impact of policies.[4] With sufficient evidence on the lack of value of care and indications that it is still provided, the next step is to study the factors that influence the provision of this low-value care.

What factors influence the provision of low-value care?

In order to reduce low-value care, it is important to identify why it is provided by clinicians. We asked clinicians which factors influence the provision of low-value wound care and primary care. Chapter 4 shows the main factors that lead to low-value wound care: the clinicians' work environment, lack of knowledge on wound care, and presumed preferences of the patient. Repeated attention for the subject, cost-consciousness and an open culture facilitated appropriate wound care. Chapter 5 shows the main factors that lead to low-value primary care: maintaining a good relationship with the patient, the wish to offer the patient an intervention, and lack of time. For chapter 6, we asked de-implementation experts for key factors that promote low-value care on a national level. We found that the payment system, the pharmaceutical and medical device industry, a fear of malpractice litigation, biased evidence and knowledge, medical education, and a 'more is better' culture promoted low-value care. The main factors that hindered de-implementation in eight projects were a lack of time for the patient, an inability to reassure the patient, a desire to meet the patients' wishes, financial considerations, and a discomfort with

uncertainty (chapter 7). The most important facilitators were support by evidence and consensus amongst clinicians, knowledge of the side effects and of the burden of low-value care, and a growing consciousness among clinicians that more is not always better.

Our studies identified a variety of factors that influence the provision of low-value care on the level of the patient, clinician, organization, and society. Many of these factors are not new and have been described as a barrier or facilitator to implementation or de-implementation before. However, our studies provide the context that helps to develop a successful de-implementation strategy. We identified many factors related to the context in which clinicians operate, such as their work environment, local culture, financial considerations, or fear of malpractice. Yet, patient-related factors were the most frequent.

The patient's knowledge and preferences, and the patient-clinician interaction, were frequently encountered factors in our studies. Mostly as a barrier, such as when clinicians wanted to meet their patients' wishes or were unable in the limited time they have to explain that a practice is of low value. This is confirmed by literature: clinicians' communications skills and patient expectations are common barriers to de-implementation.[5] Patients tend to overestimate the benefits and underestimate the harms of care.[6] Suboptimal health literacy due to misleading information on websites and media can contribute to this.[7] The idea that more care is not always better can be hard to understand. However, when patients are aware of the potential harm, lack of benefit, and cost of low-value care, they can be a powerful facilitator of de-implementation.[8] Therefore, strategies that focus on informing patients and facilitating the clinician by improving their communication skills are important elements to reduce low-value care.

We also found that the clinicians' motivation to reduce low-value care was an important facilitator. The lack of value and potential harms of low-value care appeal to their drive to provide the best care for their patients. Other studies also show that clinicians feel that low-value care is a significant problem and that they are motivated to reduce it.[9 10] Most clinicians in the United States even embrace their responsibility in reducing costs.[11] Many are aware of the Choosing Wisely campaign and the recommendations in their specialty.[12 13] However, knowledge and motivation is not always enough to change. There is a gap between intention and behaviour.[14] We tend to take a large part of our decisions more intuitively and habitual, instead of a rational approach in which pros and cons are balanced, leading to deviation from the ideal evidence-based practice.[15 16] Sometimes, removal of contextual barriers is not enough, and more effort is needed to change the behaviour of clinicians and

patients. A review identified barriers and facilitators to de-implementation related to clinician attitude.[5] Barriers that the authors found were the desire to meet expectations of the patient, fear of medical errors, a defensive attitude, and habit.[5] Facilitators were a desire to restrict unnecessary care, a sense of ownership, and public commitment to change.[5] This outcome supports our finding that clinicians can be motivated to reduce low-value care, but can be limited in this by several internal and external factors.

Because of these internal factors related to the patient's or clinician's internal motivation, beliefs, intentions and goals, de-implementation science can benefit from insights from psychology and behavioural economics. To support this, a tool is developed that incorporates these insights. The Theoretical Domains Framework is based on 33 psychological theories and describes factors that impact clinician behaviour.[17] This tool can help to identify psychological factors that hinder or facilitate de-implementation. When specific factors are identified, a behavioural change technique that is judged to be effective for these factors can be applied.[18]

What are promising strategies to reduce low-value care?

We studied how we could overcome the factors that influence low-value care and what is needed to reduce it. In chapter 2, we hypothesized that whether low-value care is ineffective, inefficient or unwanted can provide guidance in choosing the most promising strategy for its de-implementation: limit, lean or listen. Also, we asked general practitioners what they need in order to reduce low-value care. Chapter 5 shows that general practitioners need more time for the patient and more support to inform them, such as improved brochures. Furthermore, they need more knowledge on what is low-value care and recommend reducing the amount of biased information on care in the media and from commercial clinics. In chapter 7, we evaluated the strategies of eight de-implementation projects and found that successfully reducing low-value care is possible in spite of the powerful barriers opposing it. Five out of the eight projects resulted in a reduction of low-value care. Tailoring the strategy to counter the barriers; using repeated education and feedback for clinicians; providing patient information when patients request the low-value care; and changing the organisation to support the change are promising strategy components to reduce low-value care.

There is not one de-implementation strategy that works for all low-value care practices. The strategy should always be tailored to the context of the care practice and the barriers and facilitators. Nevertheless, some general lessons regarding developing a de-implementation strategy can be derived from these studies. Practical recommendations for de-implementation projects are already stated in

chapter 7. Below, I discuss the most promising strategies according to our studies: clinician education and feedback, patient education, and organizational changes.

We found that educating clinicians on the lack of benefit and the harms of low-value care, and on the higher-value alternative, is a valuable component of a de-implementation strategy. Education can come in many different forms, such as educational materials or meetings, that are delivered passively or actively, and provided once or multiple times. It is often combined with providing feedback, which can create a sense of urgency and motivate clinicians to improve. However, education and feedback alone are not always effective,[19] especially for changing complex behaviours[20] There are three common causes for this.[19] Firstly, education is not the right solution if a knowledge deficit is not the problem. Secondly, the effect of a single session quickly fades, especially if it is passive, such as a non-interactive presentation or mailing of educational materials.[21] Thirdly, education and feedback alone do not take away any of the barriers that might be in place. They can, however, be a very valuable component of a strategy that at the same time focuses on removing the barriers for de-implementation. Most studies that successfully reduced low-value nursing practices used an educational component to their strategy.[22] The effectiveness of educational meetings is generally small, but can be improved by increasing attendance, using mixed interactive and didactic formats, and focusing on serious outcomes.[20] Feedback also generally leads to small but potentially important improvements, and it may be more effective when there is much room for improvement, the source is a colleague, it is provided more than once, it is delivered both verbal and written, and it includes explicit targets and an action plan.[23]

Targeting the patient should always be considered in designing a strategy to reduce low-value care, since clinicians often struggle with informing and reassuring the patient in a limited amount of time. Patient directed strategies such as information material for patients could help to reduce their anxiety for missing a diagnosis, reduce the risk of a patient's claim, or reduce the time needed for counselling the patient. A recent review included 22 studies that engaged patients within the patient-clinician interaction and found that these interventions are effective in reducing low-value care.[8] Stimulating shared decision making can also help to reduce low-value care,[8 24] specifically care of which the value depends on the individual patients' preference (described as 'unwanted' in chapter 2). An example is reducing medication use in the elderly.[25] It can also be effective to target patients outside the patient-clinician interaction, for example a letter sent to long-term benzodiazepine users.[26] Mass media can be used to inform large numbers of patients. For example, the reduction of unnecessary radical mastectomy and hysterectomy only really took off after these themes were discussed in mass media and patients initiated the conversation about this topic.[27 28]

Lastly, changes in the organizational structure and in policy could be helpful in achieving a sustained reduction of low-value care. This can vary from providing more time for the consult, and modifications in the order entry system, to a different payment system. Based on the factors described in chapter 6, a promising strategy could be to remove the pressure on clinicians to generate volumes of care. This could be done with for example fixed budget contracts between providers and insurers, or value-based payment instead of volume-based payment. System focused strategies such as standardization, automation and forcing functions are generally more effective than non-binding strategies such as education.[19] A study in Canada showed that eliminating the reimbursement of a low-value care practice was significantly more effective than creating awareness alone.[29] A review found that restricting coverage and reimbursement of selected medications can decrease their use without increasing the use of other health practices.[30] However, there are limitations to these system focused strategies. We theorized in chapter 2 that forcing changes are not appropriate for practices that are of low value in one situation and of high value in another. In addition, policy changes are generally blunt and can lead to unintended consequences such as underuse or waiting lists. Lastly, these changes can be hard and sometimes even impossible to achieve. However, some barriers, such as financial considerations or the influence of the industry, can only be removed with large-scale and structural efforts such policy changes, healthcare reform, or a culture change. This is very challenging, but if we do manage to achieve such changes, they have the potential to facilitate the reduction of many low-value care practices.

The difference between de-implementation and implementation

Since in this thesis de-implementation of low-value care is approached as a new process, the question arises whether and how it differs from implementation of higher-value care. Both de-implementing established care that is proven to be of low-value, and implementing new innovations require a change in behaviour and process. Here I discuss the differences between de-implementation and implementation.

It is likely that the relevance of certain barriers is different for de-implementation and implementation. Both clinicians and patients have an internal drive towards more care, which operates as a barrier in trying to reduce low-value care. As mentioned before, several psychological and cognitive mechanisms cause people to want more care and clinicians to deliver more care.[16 31-33] One such mechanism is the human tendency to avoid any risks.[16] Also, patients and clinicians tend to overestimate the benefits and underestimate the harms of care.[6 33] The therapeutic illusion strengthens the belief that care is more effective than it actually is.[34] For example, a patient with sinusitis who feels better after using antibiotics will think that the antibiotics have

helped, even though the patient would have felt equally well without antibiotics. In addition, the harms from missing a rare diagnosis are far more clear than the harms of overtesting.[35] A New York Times columnist described his experiences with a CT scan for low back pain that picked up an unexpected kidney mass, possibly cancer.[36] After a partial nephrectomy it turned out to be nothing serious. Instead of recognizing that he fell into a cascade of unnecessary care, he was relieved and recommended others to get themselves tested.[36] These subconscious mechanisms that are specific to de-implementation result in barriers regarding fear of disease, discomfort with uncertainty, and the preferences of the patient. Clinicians' fear of malpractice complaints and loss of revenue are also more likely to be relevant for de-implementation than implementation.[37] Other researchers also suggest that the factors described above are characteristic to de-implementation.[38 39] As the factors that hinder de-implementation are likely to be different from implementation, the required strategy is different as well.

It is increasingly stated that de-implementation not only faces different barriers in relation to implementation, it also is more challenging.[40] This is supported by a theoretical study that showed that physicians will adopt new treatments more readily than they abandon existing ones.[41] Participating in a de-implementation project is less appealing than participating in an implementation project. A preference for the familiar, shame at having used a discredited practice, and regret at leaving behind the sunk costs of training and equipment can contribute to this.[42] As an example: robot-assisted surgery using the Da Vinci system was already implemented and used for prostate cancer surgery, without adequate evidence.[43] As quickly as it was adopted, de-implementing it will be many times more difficult for hospitals and clinicians that have invested in such a robot.

The distinction between implementation and de-implementation fades when the low-value care practice is to be substituted by a more valuable practice, compared to the low-value care practice being substituted by providing no or less care or a watch and wait policy. Several projects described in chapter 7 have offered a substitute to patients, such as an e-learning and exercise instructions. A substitute is a known strategy to decrease the frequency of other behaviour, but the theoretical basis for this strategy is lacking.[44] The question arises where de-implementation of low-value care ends and implementation of high-value care begins. It is likely that the change could be approached and treated as de-implementation if the care practice is replaced by less intensive or less invasive care. In the case where the change is associated with the aforementioned fear and uncertainty, patient preferences, and financial considerations, the project could benefit from de-implementation knowledge.

Frameworks for reducing low-value care

When the use of low-value care does not decrease through the diffusion of evidence and incorporation in guidelines, active de-implementation is needed. But how do you know where to start? Whereas de-implementation research is still in its early days, there has been extensive research on the process of implementation. Over the years, many implementation theories and models have been developed to explain the process and provide guidance.[45] Because of a lack of appropriate de-implementation models, we have used implementation theory in this thesis, particularly the Implementation of change model from Grol and Wensing.[46] In our different studies, we found no indications that this model was not applicable to de-implementation. Other de-implementation studies have applied implementation theories and models with success as well.[47] Based on the Grol and Wensing model and our experiences, we wrote a practical step-by-step de-implementation guide in Dutch that supports successful de-implementation.[48]

Recently, several new models for de-implementation have been proposed, such as the model of Niven and colleagues that aims to facilitate de-implementation,[49] the Taking action on overuse framework that guides engagement of providers and patients,[50] the Framework for overuse of care that shows the factors that influence the patient-clinician interaction,[38] and the Choosing Wisely De-implementation Framework (CWDIF).[51] The CWDIF and the model of Niven provide guidance for the entire process of de-implementation.[49] [51] Their models are similar and describe essentially the same steps that are known for implementation, with recommendations within several steps that are specific to de-implementation. The CWDIF however contains the most recent knowledge and incorporates theory and tools from behavioural science. This framework is shown in figure 1. Experience with these models is still scarce.[47]

Effects of reducing low-value care on quality and costs

The goal of reducing low-value care is ultimately to improve the quality and safety of care and the sustainability of our healthcare systems. Theoretically, reducing low-value care reduces the risk of harm, burden for the patient, and the costs that are associated with it, and creates room for more valuable care. However, it might also have different outcomes in clinical practice.

Reducing low-value care can have several unintended and unwanted consequences for patients.[52] Firstly, it can lead to an increase in the use of other care, because clinicians and patients fill the gap that was left behind. This can be convenient for solving waiting lists or underuse of high-value care. However, it can also lead to an increase in other low-value care. For example, a reduction in unnecessary CT scans

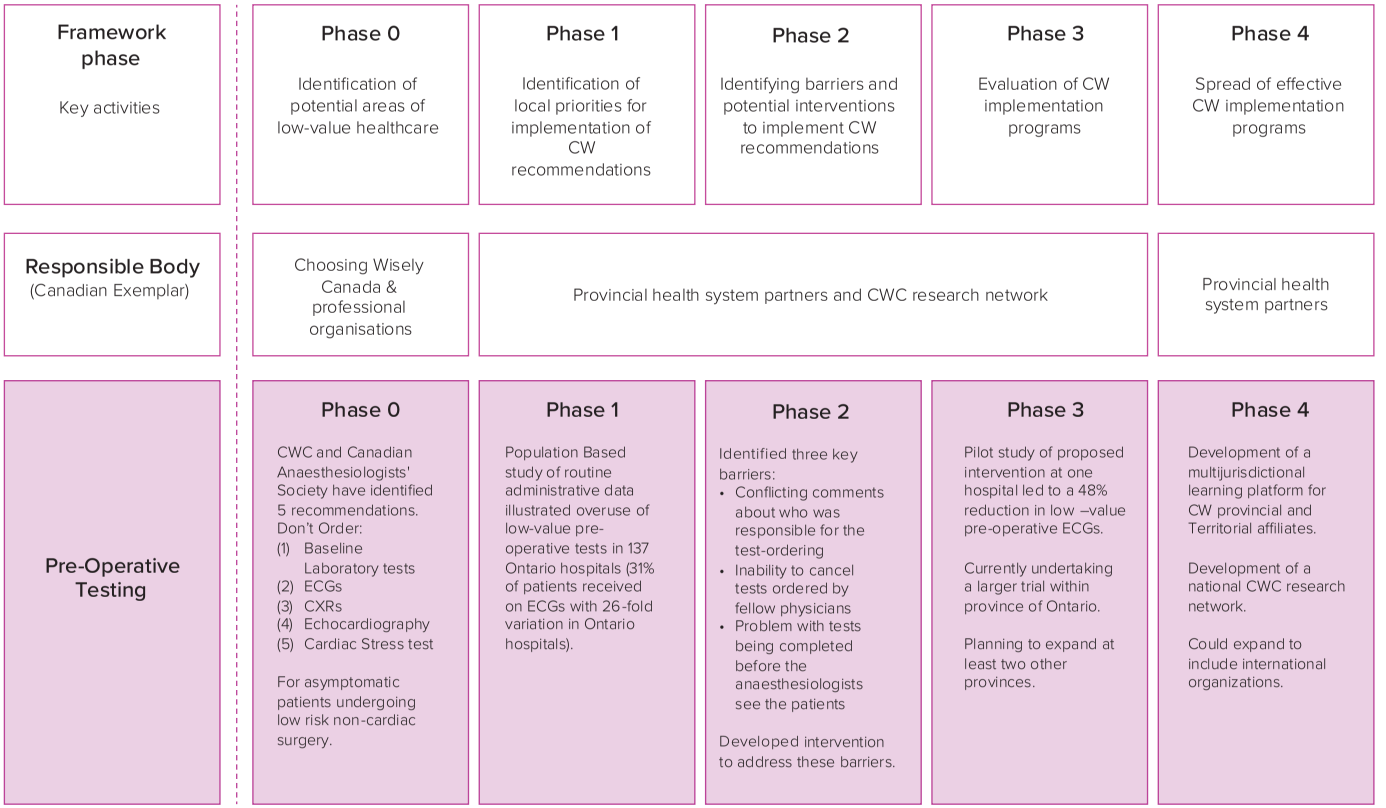

Figure 1 Choosing Wisely De-Implementation Framework with preoperative testing example.[51]

can be accompanied by an increase in other diagnostic tests, when clinicians feel the need to compensate, or when patients request another test instead of a CT scan, either intentional or unintentional.[39] Secondly, it can lead to underuse of high-value care. For example, reducing the inappropriate use of urinary catheters can also lead to a reduction in the appropriate use of urinary catheters, when clinicians focus on a limited use of urinary catheters instead of an appropriate use. Lastly, reducing low-value care that is wanted by patients can decrease the patients' satisfaction or trust in their clinician. This can put pressure on the patient-clinician relationship and reduce the patients' engagement in their care.[39] In order to make sure that we are indeed improving the quality and safety of care, we need to monitor the potential unintended consequences that a de-implementation strategy can cause. Where possible, the strategy should anticipate on expected unintended consequences.

One of the reasons that more countries are investing in de-implementation initiatives is the rising healthcare costs. However, it is questionable whether reducing low-value care can reduce healthcare costs. Less testing, treatments and procedures does not immediately result in significant savings. In order to sustainably reduce costs, a structural reduction of material and personal costs is required. This a difficult process and large reorganizations can take up to multiple years costing lots of money. The healthcare providers' earnings reduce instantly after de-implementation, while their expenses take longer to reduce. Fixed budget contracts that run for multiple years between healthcare insurers and providers can give them time to cut expenses.[53] Without such fundamental changes, it is likely that the resources that become available are used for other healthcare practices.

A third issue regarding the effect of de-implementation is that, as with implementation, there is a risk that the effect diminishes after the strategy ends and clinicians and patients fall back into old patterns. It is unknown how long the strategy components, such as education and feedback, should be continued to achieve a sustained effect. It is often necessary to adapt the strategy in response to changes in its setting.[54] Factors that are suggested to influence sustainability are characteristics of the strategy and the de-implementation leaders, contextual factors, and organizational factors.[54] It seems likely that strategy components that can be incorporated in daily practice, such as modifications of the order entry system, have a longer lasting effect, although this has not yet been studied. Few de-implementation projects evaluate long-term sustainability and more knowledge on what contributes to sustainable effects is required.[55]

Apart from these issues regarding the effects of de-implementation initiatives, our studies have had significant implications in the Netherlands. The Dutch Nurses Association started a campaign with the 66 low-value care practices for nurses, called *'Better not to'* ('Beter laten'). The association developed infographics, collected success stories on addressing low-value care in clinical practice, and launched a website. The campaign brought the list with 66 practices to the attention of nurses throughout the Netherlands. Several hospitals have started to review the list and assess what practices need further de-implementation. Consequently, one hospital started a project to reduce the use of auscultation to verify the position of a feeding tube. Many more hospitals and primary care practices participated in the eight projects described in chapter 7. This has prevented tens of unnecessary endoscopies and dermatology visits, hundreds of unnecessary catheters, and thousands of unnecessary vitamin and laboratory tests. A follow-up dissemination project is currently being rolled out. Lastly, the physicians and researchers involved in the *To do or not to do?* program have published several articles and blogs in non-scientific media, have been interviewed for national radio and television and gave many presentations and workshops throughout the country to create awareness and spread knowledge on reducing low-value care amongst clinicians and other healthcare stakeholders. We have noticed that an increasing number of stakeholders is motivated and anticipate that the medical field is ready to further take actions towards the de-implementation of low-value care.

Implications

In this paragraph, I will discuss the implications that our findings might have and suggest what actions could be taken to further reduce low-value care in the Netherlands.

In the light of the enthusiasm amongst clinicians and other stakeholders, their willingness to step up to the challenge, and the increasing media attention and awareness that change is required to prevent harm, more de-implementation initiatives should be started and facilitated. Our Dutch de-implementation guide[48] or other de-implementation models, such as the CWDIF,[51] can help with the process of selecting a low-value care practice, and developing and evaluating a strategy. Several stakeholders should take their responsibility in making de-implementation initiatives a success.

Clinicians should take the lead in reducing low-value care. They have the medical knowledge to determine together with the patient when care is of low or of high value. They are also motivated to provide the best care for their patients and have the responsibility to do no harm. Despite that reducing low-value care takes time,

can decrease their revenue, and can lead to dissatisfied patients, there are clinicians that are willing to take the lead and spread the message to their peers. An important opportunity to reduce and prevent low-value care is in the development of clinical practice guidelines, by clearly stating what is discouraged, not recommending practices that go beyond existing evidence,[56] and keeping away from the influence of the industry. Also, medical education should not only reward thoroughness, but also the careful use of treatments and testing. A program that is focused on educating and empowering medical students in limiting the use of low-value care shows promising results.[57]

Medical societies that represent groups of clinicians could activate their constituency and should be open towards new evidence that shows an established practice is of low-value. Some have already actively participated and created lists of low-value tests, treatments and procedures commonly used in their field. However, international research shows they tend to select practices of other specialties or with an already low prevalence, and avoid items that are income-generating for their specialty.[58-60] Nevertheless, their participation should be encouraged and is the start of a conversation that can evolve and spread to all healthcare stakeholders.

Policy makers in the government or hospitals should support initiatives for reducing low-value care. They might find the ripple effect of several bottom-up initiatives too slow and be tempted to use more forced measures such as restrictions or financial incentives. As described earlier in this discussion, although these measures can be very effective in reducing the use of low-value care, they need to be used with caution. Policy interventions should preferably not restrict the clinician, but should remove barriers such as fear of claims to support them to deliver high quality care to their patients. Clinicians value their autonomy and others trying to control their behaviour can evoke a tendency to resist change.[61] Once they feel threatened, clinicians become more entrenched in their original beliefs and there is less room for an open debate.[61] Support from clinicians is therefore key for implementing policy interventions.

Fields in which policy measures can be considered are in the payment structure, such as capitation, in stopping the reimbursement of practices with strong evidence that they are of low-value for a clearly defined group of patients, and in restricting industry ties, for example in the development of clinical practice guidelines. These reforms will require careful consideration of unintended consequences, so that our efforts to limit low-value care do not foster underuse of high value care. More research is needed to determine the best policy measures to bring down the factors that promote low-value care.

Healthcare insurers in the Netherlands are expected to engage in strategic purchasing, thereby encouraging healthcare providers to compete on quality and costs. In theory, they can be a strong stimulator to reduce low-value care. In practice, insurers purchase only a limited amount of care selectively.[62 63] In addition, selective purchasing is not the right strategy for practices that are of low value in one situation and of high value in another. There are other opportunities for insurers to facilitate clinicians in reducing low-value care. They can provide data on the volume and variation of low-value care in the Netherlands, which can give insight in priorities for de-implementation, can stimulate initiatives, and enable a focus on high-users. They can also close fixed budget contracts with healthcare providers that run for multiple years, to give providers more time to reorganize and reduce their expenses for sustainable change. This, together with other structural changes such as giving clinicians a fixed salary instead of a fee for service, is rolled out in two Dutch hospitals.[53 64] After these changes, the hospitals provided less care without negative consequences on the quality of care.[64] Although insurers sometimes suffer from the image that they mainly focus on costs, they are in a valuable position to contribute to the challenge of reducing overuse.

Patients are both victims and drivers of low-value care. As they need help to make the right choices, they are mostly on the receiving end of initiatives to reduce low-value care. Patient-targeted interventions are information material or improving clinicians' communication skills. However, patients should take action to reduce their chance of receiving low-value care. They should educate themselves on their symptoms and treatment options using reliable information sources, such as the Dutch health information website thuisarts.nl (home doctor). This website is developed by general practitioners and is proven to reduce the consultation rate.[65] Increased participation of well-informed patients can lead to more appropriate care. For example, training clinicians in shared decision-making led to less prescription of antibiotics for acute respiratory tract infections.[24] Patient advocacy organizations should educate the patients that they represent and spread the message that more care is not always better.

Further research

Our studies add to the knowledge on low-value care and de-implementation in the Netherlands, and can also be of interest internationally. We have identified areas for research which can further increase this knowledge. First, there is more guidance needed to select the strategy that is right for the context in which the low-value care is provided and the specific factors that prevail. The CWDIF already provides guidance and recommends to consider five criteria, including understanding the mechanism of action of strategy components and reviewing their evidence.[51] However, more knowledge regarding what strategy works for what factor or

combination of factors can help to compose the most effective strategy. Improved reporting of the effects and process evaluations of de-implementation projects can contribute to this. Secondly, knowledge on how we can achieve sustained effects on the long term is lacking. Evaluating the effects long after the strategy has ended and the factors that have contributed to this should be a part of future de-implementation projects. Finally, we need more knowledge regarding the spread of de-implementation strategies that have proven to be successful in one setting, to other settings.[66] It is unknown what contributes to this spread and how the strategy can be adapted to the local context while keeping the elements that lead to success.

Conclusion

We studied which low-value care exists and needs to be reduced, what factors influence the provision of low-value care, and what promising strategies are to reduce it. Based on our results, I conclude that low-value care exists in the Netherlands, and that it can be reduced using the right approach. Our studies offer several concrete opportunities and guidance for this. The 66 low-value care practices for nurses can be a starting point for further review. Also, unnecessary antibiotics, vitamin and PSA tests, and X-rays occur frequently in the primary care practice, which warrants further research. For low-value wound care, X-rays of the lumbosacral spine, vitamin B12 tests, and the eight practices from chapter 7, we identified barriers and facilitators and promising strategies that can help to set up projects that aim to reduce those practices.

We have also contributed to the knowledge base on low-value care and de-implementation. We found that the concept of low-value care is broad and can include ineffective, inefficient and unwanted care. We identified a variety of factors that hinder or facilitate de-implementation on the level of the patient, clinician, organization, and society. Overall, clinicians were motivated to reduce low-value care, but they experienced barriers related to the patient and the organizational and financial context in which they operate. Lastly, we found that successfully reducing low-value care is possible in spite of the powerful barriers opposing it. Promising strategy components are repeated education and feedback for clinicians, patient information, and changes in the organisation. Tailoring the strategy to counter the contextual barriers to change is essential for success.

During these studies, we also tried to make a change in clinical practice by getting the word out, giving (future) de-implementation leaders the opportunity to start a project, and creating a platform for clinicians and other stakeholders that are willing

to start the conversation on this. Despite the many challenges to reducing low-value care that this thesis has identified, it is very encouraging to have noticed over the last years that the awareness on and interest in this subject have increased. More and more clinicians, healthcare insurers, medical societies, healthcare providers, politicians, and government organizations in the Netherlands have expressed their willingness to contribute. Actual changes however have been slow. We must seize this opportunity and initiate de-implementation projects, led by clinicians and facilitated by insurers, the government, and other stakeholders. More experience, success stories and leaders on de-implementation will further spur the movement toward achieving more with less.

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Summary

Some patients receive care that does not benefit them. This so-called low-value care is described as care that is proven to provide no benefit to the patient, or disproportionate low benefit in relation to its harms, costs, alternatives and the preferences of the patient. Since low-value care may cause harm and wastes limited resources, reducing it will improve the quality and safety of care. We aimed to study how low-value care can be reduced in the Netherlands.

First, it is necessary to identify what low-value care constitutes, and which low-value care is still used in clinical practice. The first question that this thesis addressed is therefore: 'Which low-value care exists and needs to be reduced?'. To answer this question, we studied the different reasons for care to be considered of low value (chapter 2), created a list of nursing low-value care practices (chapter 3), and evaluated whether specific low-value care practices are still provided (chapters 4 and 5). Prior to reducing low-value care, also called de-implementation, it is vital to understand why low-value care is provided and what barriers need to be countered. Therefore, the second question of this thesis is: 'What factors influence the provision of low-value care?'. To answer this question, we studied factors that influence the provision of low-value wound care and primary care (chapters 4 and 5), factors that promote low-value care on a national level (chapter 6), and factors that influenced eight de-implementation projects (chapter 7). Lastly, there is little knowledge on how we can overcome these barriers and successfully reduce low-value care. The last question that this thesis addressed is: 'What are promising strategies to reduce low-value care?'. To answer this question, we unfolded the promising strategies for three types of low-value care (chapter 2), asked general practitioners what they need in order to reduce low-value care (chapter 5), and evaluated the strategies of eight de-implementation projects (chapter 7).

Chapter 2 proposes three types of low-value care, based on a literature scan and interviews with experts. We hypothesize that care can be of low-value because it is ineffective, inefficient or unwanted. We argue that these three types differ in their most promising strategy for de-implementation and that our typology gives direction in choosing whether to limit, lean or listen.

Chapter 3 provides a systematic assessment of low-value nursing care in Dutch clinical practice guidelines. The list with 66 low-value care practices for nurses can be used to create awareness, to further review their prevalence, and initiate de-implementation. The majority of the practices is a new target for de-implementation.

Chapter 4 describes a survey and interview study that shows that the majority of the nurses and physicians (62%-89%) knew that five wound care practices are of low-value. However, up to 15% of the nurses and 28% of the physicians still provide these practices because they experience barriers in their work environment, lack knowledge on wound care, and presume that the patient prefers these practices. Targeting these barriers is necessary for further de-implementation.

Chapter 5 describes a survey study that found that almost all general practitioners (99%) were aware that low-value care is provided. Unnecessary antibiotics, vitamin and PSA tests, and X-rays were the most frequent. 74% of the general practitioners reported to have done something to reduce low-value care. However, many still choose care that is not recommended, such as an X-ray of the lumbosacral spine (44%) or a vitamin B12 test (74%). Their main reasons for this were to maintain a good relationship with the patient and a lack of time. In order to reduce low-value care, general practitioners need more time for the consult, more knowledge, and more support in informing patients, such as information campaigns or materials.

Chapter 6 describes an interview study with de-implementation experts from the Netherlands, Canada and the United States. We identified key factors that promote low-value care on a national level: the payment system, the pharmaceutical and medical device industry, fear of malpractice litigation, biased evidence and knowledge, medical education, and a 'more is better' culture. These factors are key in all three countries, although there are several differences in their payment structure, industry and malpractice policy, and culture regarding overuse.

Chapter 7 reports a process evaluation regarding the effects, barriers and facilitators, and effective components of eight regional de-implementation projects. Five out of the eight projects resulted in a reduction of low-value care. The most important barriers were a lack of time, an inability to reassure the patient, a desire to meet the patients' wishes, financial considerations, and a discomfort with uncertainty. The most important facilitators were support amongst clinicians, knowledge of the harms of low-value care, and a growing consciousness that more is not always better. Repeated education and feedback for clinicians, patient information material, and organizational changes were valued strategy components.

Since in this thesis de-implementation is approached as a new process, the question arises whether and how it differs from implementation. Based on our studies and recent literature, I state that the same process can be followed for both, including an assessment of the barriers and facilitators and subsequent tailoring the strategy. However, the barriers and facilitators that are encountered are likely to differ. Factors

such as fear of disease, discomfort with uncertainty, preferences of the patient, fear of malpractice lawsuits and loss of revenue are more often relevant for de-implementation than for implementation. Even when we succeed in overcoming these barriers and reduce the use of low-value care, several mechanisms can impair the effect of a de-implementation project on the quality and safety of care. Reducing low-value care can for example lead to an increased us of other, potentially low-value, care. We therefore need to monitor the potential unintended consequences of the strategy and its long-term effects. Apart from these impairments, our studies have had significant implications in the Netherlands. Many hospitals and general practitioners have participated and reduced their use of unnecessary endoscopies, dermatology visits, catheters, and laboratory tests. In addition, the awareness of and interest in the subject have increased. More research is needed to better tailor a de-implementation strategy, achieve sustained effects, and successfully spread it throughout the Netherlands. In order to further reduce low-value care in the Netherlands, I recommend that more de-implementation initiatives should be started by clinicians and facilitated by policy makers and healthcare insurers. More experience, success stories and leaders on de-implementation will further spur the movement toward achieving more health with less care.

Samenvatting

Sommige patiënten krijgen zorg waar ze geen baat bij hebben. Van deze zogenaamde niet-gepaste zorg is bewezen dat het geen toegevoegde waarde heeft voor de patiënt, of onevenredig weinig waarde in verhouding tot de nadelen, kosten, alternatieven en de voorkeuren van de patiënt. Voorbeelden zijn urinekatheters die onnodig lang blijven zitten, MRI's bij aspecifieke lage rugklachten zonder alarmsymptomen, of antibiotica bij een verkoudheid. Aangezien niet-gepaste zorg de patiënt wel blootstelt aan risico's en bijwerkingen, en tijd en geld kost, zal het verminderen ervan de kwaliteit en veiligheid van de zorg verbeteren. We hebben onderzocht hoe niet-gepaste zorg in Nederland verminderd kan worden.

Ten eerste is het nodig om in kaart te brengen wat niet-gepaste zorg is en welke niet-gepaste zorg in de praktijk nog wordt toegepast. De eerste vraag die in dit proefschrift aan de orde kwam is: 'Welke niet-gepaste zorg is er en moet worden teruggedrongen?'. Om deze vraag te beantwoorden, hebben we verschillende redenen onderzocht om zorg als niet-gepast te beschouwen (hoofdstuk 2), een lijst opgesteld van niet-gepaste verpleegkundige handelingen (hoofdstuk 3) en geëvalueerd of specifieke niet-gepaste zorgpraktijken nog worden toegepast. (hoofdstukken 4 en 5). Alvorens niet-gepaste zorg terug te dringen, oftewel deïmplementeren, is het van belang om te begrijpen waarom het wordt verleend en welke belemmeringen moeten worden weggenomen. Daarom is de tweede vraag van dit proefschrift: 'Welke factoren zijn van invloed op het verlenen van niet-gepaste zorg?'. Om deze vraag te beantwoorden, hebben we factoren onderzocht die van invloed zijn op het aanbieden van niet-gepaste wondzorg en eerstelijnszorg (hoofdstukken 4 en 5), factoren die niet-gepaste zorg bevorderen op nationaal niveau (hoofdstuk 6), en factoren die deïmplementatieprojecten beïnvloeden (hoofdstuk 7). Ten slotte is er weinig kennis over hoe we deze barrières kunnen overwinnen en met succes niet-gepaste zorg kunnen verminderen. De laatste vraag die in dit proefschrift aan de orde kwam, is: 'Wat zijn veelbelovende strategieën om niet-gepaste zorg te verminderen?'. Om deze vraag te beantwoorden, onderzochten we de veelbelovende strategieën voor drie typen niet-gepaste zorg (hoofdstuk 2), vroegen we huisartsen wat ze nodig hebben om niet-gepaste zorg te verminderen (hoofdstuk 5), en evalueerden we de strategieën van acht deïmplementatieprojecten (hoofdstuk 7).

Hoofdstuk 2 stelt drie typen van niet-gepaste zorg voor, gebaseerd op een literatuurscan en interviews met experts. Onze hypothese is dat zorg niet-gepast kan zijn omdat het ineffectief, inefficiënt of ongewenst is. We stellen dat deze drie typen ieder een andere aanpak voor deïmplementatie vragen en dat onze typologie richting geeft bij de mogelijkheden om niet-gepaste zorg te ontmoedigen (limit), de zorg efficiënter te organiseren (lean), of beter naar de patiënt te luisteren (listen).

Hoofdstuk 3 beschrijft hoe we systematisch Nederlandse richtlijnen screenden op zoek naar niet-gepaste verpleegkundige zorg. De lijst met 66 niet-gepaste verpleegkundige zorghandelingen kan worden gebruikt om bewustwording te creëren over niet-gepaste zorg. Ook kan onderzocht worden of ze nog voorkomen in de praktijk en kan een de-implementatieproject geïnitieerd worden. Het merendeel van de 66 zorghandelingen was nog niet bekend als onderwerp voor de-implementatie.

Hoofdstuk 4 beschrijft een vragenlijst- en interviewstudie waaruit blijkt dat de meerderheid van de verpleegkundigen en artsen (62%-89%) wist dat vijf wondzorghandelingen niet-gepast zijn. Echter, tot 15% van de verpleegkundigen en 28% van de artsen gebruikt ze nog steeds omdat ze barrières ervaren in hun werkomgeving, een gebrek aan kennis hebben over wondverzorging en aannemen dat de patiënt deze handelingen prefereert. Het aanpakken van deze belemmeringen is noodzakelijk voor verdere deïmplementatie.

Hoofdstuk 5 beschrijft een vragenlijstonderzoek waaruit bleek dat bijna alle huisartsen (99%) wisten dat er niet-gepaste zorg wordt geleverd. Onnodige antibiotica, vitamine- en PSA-testen en röntgenfoto's kwamen het meest voor. 74% van de huisartsen gaf aan iets te hebben gedaan om niet-gepaste zorg te verminderen. Velen kiezen echter nog steeds voor zorg die niet wordt aanbevolen, zoals een röntgenfoto van de lage rug (44%) of een vitamine B12 bepaling (74%). De belangrijkste redenen hiervoor waren het houden van een goede relatie met de patiënt en een gebrek aan tijd. Om niet-gepaste zorg te verminderen hebben huisartsen meer tijd nodig voor het consult, meer kennis, en meer ondersteuning bij het informeren van patiënten, zoals voorlichtingscampagnes of informatiematerialen.

Hoofdstuk 6 beschrijft een interviewonderzoek met deïmplementatie-experts uit Nederland, Canada en de Verenigde Staten. We identificeerden de belangrijkste factoren die leiden tot niet-gepaste zorg op nationaal niveau: het betalingssysteem, de farmaceutische industrie en de industrie voor medische hulpmiddelen, angst voor klachten en rechtsvervolging, onbetrouwbaar onderzoek en eenzijdige kennis, de medische opleiding en een 'meer is beter'-cultuur. Deze factoren zijn belangrijk in alle drie de landen, hoewel er onderling verschillen zijn in hun betalingssysteem, beleid met betrekking tot de industrie, en cultuur.

Hoofdstuk 7 rapporteert een procesevaluatie met betrekking tot de effecten, belemmerende en bevorderende factoren, en effectieve componenten van acht regionale deïmplementatieprojecten. Vijf van de acht projecten hebben geleid tot een vermindering van niet-gepaste zorg. De belangrijkste belemmeringen waren

een gebrek aan tijd, een onvermogen om de patiënt gerust te stellen, het willen voldoen aan de wensen van de patiënt, financiële overwegingen en ongemak met onzekerheid. De belangrijkste bevorderende factoren waren steun door clinici, kennis van de nadelen van niet-gepaste zorg en de groeiende aandacht voor het feit dat meer zorg niet altijd beter is. Herhaalde scholing en feedback voor clinici, patiëntvoorlichtingsmateriaal en organisatorische veranderingen waren waardevolle strategiecomponenten.

Aangezien in dit proefschrift deïmplementatie wordt benaderd als een nieuw proces, rijst de vraag of en hoe het verschilt van implementatie. Op basis van onze studies en recente literatuur stel ik dat hetzelfde proces kan worden gevolgd in beide gevallen, inclusief een inventarisatie van de belemmerende en bevorderende factoren en vervolgens het op maat maken van de strategie. De belemmerende en bevorderende factoren zelf zullen echter waarschijnlijk verschillen. Factoren als angst voor ziekte, ongemak met onzekerheid, voorkeuren van de patiënt, angst voor klachten en productieverlies zijn vaker relevant voor deïmplementatie dan voor implementatie. Zelfs als we erin slagen deze barrières te overwinnen en het gebruik van niet-gepaste zorg te verminderen, kunnen verschillende mechanismen het effect van een de-implementatieproject op de kwaliteit en veiligheid van de zorg beperken. Het verminderen van niet-gepaste zorg kan bijvoorbeeld leiden tot een verhoogd gebruik van andere, mogelijk niet-gepaste, zorg. Het is daarom belangrijk om de mogelijke onbedoelde gevolgen van de strategie en de langetermijneffecten ervan te monitoren. Afgezien van deze beperkingen hebben onze onderzoeken veel teweeg gebracht in Nederland. Veel ziekenhuizen en huisartsen hebben deelgenomen en hebben het gebruik van onnodige gastroscopieën, nacontroles, katheters en laboratoriumtests verminderd. Bovendien is het bewustzijn van en de belangstelling voor het onderwerp toegenomen. Er is meer onderzoek nodig om een deïmplementatiestrategie beter af te stemmen op de context, de behaalde resultaten te behouden, en deze door heel Nederland te verspreiden. Om niet-gepaste zorg in Nederland verder terug te dringen, raad ik aan om meer deïmplementatie-initiatieven te starten, geleid door clinici en ondersteund door beleidsmakers en zorgverzekeraars. Meer deïmplementatie-ervaring, succesverhalen en leiders zullen een beweging in gang zetten naar meer gezondheid met minder zorg.

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Data management

This thesis used literature, clinical practice guidelines, interviews and surveys as data sources. For all studies, ethical approval was not required under Dutch National Law (Medical Research Involving Human Subjects Act (WMO)), because participants were not subjected to actions or interventions. All participants gave informed consent to participate. Oral informed consent was recorded and written consent was scanned and the paper version was destroyed. Both were stored on the Radboudumc IQ healthcare department server in the respective project folder, and are accessible for project team members only. The returned anonymous paper surveys from chapter 5 are stored in a closed cabinet on the department of IQ healthcare. The privacy of the participants is secured by use of individual subject codes. The encryption key to these codes is stored separately from the study data. The raw and processed data is stored on the Radboudumc IQ healthcare department server in the respective project folders, in SPSS, Atlas.ti, or Microsoft Excel data files. The data will be available for further analyses for at least 15 years. Anonymous data generated or analysed in this thesis are available from the corresponding author upon reasonable request, after publication of the associated paper.

About the author

Eva Verkerk was born on August 19th, 1990 in Boxmeer in the Netherlands. In the last year of her VWO (pre-university education), she dissected the brains of pigs for a project, which sparked her interest in the human body. She therefore pursued a Bachelor and Master of Science in Biomedical Sciences at the Radboud University in Nijmegen. While learning more about research, she became interested in improving the quality of healthcare. She specialized in Health Technology Assessment and took minors in Public Administration and Consultancy. While studying, she worked as an assistant in statistics education and performed data entry in several studies. In the last year of her masters, she participated in the interdisciplinary program of the Radboud Honours Academy: Reflections on professions.

After graduating in 2013, Eva started working as a trainer and Epic application specialist at the Radboud university medical center. She was involved in implementing and tailoring the hospitals' new electronic health record system. Here, she already took a glimpse of the challenge that implementation can be. In 2014, she started a research project at the department of Obstetrics and Gynaecology, where she developed a tool to improve the patient-centeredness of fertility care. Seeking a new challenge, she joined the *To do or not to do* team in 2015 at IQ healthcare. A year later, she started her PhD on reducing low-value care. In addition to her research on low-value care, she enjoyed working on several other projects related to quality and safety in healthcare. In 2017, she spent three months in Canada where she joined the Choosing Wisely campaign team and performed an interview study. Eva continues her research as a part of the *To do or not to do* team.

List of publications

Scientific publications

Verkerk EW, van Dulmen SA, Westert GP, Hooft L, Heus P, Kool RB, To do or not to do program collaborators. What lessons can be learnt from a Dutch national programme to reduce low-value care? (published in this thesis)

Verkerk EW, van Dulmen SA, Born K, Gupta R, Westert GP, Kool RB. Key Factors that Promote Low-Value Care: Views of Experts from the United States, Canada, and the Netherlands. (published in this thesis)

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Van Dulmen S, **Verkerk E**, Huisman-de Waal G, Vermeulen H, Kool T. Een verpleegkundige en verzorgende beter-laten-lijst. Nijmegen: IQ healthcare; juli 2017.

Verkerk E, Verbiest M, van Dulmen S, van der Weest P, Terwee C, Beurskens S, de Boer D, Bakker C, Vajda I, Zuidgeest M. De PROM-toolbox. Tools voor de selectie en toepassing van PROMs in de gezondheidszorg. Nijmegen: IQ healthcare; februari 2017.

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PhD Portfolio

Institute for Health Sciences
Radboudumc

Name PhD candidate:
E.W. Verkerk
Department:
IQ healthcare
Graduate School:
Radboud Institute for Health Sciences

PhD period:
15-6-2016 - 15-6-2020
Promotor:
Prof G.P. Westert
Co-promotors:
Dr R.B. Kool, Dr S.A. van Dulmen

	Year(s)	ECTS
TRAINING ACTIVITIES		
a) Courses & Workshops		
Graduate School specific introductory course (RIHS).	2016	1.0
Workshop Research professional.	2016	0.2
BROK course.	2016	1.5
Management for PhD's.	2017	2.0
Qualitative research methods and analysis.	2017	0.2
Scientific Integrity course.	2018	1.0
Scientific writing.	2018	3.0
Winteracademie economie en beleid: de betaalbaarheid van de zorg.	2020	1.5
Masterclass stakeholdering.	2020	0.2
Thesis writing week.	2020	
Writing coach sessions.	2020	
b) Seminars & lectures		
Radboud Research Rounds (3x).	2016-2018	0.3
Radboud Grand Rounds (3x).	2016-2018	0.3
Refereerbijeenkomsten IQ healthcare.	2016-2019	0.1
Monthly webinars on low-value care (co-organizing).	2020	0.5
c) Symposia & congresses		
PhD retreat.	2016, 2017	2.0
Doen of laten? congres (co-organizing, oral presentations).	2016-2019	6.25
Conference Ervaringskennis toepassen.	2016	0.25
Symposium Doelmatige diagnostiek (oral presentation).	2016	0.5
Conference Patiëntmetingen voor kwaliteitsevaluatie, gebruik in de spreekkamer en onderzoek.	2016	0.25
IQ conference.	2016, 2018	0.5
Symposium Citrienfonds (workshops).	2016, 2017	1.75
Symposium PROM-toolbox (co-organizing, oral presentation and workshop).	2017	2.75
Doen of laten? congres (co-organizing, oral presentation).	2017	2.25
Symposium Choose Wisely (oral presentation).	2017	0.25
CaRe days (oral presentation).	2017	0.75
Symposium Preventing Overdiagnosis in Quebec, Canada (oral presentation and workshop).	2017	1.75

	Lunch meeting at St Michael's hospital in Toronto, Canada (oral presentation).	2017	0.25
	POH PhD Career day.	2018	0.25
	Symposium Preventing Overdiagnosis in Copenhagen, Denmark (oral presentation and seminar).	2018	1.75
	Conference Zorgevaluatie en gepast gebruik.	2019	1.0
	Symposium Preventing Overdiagnosis in Sydney, Australia (oral presentation and seminar).	2019	1.75
d)	Other		
	2 Monthly paper review meetings with PhD's (30x).	2017-2020	1.5
	TEACHING ACTIVITIES		
e)	Lecturing		
	Education module Sherlock is looking for Watson, kennismaking met het uitvoeren van observaties.	2016, 2017	2.0
	Guiding work groups and grading assignments in courses on evidence based medicine and PROMs.	2016-2020	2.0
f)	Supervision of internships / other		
	Supervision Master student internship (8x).	2016-2020	8.0
	Supervision Bachelor student internship (2x).	2016, 2020	2.0
TOTAL			51.55

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