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Reducing low-value care: what can we learn from eight de-implementation studies in the Netherlands?

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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 a process evaluation of eight multicentre projects aimed at reducing low-value care. We reported the quantitative outcomes of the eight projects on the volume of low-value care and performed a qualitative analysis of the project teams' experiences and evaluations. A total of 40 hospitals and 198 general practitioners participated.

Results Five out of eight projects resulted in a reduction of low-value care, ranging from 11.4% to 61.3%. The remaining three projects showed no effect. Six projects monitored balancing measures and 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 among 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 that oppose it. The projects managed to recruit many hospitals and general practices, with five of them achieving significant results without measuring negative consequences. Based on our findings, we offer practical recommendations for successfully reducing low-value care.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Reducing low-value care can increase the quality and safety of care while maintaining or decreasing healthcare costs.
⇒ Reducing such care has proven to be difficult and knowledge about its de-implementation is scarce.

WHAT THIS STUDY ADDS

⇒ This study shows that clinicians can reduce low-value care successfully, despite barriers such as a lack of time, financial considerations and the need to reassure patients.
⇒ We provide practical recommendations for de-implementation studies, such as only reduce low-value care that is supported by sufficient evidence, tailor a de-implementation strategy to counter the barriers, use repeated education and feedback for clinicians, and provide carefully developed patient information.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ More clinicians and researchers should reduce the overuse of low-value care, and our study will help them to improve their approach.

INTRODUCTION

Reducing care that is 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. Hence, many initiatives have started worldwide, such as the Choosing Wisely campaign that began in the USA in 2012 and since then has spread to over 20 countries.[4] However, reducing low-value care has proven to be difficult and knowledge about de-implementation is scarce.[5] Two evaluations of Choosing Wisely recommendations showed marginal and varying results 1.5 years and 2.5 years after their release.[6 7] Literature reviews suggest that strategies comprising different components, addressing patients and clinicians, have the potential to reduce overuse.[2 8] However, the underlying mechanism in play is unclear and further experimentation and evaluation is needed.[2 9]

Several publications describe lessons learnt so far from de-implementation. A review

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stated that involving physicians from the beginning is of great importance.[10] Another study evaluated eight de-implementation projects in a hospital and found that support from the hospital board was a key to their success.[11] An interview study among Choosing Wisely team members found that harm reduction is a significant motivator to reduce low-value care and that data collection could be challenging.[12] Further in-depth knowledge and experience of de-implementation, including its impact and the barriers and facilitating factors involved, is needed to determine what is necessary for successful de-implementation.[13]

In 2015, we started a nationwide programme in the Netherlands, comprising eight multicentre de-implementation projects that we prospectively monitored and evaluated. Each de-implementation project aimed to reduce a different type of low-value care. The projects were led by clinicians and set in multiple hospitals or primary care practices. This paper describes the lessons learnt from these projects 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 prospectively monitored and evaluated 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 and in more detail in online supplemental file 1.

The projects' structure

An overview of the projects 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 would fit 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, and all projects obtained ethical approval before the start of their study. Several projects are described in more detail in other papers.[14–23]

Box 1 Programme characteristics

⇒ 'To do or not to do? Reducing low-value care' was a national programme, coordinated by the eight university hospitals in the Netherlands.
⇒ The programme was both top-down and bottom-up, supported by stakeholders and initiated and led by clinicians.
⇒ Eight de-implementation projects were selected from 42 proposals by an independent committee.
⇒ The eight de-implementation projects received support from a central team, comprising the authors of this paper. The projects all followed similar steps according to the Grol and Wensing Implementation of Change Model.[25]
⇒ The projects ran from 2016 to 2018.

Evaluation

We used the Medical Research Council framework for process evaluation of complex interventions.[24] This framework helps to analyse why, and how, the planned intervention has led to the effect observed. Using this framework, we evaluated 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 V.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, for which they used a variety of qualitative and quantitative methods (table 1). In May 2018, two researchers from the coordinating team (EWV and PH) interviewed the project leaders of the eight teams. Details on these interviews are reported in the COnsolidated criteria for REporting Qualitative research checklist (online supplemental file 2). The interviews included open-ended questions about the barriers and facilitating factors, the project leaders' experiences with different components of their project, the lessons they have learnt and their advice for other project leaders. Reports of the audiotaped interviews were sent to the project leaders for correction and confirmation.

EWV analysed the information reported in the logbooks, reports and interviews. Barriers and facilitators were classified using the framework of the determinants of change.[25] This framework identifies individual health professional factors, patient factors, professional interactions, incentives and resources, and social, political and legal factors. These categories were used for coding. We added one category (low-value care related) and three subcategories (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. The coding and description of results were verified by PH and discussed until consensus was reached.

Patient and public involvement

We analysed eight de-implementation projects, each of which involved patients in their problem analysis, process

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Table 1 Overview of the eight projects

Project	Reduction in the inappropriate use of:	Setting	Problem analysis data source	Design	De-implementation strategy	Effect evaluation data source	Process evaluation data source
1	Inhaled corticosteroids for patients with mild chronic obstructive pulmonary disease	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	Education of GPs and pharmacists. Publications in patient and professional magazines. Selection of patients whose use of inhaled corticosteroids was potentially unnecessary. Patient information	National database	Survey among clinicians and patients
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	Education of haematologists. Patient information (leaflet). Presentation at a patient association conference	National database	Survey among clinicians
3	Knee arthroscopies and MRIs for orthopaedic patients aged 50 years or older	Thirteen orthopaedic centres	Interviews and surveys among clinicians and patients	A difference-in-difference design with a national control group	Appointing clinical champions. Education of orthopaedic specialists. Patient information (leaflet). Feedback	National database	Survey among clinicians
4	Intravenous and urinary catheters	Seven hospitals' internal medicine and non-surgical subspecialty wards	A survey among patients and observations in clinical practice	A before-after study with an interrupted time series analysis	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
5	Vitamins D and B_{12} 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	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
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	Conferences for physicians. Increased supervision of residents. Education of physicians. Feedback. Changes in the ordering system	Hospital registries	Survey among clinicians

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Table 1 Continued

Project	Reduction in the inappropriate use of:	Setting	Problem analysis data source	Design	De-implementation strategy	Effect evaluation data source	Process evaluation data source
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	Personalised patient information	A survey among patients	Interviews with clinicians and patients
8	Upper gastrointestinal endoscopies for dyspeptic patients	Four hospitals' gastroenterology wards	Focus group interviews with clinicians and patients	A randomised controlled trial	Interactive e-learning for patients	Patients' medical records	A survey among patients

evaluation or both (specified in table 1). Patients who had been involved in the problem analysis contributed to the development of the de-implementation strategy. In addition, a representative of the Dutch patient federation became a member of the programmes advisory board. This board regularly met and advised the coordinating team on the design and progress of the programme.

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 online supplemental file 3 and summarised in the text below. Five projects (4, 5, 6, 7, 8) showed a positive effect of the de-implementation strategy, the reduction in low-value care ranging from 11.4% to 61.3%. Project 5 compared two interventions and found a larger reduction in the group that received the additional patient information (10% extra reduction for vitamin D and a non-significant extra reduction of 4% for vitamin B_{12}). Project 6 and 8 also collected data from a concurrent control group and both found a larger reduction (reduction of 11.4% in project 6 and 61.3% in project 8) in the intervention group compared with the control group (increase of 2.4% in project 6 and reduction of 17.5% in project 8). The remaining projects 4 and 7 studied one intervention arm and no control group.

Three projects (1, 2, 3) found no effect of the de-implementation strategy. Project 1 found a significant reduction in the control group, compared with 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 groups, but no difference between these groups. Six projects monitored balancing measures and 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 online supplemental file 4. Below, we describe the most frequently reported factors.

Factors related to low-value care

Regarding the factors that relate to the low-value care, evidence and a consensus among clinicians were the most frequently mentioned factors. These factors both facilitated de-implementation when they were present, and hindered de-implementation when they were absent.

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Individual health professional factors

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 outweighed its benefits facilitated de-implementation. For example, receiving a reminder of 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 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.

Patient factors

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 were informed in a focus group about the lack of benefit of inhaled corticosteroids, they felt a need to immediately reduce them. 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.

Professional interactions

Regarding the professional interactions, de-implementation was hindered by a lack of support and trust, as well as 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. An example of this is the use of standard laboratory packages in the medical ordering system. The growing consciousness among clinicians that more is not always better, as well as good collaboration and support, facilitated de-implementation.

Incentives and resources

Regarding incentives and resources, de-implementation was hindered by a lack of time, both to communicate with the patient and to participate 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.

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. Online supplemental file 5 shows all experiences.

Education

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 why the care provided 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 among clinicians.

Clinical champions

Two projects appointed clinical champions in the participating hospitals. Their task was to bring the subject regularly to the attention of their colleagues and to further spread 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 did not have as much influence because they did not work near the target group.

Feedback

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 were valid, these clinicians were able to acknowledge that there was room for improvement. Moreover, they were willing to improve. Some projects found the data collection for the feedback time-consuming or even impossible to achieve in time.

Patient information

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 preintervention rates of vitamin tests.

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Organisational changes

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.

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.

Project approach

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 among the target group. Several project leaders also thought that having a clinician in their project team was essential for recruiting hospitals or general practitioners (GPs) and for providing the education. Lastly, some project leaders found it challenging to collect the right data to evaluate their strategy, because routine hospital or GP data proved to be time-consuming to acquire, was not up to date, or provided insufficient detail to distinguish low-value from high-value care.

DISCUSSION

Effects on clinical practice

Five out of the eight projects found a reduction of low-value care following their de-implementation strategy. Two of these five projects compared their results to a control group and found greater reductions in the intervention group. Three out of the eight projects found no effect of the de-implementation strategy. One of these did show a significant reduction in the control group, while another project showed equal reductions in both the control and intervention groups. 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 of seven Choosing Wisely recommendations that recommended against low-value care practices has resulted in a reduction in two out of the seven low-value care practices.[6] This could suggest that dissemination of recommendations including publicity can be sufficient for reducing a part of low-value care practices. The last project with no effect found a non-significant reduction in low-value care in the intervention period, but this was followed by a significant increase in low-value care use after the intervention period, indicating that any potential effect disappeared directly. Unfortunately, this happens more often to de-implementation projects.[26] This shows the importance of choosing interventions that have sustained results, such as system-focused interventions.[27]

Barriers and facilitating factors for de-implementation

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 in our study. 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 sufficiently supported by the evidence and by consensus among clinicians. Improved collaboration between professions, improved accessibility of the alternative to low-value care and media attention can help to reduce low-value care.

Several of these barriers and facilitators, such as the clinicians' move away from harmful care and their fear of missing a diagnosis, could be connected to the clinicians' motivation to provide the best care for their patients. Two recent studies confirm the importance of harm reduction as a motivator.[12 28] Another connecting theme seems to be the effort that goes into providing less care and communicating this with patients. Patient expectations and a lack of time to turn these around are frequently reported barriers to reducing low-value care.[29–37] In our eight projects, a fear of malpractice was not identified as a barrier, contrary to several other studies from the USA.[29 33] This might indicate that malpractice claims have a smaller influence in the Netherlands. Other studies confirm this. Only 10% of GPs in the Netherlands provide low-value care because of a fear of claims[35] compared with 50%–73% of the primary care physicians in the USA.[33] Fear of malpractice did not emerge at all in our study, possibly because of clinicians' socially desirable responses.

Experiences with strategy components

Repeated education on the low-value care and on patient communication, as well as feedback were highly valued components of the de-implementation strategies. However, they were hindered by a lack of time to participate in the projects, and difficulties with the availability of data. 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.

Two systematic reviews found that multicomponent interventions have the greatest potential in reducing low-value care.[2 8] Two of our projects which targeted only patients achieved significant reductions in low-value care. This suggests that a single intervention can also be effective, although the success of any intervention is generally hard to predict and is likely to depend on the match between barriers and facilitating factors as well as the chosen strategy.[38] Furthermore, Colla and colleagues concluded that supporting clinical decisions, performance feedback and provider education are promising

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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, and consensus among clinicians, of being of low value. When the field is not ready for de-implementation, you risk provoking discussions among clinicians, achieving less or no effect.

⇒ To 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 have found.

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.

⇒ To provide regular feedback if data are easily available in order to motivate clinicians to reduce their use of low-value care.

⇒ To 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.

⇒ To promote organisational changes such as providing tools to support clinical decision-making in order to challenge previous patterns of practice.

⇒ To 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 for this.

⇒ To 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.

⇒ To be aware that reducing low-value care can evoke fear and uncertainty in both clinicians and patients.

strategies.[2] Our study confirms this while adding patient information as another promising strategy. Additionally, in our practical recommendations (box 2), we provide conditions for the success of these strategies.

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.[11] They found that 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.[11] Parker and colleagues identified several challenges and facilitators for leaders of de-implementation projects, such as the availability of data and harm reduction.[12] 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. Three of the five projects that achieved a reduction in low-value care did not compare their intervention to a concurrent control group. Before that reason we do not know 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. It could therefore be the case that our results overestimate the effects of a de-implementation strategy. Other items that indicate the quality of a project, such as blinding or randomisation, are reported in the papers of the individual projects (referenced in online supplemental file 3).

A second limitation is that the qualitative analysis of the projects is conducted by two authors who were part of the coordinating team that supported the eight projects. This might have biased both the experiences that the project leaders reported in the interviews and logs, and the authors in their analysis, to present a more favourable picture of the projects.

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 the 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.

Implications for research and practice

Many hospitals and general practices in the Netherlands participated in the eight projects described. 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 five successful projects are currently being spread throughout the Netherlands and of three projects the long-term effects will be measured. 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 majority of the literature on the spread and dissemination of projects is focused on implementation rather than de-implementation, such as the theory of Rogers.[39] Research is necessary to evaluate whether these theories are also relevant for de-implementation projects.

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

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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).

CONCLUSIONS

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 this change.

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Contributors EWV, SAvD, GPW, LH, PH and RBK were involved in the study concept and design. RBK obtained funding. EWV and PH performed the interviews. EWV performed the analyses, which PH verified. EWV, SAvD, PH and RBK interpreted the data. EWV drafted the manuscript. RBK was the guarantor of this study. The To do or not to do programme collaborators led the eight projects that were evaluated. All authors participated in critical revision of the manuscript for important intellectual content. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted. All authors approved the final version of this paper and agree to be accountable for all aspects of the work. The To do or not to do programme collaborators group consists of the following authors: Corina de Jong, Janwillem Kocks, Aniek de Coninck, Harry C Schouten, Leti van Bodegom-Vos, Tessa Rietbergen, Bart J Laan, Suzanne E Geerlings, Evelien IT de Schepper, Saskia F van Vugt, Prabath WB Nanayakkara, Renuka S Bindraban, Sven van Egmond, Marlies Wakkee, Judith J de Jong, Joost PH Drenth. The To do or not to do programme collaborators led the eight projects that were evaluated. They recruited the participants, performed the problem analysis, the strategy, and the evaluation of their project, and they were interviewed for this study. Corina de Jong and Janwillem Kocks led project 1; Aniek de Coninck and Harry C Schouten led project 2; Leti van Bodegom-Vos and Tessa Rietbergen led project 3; Bart J Laan and Suzanne E Geerlings led project 4; Evelien IT de Schepper and Saskia F van Vugt led project 5; Prabath WB Nanayakkara and Renuka S Bindraban led project 6; Sven van Egmond and Marlies Wakkee led project 7; and Judith J de Jong and Joost PH Drenth led project 8.

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Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants. For this interview study that evaluated the effects and experiences of eight projects, ethical approval was not required under Dutch national law. The eight projects that are studied obtained ethical approval before the start of their study. Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon reasonable request. De-identified reports of the eight projects are available (in Dutch) from the corresponding author upon reasonable request.

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Supplementary file 1: programme description

Supplement to: EW Verkerk, SA van Dulmen, GP Westert, L Hooft, P Heus, RB Kool, To do or not to do programme collaborators. Reducing low-value care. What can we learn from eight de-implementation studies in the Netherlands?

The programme To do or not to do?

In 2015, the university hospitals in the Netherlands joined 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 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. The teams received guidance on de-implementation based on the Grol and Wensing Implementation of Change Model.[1] The guidance recommended to: perform a problem analysis to identify potential barriers and facilitators of de-implementation; develop a tailor-made strategy based on the problem analysis; and perform a process evaluation. Within this structure, the project teams were free to design their own project. Each project team recruited hospitals or primary care practices in the region of the university hospital in which they were based. The two projects that focused on primary care recruited in existing networks of primary care practices. 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.

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Supplementary file 2: Research checklist. The COREQ (Consolidated criteria for reporting qualitative research)

Supplement to: EW Verkerk, SA van Dulmen, GP Westert, L Hooft, P Heus, RB Kool, To do or not to do programme collaborators. Reducing low-value care. What can we learn from eight de-implementation studies in the Netherlands?

Criteria	Detailed information	Where is the information stated?
Domain 1: research team and reflexivity		
Personal characteristics		
1. Interviewer	EWV and PH performed the interviews and analysed the documents	Page 11
2. Credentials	EWV: MSc PH: MSc, PhD	Page 1 and 2
3. Occupation	EWV: PhD candidate PH: assistant professor	Page 1 and 2
4. Gender	Female	This checklist
5. Experience and training	EWV is trained in qualitative research and had experience interviewing healthcare professionals and policymakers. PH is also trained and experienced in qualitative research.	This checklist
Relationship with participants		
6. Relationship established	EWV and PH had met the project leaders before interviewing them for this study. They had contact about the progress of the projects about every three months for the duration of the projects. EWV and PH were aware that this relationship should not hinder them in asking critical questions. In contrary, they felt that it helped the project leaders to be open about the barriers and facilitators that they encountered.	This checklist
7. Participant knowledge of the interviewer	The reasons for the study were described in the e-mail with which the project leaders were approached. Participants were aware of the occupations of EWV and PH.	This checklist
8. Interviewer characteristics	EWV and PH were not clinicians, which enabled them to more objectively observe the projects and ask critical questions.	This checklist
Domain 2: study design		
Theoretical framework		
9. Methodological orientation and theory	We used a theoretical thematic analysis, in which the analysis is driven by a pre-existing frame. We used the Grol and Wensing framework of the determinants of change to categorize the barriers and facilitators that we found.	Page 11
Participant selection		
10. Sampling	We interviewed the project leaders of the eight projects. They were selected by an independent committee from 42 submitted project proposals, based on their societal impact, quality of study design, feasibility, and variation in specialty.	Page 8
11. Method of approach	All project leaders were invited to participate and received information about the interviews by email. They were asked to submit log books they kept to document the project's progress, and reports on their results and process evaluations.	Page 11
12. Sample size	We interviewed one or two project leaders of each project, 13 participants in total.	This checklist
13. Non-participation	Project leaders of all eight selected projects were interviewed and all eight projects submitted their log books and reports.	Page 11
Setting		

14. Setting of data collection	We conducted face-to-face interviews with the project leaders at the location of their choice, mostly their workplace.	This checklist
15. Presence of non-participants	Only the project leader(s) and interviewers were present.	This checklist
16. Description of sample	The sample of project leaders worked as a clinician, a healthcare researcher, or both.	This checklist
Data collection		
17. Interview guide	We first developed a semi-structured interview guide based on the MRC guide for process evaluation of complex interventions. Then, we tailored the guide to the characteristics of each project. 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. At the start of the study, we developed the formats for the log books and reports that the project teams completed.	This checklist and page 11
18. Repeat interviews	We did not perform repeat interviews.	This checklist
19. Audio/visual recording	The interviews were audio-recorded and summarized.	This checklist
20. Field notes	We did not make any field notes.	This checklist
21. Duration	The interviews ranged in length from one hour to 1,5 hours.	This checklist
22. Data saturation	We monitored and evaluated eight projects that targeted different low-value care practices and used different strategies. Because the projects were so heterogeneous, data saturation was not applicable. We are, however, confident that we have identified the most important lessons for de-implementation projects.	This checklist
23. Transcripts returned	Reports of the audiotaped interviews were sent to the project leaders for correction and confirmation. Two project leaders corrected the reports.	This checklist
Domain 3: analysis and findings		
Data analysis		
24. Number of data coders	EWV coded the interviews, log books and reports and classified the codes. The coding and description of results were verified by PH and discussed until consensus was reached.	Page 11
25. Description of the coding tree	The classified codes are presented in supplementary files 3 and 4.	Supplementary files
26. Derivation of themes	We used the Grol and Wensing framework of the determinants of change to categorize the barriers and facilitators that we found. The experiences with strategy components were categorized per strategy component.	Page 11
27. Software	We used Atlas.ti 8.4.20 for coding.	This checklist
28. Participant checking	Participants were asked to provide feedback on the findings.	This checklist
Reporting		
29. Quotations presented	We do not report any quotations.	NA
30. Data and findings consistent	The member check of the participants and their co-authorship to this paper reduces the risk of any inconsistencies between the data and findings.	This checklist
31. Clarity of major themes	We described in the text the barriers and facilitators that were encountered most frequently as being the most important. This selection was made by EWV and PH.	This checklist
32. Clarity of minor themes	See 31.	This checklist

Verkerk EW, *et al. BMJ Open Qual* 2022; 11:e001710. doi: 10.1136/bmjoq-2021-001710

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Supplementary file 3: The effects of the projects on clinical practice

Supplement to: EW Verkerk, SA van Dulmen, GP Westert, L Hooft, P Heus, RB Kool, To do or not to do programme collaborators. Reducing low-value care. What can we learn from eight de-implementation studies in the Netherlands?

Project	Sample size and study period	Primary outcome(s) Low-value care volume	Secondary outcome(s) Patient outcomes	Use of other care
1	1645 COPD patients in the intervention group and 446,012 patients in the national control group. Pre-intervention period: Jan-March 2017. Intervention period: Jan-March 2018.	No reduction in the intervention group in the number of ICS/ICS-LABA distributions per COPD patient in 3 months (1.3% reduction, P=0.693). There was an 11.4% reduction in the control group, which was statistically significant (p<0.001).	The number of prednisolone and antibiotic prescriptions per patient did not change in the intervention group, and was reduced in the national control group (3.3% reduction in prednisolone, P<0.001 and 7.1% reduction in antibiotics, P<0.001). This indicates no increase in exacerbations.	The use of bronchodilators (LAMA/LABA) per patient did not change in the intervention group, but was reduced in the national control group (1.6% reduction, P=0.004).
2	639 (in 2016), 681 (in 2017) and 391 (in 2018) patients with lymphoma in the intervention group and 16163 (in 2016), 18834 (in 2017) and 22267 (in 2018) in the control group.	No reduction in the intervention group and no reduction in the control group in the number of CT scans per patient per year. (Intervention group: 8.4% reduction (P=0.052) from pre-intervention (2016) to intervention year (2017), but a subsequent 11.5% increase (P=0.015) from intervention (2017) to post-intervention (2018). Control group: 2.0% reduction from 2016 to 2017 and 0.0% reduction from 2017 to 2018 (not tested for significance).	-	-
3	32,163 patients with degenerative knee complaints in the intervention group and 104,283 in the control group. Pre-intervention period: Jan 2016-June 2017. Intervention period: July 2017-Dec 2018.	A monthly 0.15% reduction in the percentage of patients with degenerative knee complaints who receive an MRI, and a monthly 0.19% reduction in arthroscopic surgery in both the intervention and control group. No statistically significant difference between groups for both outcomes (MRI P=0.228 and arthroscopy P=0.688). More details can be found in this paper.[1]	-	-
4	324 patients with a urinary catheter pre-intervention (Sept 2016-Aug 2017) and 398 patients post-intervention (Sept-2017-April 2018). 1665 patients with an intravenous catheter pre-intervention and 1912 patients post-intervention. These catheters were assessed for appropriateness.	A 25.6% reduction in the percentage of patients with an inappropriate urinary catheter (from 32.4% inappropriate use (105 of 324 catheters) to 24.1% (96 of 398 catheters); P=0.013). Time-series analysis was not statistically significant. A 34.5% reduction in the percentage of patients with an inappropriate intravenous catheter (from 22.0% inappropriate use (366 of 1665 catheters) to 14.4% (275 of 1912 catheters); P<0.001). Time-series analysis confirmed this reduction (P=0.011). More details can be found in this paper.[2]	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. Pre-intervention period: May 2016-April 2017.	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 20% 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).	The mean test results of vitamin D and vitamin B12 did not change.	The number of vitamin D and B12 prescriptions appeared to decrease after the de-implementation strategy (vitamin D from 90.2 to 69.2 per 1000 patients, vitamin B12 from 48.8 to 37.6 per 1000

	Intervention period: May 2017-April 2018.	Additional patient information in intervention group B resulted in a 10% extra reduction of vitamin D tests compared to group A (odds ratio 0.88, 95%CI 0.83-0.92), and a non-significant 4% extra reduction of vitamin B12 tests (odds ratio 0.96, 95%CI 0.91-1.02). More details can be found in this paper.[3]		patients, no P-value calculated).
6	130,920 patient contacts in the intervention group (4 hospitals) and 519,544 contacts in the control group (19 hospitals). Pre-intervention period: Aug 2016-Feb 2017. Post-intervention period: May 2017-April 2018.	A 11.4% reduction in the intervention group (from 11.0 to 9.7 laboratory tests per patient contact) and an 2.4% increase in the control group (from 10.9 to 11.2 laboratory tests per patient contact). Three of the four intervention hospitals showed a statistically significant reduction in the slope for laboratory test volume over time (H1: -1.55 P<0.001, H3: -0.74 P=0.03, H4: -2.18 P<0.001). The last hospital showed no change (H2: -0.34 P0.73). More details can be found in this paper.[4]	Apart from a decrease in outpatient visits in one hospital (a 0.40 reduction in the slope for visits over time, P=0.01), 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 (a 0.03 reduction in the slope for radiology use over time, P=0.005). Microbiology use decreased in one and increased in another hospital (a 0.15 increase and a 0.16 reduction in the slope of microbiology use over time, P=0.02 and P=0.02). Nuclear medicine decreased in two hospitals (a 4.96 and a 14.26 reduction in the slope for nuclear medicine use over time, P=0.02 and P<0.001).
7	278 patients with BCC pre-intervention (2014) and 195 during the intervention (2016).	A 14.8% reduction in the number of BCC-related dermatology visits per patient within one year of diagnosis (from 1.59 to 1.34) in the intervention group. This change was statistically significant (P=0.04). More details can be found in this paper.[5]	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 who were referred for an upper gastrointestinal endoscopy in the intervention group and 57 patients in the control group. Patients were recruited between Nov 2017-March 2019, with follow-up 1 year after randomization.	A 61.3% reduction (from the 62 patients who were referred for an upper gastrointestinal endoscopy, 24 underwent the gastrointestinal endoscopy after the intervention) in the intervention group and a 17.5% reduction (from 57 to 47) in the control group. This difference was statistically significant (P<0.001). More details can be found in this paper.[6]	The severity of symptoms and the quality of life improved equally in both groups (symptoms reduced by 0.56 in the intervention and 0.62 in the control group, P<0.001 and P<0.001, quality of life improved by 0.42 in the intervention and 0.61 in the control group, P<0.003 and P<0.001). Health anxiety declined in the intervention group (mean reduction 0.18, P=0.008) but not in the control group.	-

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

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Supplementary file 4: The barriers and facilitators for de-implementation

Supplement to: EW Verkerk, SA van Dulmen, GP Westert, L Hooft, P Heus, RB Kool, To do or not to do programme collaborators. Reducing low-value care. What can we learn from eight de-implementation studies in the Netherlands?

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 (3, 6). 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, 4, 8). 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).
	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). 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 (5, 8). A lack of trust in one's own skills (7).	A reduction in the burden and side effects of lvc (1, 4, 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).
	Cognitions	A search for reassurance (2, 8). Fear of disease (1, 5, 7, 8). 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).
	Organisational structure and capacity for change	The convenience of standard laboratory packages (6). Easy access to lvc (8). The rapid turnover of junior physicians (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 (1, 3, 7, 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 (1, 5, 6, 8).	
	Financial incentives and disincentives	Lvc is reimbursed, therefore reducing it reduces revenue (2, 3, 4, 6, 7, 8). Minimal cost savings by reducing lvc (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

Supplementary file 5: Experiences with strategy components

Supplement to: EW Verkerk, SA van Dulmen, GP Westert, L Hooft, P Heus, RB Kool, To do or not to do programme collaborators. Reducing low-value care. What can we learn from eight de-implementation studies in the Netherlands?

Strategy component	Implementation	Mechanism of impact
Education	Six projects provided education for clinicians about lvc (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 lvc 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 lvc 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 lvc (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).	