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Assessing volume and variation of low-value care practices in the Netherlands

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Background: There have been contributions to quantify the volume of low-value care practices in the USA, Canada and Australia but we have no knowledge about the volume in Europe. The purpose of this study was to assess the volume and variation of Dutch low-value care practices. **Methods:** We conducted a cross-sectional study with data of a Dutch healthcare insurance company from general practioners (GP's) and hospitals in the Netherlands from 2016. We used all billing claims made by healthcare providers of 3.5 million Dutch inhabitants. We studied Choosing Wisely recommendations in order to select low-value care practices. We used the percentage low-value care practices per hospital and number of low-value care practices per GP as outcomes. **Results:** We assessed the volume of low-back imaging by GPs, screening of patients over 75 years for colorectal cancer and diagnosing varices with Doppler or Plethysmography. We found that 0.4% (range 0–7%) of the eligible patients received low-value screening for colorectal cancer and 8.0% (range 0–88%) of eligible patients received low-value diagnosing of varices. About 52.4% of the GPs ordered X-rays and 11.2% ordered magnetic resonance imagings of the lumbosacral spine. Most healthcare providers did not provide the measured low-value care practices. However, 1 in 12 GPs ordered at least one low-back X-ray a week. **Conclusions:** The three Choosing Wisely recommendations showed a lot of practice variation; many healthcare providers did not order these low-value diagnostic tests; a minor part did order a substantial amount, low-back spine radiology in particular. These healthcare providers should start reducing these activities.

Introduction

We have known for several years that a substantial part of healthcare, so called 'low-value care' is unlikely to benefit patients and can even unintentionally harm them.[1–5] Low-value care is healthcare for which there is evidence that it has no or little benefit for the patient, considering the costs, available alternatives, and patient preferences.[6,7] Assessing the magnitude of low-value care is hampered by the lack of clear definitions and international consensus.[8,9] In the past decade, many attempts have been made to identify low-value care such as the do-not-do list, made by the National Institute for Health and Care Excellence (NICE)[10] and several lists with 'wise choices' in many countries in the context of Choosing Wisely.[11] By quantifying low-value care, doctors and policymakers are able to prioritize attempts of reducing low-value care practices. It provides them also with a baseline measurement necessary to assess the effectiveness of the deimplementation interventions.

Most estimates of unnecessary or potentially harmful care range from 10% to 30% of healthcare services.[2,3,8] The exact amount of low-value care varies among different services and countries, and there is a significant grey zone of services for which the appropriateness remains uncertain in many individual cases.[8] In recent years, there have been several contributions to quantify the volume of low-value care in the USA[12–14], Canada[15,16] and Australia.[17] From these studies, we know that some low-value care practices are provided to a major part of the target population [magnetic resonance imaging (MRI) for low-back pain], while others are hardly provided at all (cervical cancer screening in older women).[12,13,15] These studies also show that there is a lot of practice variation in providing low-vale care practices.[12,13,15] Most of these studies were based on national or regional administrative data.

To the best of our knowledge, there have been no scientific analyses from Europe published so far. This study aims at assessing the volume and variation of low-value care practices in the Netherlands, one of the first European countries to follow the USA in selecting wise choices in the Choosing Wisely Campaign. Twelve medical specialist societies in the Netherlands published 70 wise choices.[18] Dutch researchers also published a do-not-do-list helping to identify low-value care practices.[19,20] However, there has been no attempt to quantify low-value care practices. The research question of this study is whether Dutch healthcare insurance claim data can be used to assess the volume and variation of low-value care practices in order to identify which low-value care practices should be reduced.

Methods

Design and setting

We conducted a cross-sectional study with data from one of the four major healthcare insurance companies in the Netherlands, Cooperation VGZ. In the Netherlands, a private-based basic health

insurance is mandatory by law. Almost all Dutch inhabitants have a healthcare insurance through a private healthcare insurer. There are 10 healthcare insurance companies; four of them together have a market share of 90%.[21] One of those four is Cooperation VGZ, the insurance company of which we used the data in this study. In the Dutch healthcare, the GP acts as a gatekeeper to reduce unnecessary referrals to hospitals. Most hospital care is paid for by a fee for service system.

In order to select low-value care, two authors (R.B.K. and S.v.D.) studied relevant international research papers about measuring low-value care[13–17] and all Dutch Choosing Wisely recommendations.[18] The researchers independently choose recommendations with impact on healthcare when reduced and which they thought would be accurately measurable in the available claim data. They discussed the recommendation until consensus was reached. This resulted in a list of nine low-value care practices (see Supplementary table S1). Three data analysts (J.M., N.v.G. and M.M.) investigated whether the database indeed did contain data about that specific low-value care practice and whether an algorithm could be developed to identify a suitable cohort. The volume of some low-value care practices could not be assessed because there were no adequate codes for the low-value care available in the database or there were only data for 1 year. The volume of one recommendation could not be measured because of a coding issue; for sinusitis Dutch Ear, Nose and Throat (ENT) doctors use the same code for acute and chronic sinusitis. A computed tomography (CT) scan for acute sinusitis is described in the Dutch guideline for general practitioners as overdiagnosis. However, a CT scan for chronic sinusitis might be a wise choice.[22] So, without the difference between an acute or chronic sinusitis, we cannot conclude whether a CT scan ordered by a ENT doctor in hospital, is of low-value or not. Finally, there were no data of the diagnosis of the patient visiting the GP. We could therefore not estimate the onset of the sciatic neuralgia in primary care and therefore whether the MRI was performed within or after 6 weeks after the start of the complaints. So, we decided to assess the volume of the low-value care practice of three recommendations with search algorithms. Table 1 shows these recommendations and the inclusion and exclusion criteria. Supplementary table S2 shows the details of the algorithms.

Data and study cohort

The database included all billing claims made by healthcare providers of more than 3.5 million Dutch inhabitants, 21% of the Dutch population. Because healthcare providers are financially depending on the accuracy of these claims, the database is considered to be complete. We used the 2016 data. The hospital data contained the diagnosis and information about the provider and the patient which made it possible to identify low-value care practices per patient. Information of the provider included the type of specialization, e.g. neurologist or orthopaedic surgeon. Data from the patient included the age of the patient, social economic status (SES) based on postal code, gender, claim code and relevant patient information for inclusion or exclusion criteria. The GP care data only included the claim code of the procedure and did not contain the diagnosis of the patient. Therefore, we could for example identify how many radiologic imaging a GP had ordered and for which patients but we could not assess for which diagnosis these were ordered. The assumption was that most imaging of the lower back by a GP might be considered as low-value diagnostics.

Outcome measures

We used the following outcome measures:

- percentage low-value care practices per hospital and number of low-value care practices per GP;
- variation among GPs in number of low-value care practices and for hospitals in percentage of low-value care practices.

Statistical analysis

First, we compared the characteristics of the population of this specific health insurance company with the characteristics of the Dutch population in order to assess to what extend results could be extrapolated to the total population of the Netherlands. Second, for the hospital care (recommendation 2 and 3 in table 1), we identified the number of patients receiving the specific low-value care practice and compared this with the total number of patients with the relevant diagnosis. Third, for GP care (recommendation 1 in table 1), we calculated the total number of tests ordered by a specific GP.

Results

The characteristics of the population of the health insurance company were similar to those of the Dutch population per province, per age category and per SES category with the exception of an overrepresentation of one of the provinces (see Supplementary figures S1–S3).

Table 2 shows the number of patients in hospitals in 2016 that were diagnosed varices with a Doppler or Plethysmography and that were screened for colorectal cancer on the age of 76 and older.

Table 3 shows the number of radiologic imaging tests of the lower back ordered by a GP in 2016.

Table 1 The three selected recommendations to be quantified with health insurance claim data

	Recommendation	Source	Inclusion criteria	Exclusion criteria
1	Do not perform radiological imaging for non-specific low-back pain unless red flags are present	Guideline Dutch GP's, CW recommendations USA and Canada	Patients who visit the GP and undergo imaging of their back	Exclusions: age <18 years or >105 years; red flag in medical history: neurological impairment, traumatic injury, HIV, unspecified immune deficiency, intraspinal abcess and history of cancer[a]
2	Do not screen patients for colorectal cancer if they are over 75 years	Guideline Dutch population screening colon cancer US Preventive Services Task Force C or D recommendations	Patients over 75 years. Screening: sigmoidoscopy, colonoscopy, barium enema or blood occult test for colon cancer screening	Patients 75 years and younger, previous diagnosis colorectal cancer
3	Do not use Doppler or Plethysmography for the diagnosis of varices	CW recommendation Dutch Society of Dermatologists	Patients with varices undergoing Doppler with or without pulse volume recording	

[a]For recommendations 1, patients with unexplained weight loss and fever are also 'red flags' that should be excluded. However, these patients could not be identified in the database.

Table 2 Percentage of low-value care practice and variation of the selected hospital care

	Number of patients eligible for low-value diagnostics	Number (percentage) of patients with low-value diagnostics	Min/max	Number of hospitals that provided low-value diagnostics (total number of hospitals)
Doppler or Plethysmography for diagnosing varices	15 990	1275 (8%)	0–88%	28 (115)
Screening for colorectal cancer >75 years	12 315	48 (0.4%)	0–7%	22 (86)

Table 3 Number of orders by GP's of radiologic imaging tests of the lower back

	Number of orders	Percentage of GPs that has ordered imaging of the lower back (number of ordering GPs/number of potential ordering GPs
X-rays lumbosacral spine	38 383	52.4% (7149/13 649)
CT spine	472	3.0% (411/13 649)
MRI lumbosacral spine	2928	11.2% (1533/13 649)

Figure 1 shows the practice variation level of hospitals in rates of low-value screening for colorectal cancer for patients over 75 years, and rates of diagnostics for patients treated with a Doppler or Plethysmography. Each dot represents a hospital. It also shows the practice level variation of all GP practices in rates of ordering a lumbosacral X-ray. Each dot represents a GP practice. A total of 1147 of all 13 649 GPs (8.4%) ordered at least 10 low-back X-rays.

Discussion

In this study, we investigated whether we could assess the volume of low-value healthcare practices in the Netherlands based on healthcare insurance claims. Out of nine selected low-value care practices, we could assess the volume of three low-value care practices with these data. The proportion low-value diagnostics was limited. There is hardly any screening for colon cancer above 75 years and most hospitals do not perform Doppler investigations or Plethysmographs for diagnosing varices. We may conclude that for the selected recommendations healthcare professionals show good adherence. However, a small part of the healthcare providers did order those low-value care diagnostics. For example, more than 8% (1147) of all GPs (13 649) ordered at least 10 low-back X-rays. Extrapolated to their whole population since Cooperation VGZ has only a 21% market share, 1 in 12 GPs ordered one low-back X-ray a week despite the well-known disadvantages.

Interpreting these results, it is crucial to realize that using administrative data for assessing low-value care practices is a crude measure; not all the quantified healthcare services are necessarily of low-value. Physicians and patients may have several reasons to order a test, although guidelines do not recommend it. We do not know their individual situation unless we have studied the patient records. That is a time-consuming activity. Despite the possibility that part of the data are exceptions on the guideline, a high proportion of low-value care indicates a need for education and deimplementation. Especially, the variation between hospitals and GPs, might be interesting. If a healthcare provider orders ten times more of a specific low-value care test than the national average, there is a reason to analyse why these differences exist and what could be done to reduce the numbers.

Comparison with other studies

Colla *et al.*[13] found that 22.5% of the Medicare beneficiaries in the USA received a low back X-ray, CT or MRI within 6 weeks of a low-back pain diagnosis. Pendrith *et al.*[15] found that 4.5% of the patients with low-back pain in Ontario, Canada received a CT or MRI within 3 months of an initial diagnosis. To compare those percentages, we extrapolated our results to a national level. In the Netherlands, around 6.6% of the population visits the GP every year for low-back pain.[23] This means that almost 1.125 million patients consult their GP with low-back pain. This correlates with the international number 1 status of work disability and top 5 position with regard to economic health consumption.[24] In our database, which represented 21% of the Dutch population, 3200 MRI or CT's and 38 694 X-rays were identified. Extrapolated to a national level, there were approximately 15 000 MRI's and CT's and 184 000 X-rays of the lower back. Assuming that GPs order an X-ray per patient that would mean that 17.7% of the low-back pain patients got some form of radiological imaging and 1.3% received a CT or MRI of the lower back. This is less than in Canada and the USA.

Although the volume of these low-value care practices seems to be limited in the Netherlands compared with other western countries, it concerns a substantial potential cost reduction at a direct health service economic level and indirect social economic level when reducing these low-value care interventions. Considering the costs of an MRI (214 euro), a CT scan (140 euro) and X-rays of the lower back (41 euro), direct healthcare care costs might be reduced with 10 million euro, assuming a conservative 50/50 mix of MRIs and CTs. Besides, at the socioeconomic level, a radiology diagnosis of degenerative disc 'disease' or spine facet joint arthrosis with secondary stenosis leads to a chain of anxiety for chronic pain and work disability.[24]

In the Netherlands, there is hardly any screening for colon cancer in the elderly, especially compared with the 0.8–6.9% found by Schwartz.[12] The percentage in the Netherlands may be very low because of the national screening programme for people between 55 and 75 years. Screening programmes in the USA have not been established on a structural basis.[25]

The use of Plethysmography and Doppler was not quantified before as low-value care proportion in other studies.

Strengths and limitations

A strength of this study was that our database comprehended almost a quarter of all Dutch health insurance claims in 2016. The population of this health insurance company can also be seen as representative for the Netherlands. Another advantage of the database of this healthcare insurer is that their patients are scattered all around the country in contrary to the other three major healthcare insurance companies that have a strong regional market share. Therefore, these results may be extrapolated to the whole country.

A major limitation of this study was that the database information for GPs did not contain information on the level of the diagnosis of the patient. We only could assess the volume of healthcare practices that were considered as low-value care in general such as low-back imaging by GPs. We could not assess the volume of practices that are

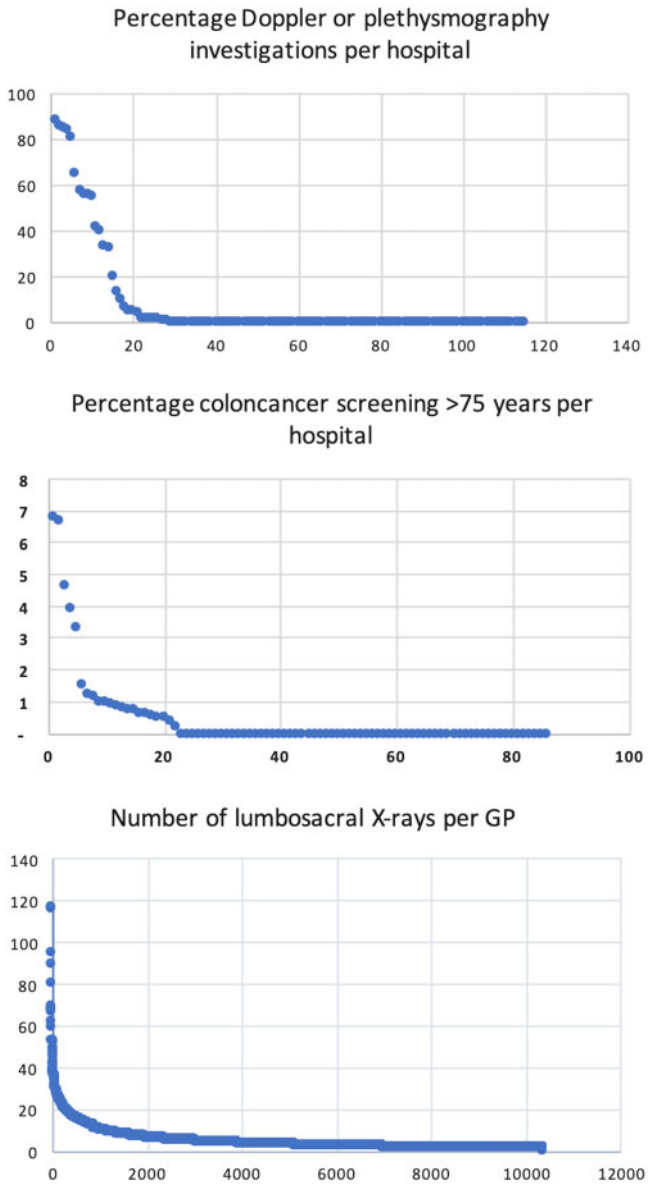

Figure 1 Practice level variation of all hospitals in rates of screening for colorectal cancer for patients over 75 years ($N = 86$), of diagnosing varices with a Doppler or Plethysmography ($N = 115$) and of all GPs ($N = 13\ 649$) in numbers of orders of lumbosacral X-rays

of low-value depending on the patient's situation, for example antibiotic prescription by GPs for sinusitis.

The accuracy of the database might also be a limitation. Although claim databases are in general rather reliable, coding might differ from daily practice.

Implications for research and practice

The volume of many Choosing Wisely recommendations could not be assessed because the patient criteria described in the recommendation are too complicated to quantify in our database. Therefore, it is impossible to identify the correct targeted population for these recommendations. An example is the recommendation of not performing an arthroscopy for patients over 50 years with knee complaints and no mechanical symptoms. Information about the last condition is not sent to any administrative database and might only be assessed by patient record reviewing. That may be a more precise but time-consuming way of assessing low-value care practices. Another opportunity is to use other databases that register more patient information such as databases based on the International Classification of Diseases or to combine different databases in order to enrich the data.

Measuring low-value care practices is an essential first step for prioritizing practices to be deimplemented. For the three diagnostic tests, professional bodies could identify the outliers and further explore the opportunities for quality improvement. It might be followed by starting deimplementation interventions for reducing the low-value care practices for a specific group of providers.

Although there is a need for better registration of patient characteristics and health conditions in claim databases to identify low-value care, claim data can still be used to get more insight in which low-value care practices might be eligible for improvement without being able to measure all details of it. For example, we could not present low-value MRIs to diagnose sciatic neuralgia because we could not assess the exact timing of onset of the complaints. This is necessary to determine the appropriateness of the MRI according to the Choosing Wisely recommendation. However, we could assess the total volume of MRIs to diagnose sciatic neuralgia and analyse whether or not the MRI was combined with any surgery or not. Of all patients with a diagnosis of sciatic neuralgia ($n = 12\ 924$), more than 75% ($n = 9887$) got an MRI without any subsequent surgery. Only 11.5% ($n = 1486$) of all patients with a diagnosis of sciatic neuralgia got no MRI. Twelve percent ($n = 1551$) of the patients got surgery and an MRI. We cannot assume that all MRIs for patients without an operation are of low value. However, these figures are remarkable high notwithstanding the Dutch guideline to perform an MRI only to consider the indication of disc surgery with the patient, and the Choosing Wisely recommendation to be precautious with this test for these patients. This insight might stimulate healthcare professionals and their societies to evaluate whether there is room for improvement in their practice. Considering the important role of the patient in requesting for low-value care practices, especially in case of individual anxiety for chronic disease and disability, we do need to address the general public in order to change the knowledge, beliefs and behaviours of the public for example by mass-media campaigns.[26]

Conclusion

Using Dutch healthcare insurance claim data, we assessed the volume of three low-value care diagnostic practices. For six other low-value care practices, the data provided insufficient details. For three low-value care practices, many healthcare providers did not order the three low-value diagnostic tests; a minor part did order a substantial amount of low-value diagnostic tests and might be targeted for improvement initiatives. Other health insurance and hospital based databases should be explored aiming at further quantification of low-value care practices, helping healthcare providers to identify areas for improving quality and reducing costs of care.

Supplementary data

Supplementary data are available at *EURPUB* online.

Conflicts of interest: None declared.

Key points

- In this cross-sectional study, we assessed the volume of three low-value diagnostic tests in the Netherlands with data from of a healthcare insurance company: radiological low-back imaging by GPs, screening of patients over 75 years for

colorectal cancer and diagnosing varices with Doppler or Plethysmography.
- Most healthcare providers did (almost) not provide these low-value care practices. However, 1 in 12 GPs ordered at least one low-back X-ray a week.

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Barriers and opportunities for prolonging working life across different occupational groups: the SeniorWorkingLife study

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Background: Increasing retirement age is a pivotal issue in labour market reforms. This study analyses factors conditioning retirement intentions. **Methods:** In SeniorWorkingLife, 11 444 employed workers ≥50 years replied to questions in random order about expected reasons for leaving and potential reasons for staying longer at the labour market. Respondents were stratified based on the Danish version of International Standard Classification of Occupations (ISCO). Representative estimates were produced using the SurveyFreq and SurveyLogistic procedures of SAS combined with model-assisted weights based on national registers. **Results:** For ISCO groups 1–4 (seated work) main expected reasons for retiring were freedom to choose and desire for more leisure time, but many would consider staying longer if there were better possibilities for additional senior days, longer vacations and flexible working hours. For ISCO groups 5–9 (physical work), poor physical health and not being capable of doing the job were common expected reasons for retiring, but many would consider staying longer if the work were less physically demanding and there were more senior days. Possibility for pension was a general expected reason for retiring. Expected reasons differed to a less extent between genders than between ISCO groups, e.g. economic factors were more important for men and high work demands more important for women. **Conclusion:** Different barriers and opportunities for prolonging working life exist across different occupational groups of the labour market—with most consistent differences between those with seated and physical work. Targeting these specifically seems opportune for policy makers and future interventions.

Introduction

Due to declining birth rates and increasing lifespan, the age-distribution in the European countries—as well as in most parts of the world—is shifting towards a relatively larger proportion of elderly citizens.[1] Thus, in EU-28 the percentage of people 65 years or older has increased from 17.1% in 2008 to 19.7% in 2018, and this trend is predicted to continue.[2] To resist negative socioeconomic consequences of this demographic transformation, most European countries have orchestrated pension reforms encouraging older workers to postpone retirement. However, retirement intentions and the timing of retirement is an outcome of complex and dynamic processes that may not be in line with the intentions of political reforms.[3,4]

For decades, factors motivating older workers to leave the labour market before the state pension age have been conceptualized as Push and Pull factors.[5] Push is defined as involuntary early retirement, i.e. the worker is being 'pushed out', e.g. due to poor health or mentally stressful or heavy physical work. Pull is triggered by generous early retirement schemes (financial incentives) or norms as to when it is appropriate to leave the labour market. These concepts, however, have been criticized for their inability to explain social variability in early retirement, e.g. gender differences. To meet this problem the concept of Jump has been constructed,[6] referring to values and needs that come from within, e.g. a desire to travel the world or spend more time with grandchildren or a retired spouse. In recent years, however, research has increasingly focused on why a growing segment of older workers continues to work until or beyond retirement age. This new trend has been conceptualized as 'need' and 'maintain'[7] resembling the concepts of Stay and Stuck developed by Snartland and Øverbye in the early 2000s.[8] Stay refers to older workers voluntarily prolonging working life due to having a fulfilling job, good salary, good interpersonal relations with colleagues and leaders, while Stuck is about prolonging working life involuntarily because retirement would have negative consequences for their life situation, e.g. cannot afford to retire due to high fixed costs of living.

In this paper, the concepts of Push, Pull, Jump, Stay and Stuck (figure 1) are looming in the background as a reference point regarding factors affecting retirement intentions of older workers. In this way, understanding factors conditioning retirement intentions—before actual retirement—may stimulate initiatives in the society and at workplaces to diminish negative factors and promote positive factors. Within the framework of Push, Pull, Jump, Stay and Stuck, existing studies of retirement patterns of older workers have shown that intentions to retire are conditioned by the work environment, including physical work demands and psychosocial work conditions,[9–16] health and subjective life expectancy,[17] gender,[18] marital status, i.e. spouses may coordinate retirement,[19] economic incentives and norms embedded in public pension systems,[20] burn-out and life dissatisfaction[21] and a preference for more leisure time to be used for a new 'life project' and/or social gains such as spending more time with grandchildren.[22] Still, our knowledge about factors conditioning intentions to retire is far from complete, and this paper will address two research gaps: