General discussion
This thesis looked at how patient safety and quality of care for older hospitalised patients at-risk for delirium can be improved, specifically focusing on the effects of e-learning on the implementation of the national Frail Elderly Project (FEP). In this final chapter the main findings of this research are discussed, as well as some methodological considerations. This chapter also looks at the implications of this research for practice, policy and future research.

Main findings

In the Netherlands, efforts have been made to improve delirium care, as part of the national Frail Elderly Project (FEP). Because there were indications that the implementation of FEP and its delirium guideline was not as successful as hoped (IGZ 2012), we first decided to look into possible barriers to this implementation.

1. Which barriers exist to adherence to the FEP delirium guideline by nurses?

We found that individual, social and organisational factors play a role in nurse’s adherence to the FEP delirium guideline. Barriers were identified regarding motivation and goals, knowledge and skills, professional role and identity, and context and resources. Overall, nurses lack the motivation to use the risk-screening instrument aimed at identifying patients at risk for delirium, despite the recommendation in the guideline. This is mainly influenced by the apparent lack of clarity of the benefits and goals of screening. Nurses stated that they did have sufficient knowledge and skills to use the screening instrument to identify patients at risk, or the Delirium Observation Screening Scale (DOSS) in order to observe possibly delirious patients. Whether nurses considered themselves capable of taking subsequent preventive or treatment measures is less clear: some indicated high levels of confidence, while others had doubts about their own and others’ level of knowledge. Physicians mainly emphasized the importance of additional education for nurses on delirium screening and treatment.

Nurses report having a shortage of time in which to perform their day-to-day tasks, leading to the professed inability to perform time-consuming or perceived non-essential activities such as screening, or observing patients using the DOSS. Nurses do not consider delirium risk screening to be an intrinsic part of their job, and in addition some nurses disagreed with the...
content of the guideline. The screening instrument is sometimes seen as limiting their autonomy, while they have little faith in the usefulness of the instrument itself. A negative influence on delirium care is the general view that nurses on general wards consider care for older patients to be uninteresting or ‘not exciting’.

An educational intervention could be a means of helping improve the implementation of the FEP delirium guideline. Such an intervention could potentially help solve some of the barriers to guideline adherence we had identified, such as the nurses’ lack of understanding of the benefits and goals of risk screening. We now turned our attention to an educational intervention: an e-learning course on delirium for nursing staff.

2. Does the use of e-learning improve nurses’ delirium knowledge?

Our study into the effects of e-learning demonstrated that an e-learning course on delirium had a significant positive effect on nurses’ knowledge on delirium, in all subgroups of nursing staff and for all question categories. Test scores on the final knowledge test (mean 87.4, 95% CI 86.7 to 88.2) were significantly higher than those on baseline (mean 79.3, 95% CI 78.5 to 80.1). At baseline, nursing staff had the most difficulty with questions related to the definition of delirium: what are its symptoms, course, consequences, and which patients are at risk. However, the mean score for this category of questions was still relatively high (74.3, 95% CI 73.1 to 75.5). The high participation rate in our study appears to show that staff members are willing and able to improve their knowledge through e-learning.

3. Does the use of e-learning improve the provision of delirium care by nurses according to the FEP delirium guideline?

Our stepped wedge trial showed that an e-learning course on delirium did have a significant effect on the nursing staff’s delirium care for older patients, as evidenced by the risk screening. The adjusted screening rate was 50.8% in the control phase, compared with 65.4% in the intervention phase (p <0.01). An e-learning course on delirium appears to be a valuable addition to the efforts of hospitals to improve delirium care. However, the goal of FEP – to ensure all older patients were screened for the risk of delirium and all at-risk patients were observed using the DOSS – was still not achieved.
After using delirium rates based on recorded delirium diagnoses in patient records as a secondary outcome measure of our stepped wedge trial on the effects of e-learning, we were interested to see whether this outcome measure could potentially be used for other research on delirium and quality of care. Which is why in the next article of this thesis, we wanted to determine what delirium rates based on patient records can tell us about the occurrence of delirium in the Netherlands.

4. What can delirium rates based on patient records tell us about the occurrence of delirium in the Netherlands?

After adjusting for oversampling of deceased patients and patients admitted to a university hospital, we found a delirium occurrence rate of 3.5% in surgical patients and 5.5% in non-surgical patients, and for patients aged 70 and over, we found a delirium occurrence rate of 6.3% in surgical patients and 5.5% in non-surgical patients. The delirium occurrence rates found in this study were lower than expected based on the literature. However, we also found that, after adjusting for patient-, admission- and hospital characteristics, recorded delirium rates did not vary between hospitals (ICC 0.0) and varied little between hospital wards (ICC 5.3 and 9.3). This is in line with expectations regarding actual delirium occurrence rates: we would expect no differences between Dutch hospitals, but would expect differences between hospital wards, given the different patient populations on those wards.

This study made clear that using only delirium diagnoses as recorded in patient records can provide information on delirium occurrence, but because this study could not compare recorded delirium rates to actual delirium rates, how reliable this information is remains uncertain. If patient records are to be used as a means of gaining reliable insight into delirium occurrence and quality of delirium care, additional information is needed besides recorded delirium diagnoses, either from patient records – using additional data – or from additional measurements, such as delirium assessment and clinical observation.

After focusing specifically on delirium, this thesis concluded by looking at adverse events in general, as a possible alternative approach to improving patient safety and quality of care for older hospitalised patients.
5. Can preventable adverse events in older patients be predicted using a predictive model?

In the final article included in this thesis, we examined whether preventable adverse events (AEs) in older patients can be predicted using a predictive model. Our intention was to design a model that could be used by healthcare providers in hospitals, so they could identify older high-risk patients for preventive measures or closer clinical attention. Several expected risk factors for preventable AEs in older patients, including comorbidity, could not predict whether these events would occur. Using routine in-patient data available on admission and collected during the course of two patient record reviews, we were only able to develop a predictive model with a poor performance, in which preventable AEs were associated with older age; elective admissions; and surgical admissions. The risk factors found were not all stable over time, suggesting that developing a predictive model for preventable AEs in older patients might not be possible due to the constant changes taking place in hospitals. The increased risk of preventable AEs in older patients admitted to a surgical department was present in both the development and the validation sample, indicating it was the only risk factor that remained stable over time.

Reflection

The central question of this thesis was “How can safety and quality of care for older hospitalised patients at risk of delirium be improved?”. Looking at the studies that make up this thesis, four answers can be formulated to this question:

1. Educate healthcare professionals and increase awareness on care for older patients.

An educational intervention is a means of helping to improve the implementation of the FEP delirium guideline, and probably other guidelines as well. Such an intervention can help solve some of the barriers to guideline adherence we have identified, such as the nurses’ lack of understanding of the benefits and goals of risk screening. Our study into the effects of e-learning demonstrated that an e-learning course on delirium aimed at nursing staff not only improved knowledge, but also improved delirium care provided, and decreased the number of older patients diagnosed with delirium. It showed that by following an e-learning course,
staff could build upon their existing knowledge of delirium care. Our study supports the concept that professional education is an effective method of improving delirium care (McCrow et al. 2014, Wand et al. 2014, Devlin et al. 2008).

In Barr et al.’s adaptation of Kirkpatrick’s framework for measuring outcomes of educational initiatives, several levels are identified on which education can have an impact before it leads to benefits for the patient (Barr et al. 2005, Kirkpatrick, 1996). This framework shows that education can be expected to change not only learners’ knowledge and skills, but attitudes and perceptions as well, before leading to changes in behaviour. Given the barriers to the implementation of FEP we identified regarding the motivation of nurses and the perception of their professional role, the influence of education on the attitudes and perceptions of healthcare professionals might be its most valuable effect when aiming to improve care for older patients at risk of delirium.

Table 8.1 Adaptation of Kirkpatrick’s framework for outcomes of educational interventions (Barr et al. 2005)

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Learner’s reaction</td>
</tr>
<tr>
<td>2a</td>
<td>Modification of attitudes and perceptions</td>
</tr>
<tr>
<td>2b</td>
<td>Acquisition of knowledge and skills</td>
</tr>
<tr>
<td>3</td>
<td>Behaviour change</td>
</tr>
<tr>
<td>4a</td>
<td>Changes in organisational practice</td>
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<tr>
<td>4b</td>
<td>Benefits to patients</td>
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In the literature on delirium education, attention is increasingly being paid to the importance of focusing education not only on increasing knowledge and skills, but also – or especially – on changing attitudes to and perceptions of older patients and geriatric syndromes (Tullo et al. 2015, Teodorczuk et al. 2012). This reinforces the view that educational interventions are valuable tools for healthcare organisations in promoting better care for their older patients, especially if they are capable of addressing knowledge gaps as well as negative attitudes.
As our study into the effects of e-learning on delirium care has shown, education of healthcare professionals can be an important part of quality improvement projects. However, education alone should not be expected to automatically lead to better care. This is made clear by the Theoretical Domains Framework on behaviour change, which includes 14 theoretical domains that play a role in the process of behaviour change (Cane et al. 2012, Michie et al. 2005). These domains range from knowledge and skills to emotion and environmental context, which illustrates that changing people’s behaviour is a complex process, involving many different aspects of the individuals, organisations and interventions involved. Virtually all research on behaviour change and implementation agrees that the context in which a quality improvement project is undertaken has significant impact on the results of the project (Bate et al. 2014, Grol & Wensing 2004, Berwick 2003, Pettigrew & Whipp 1993). In the COM-B model by Michie et al., the context of behaviour is represented in the component opportunity (see Figure 8.1). The COM-B model shows that human behaviour results from the interaction between an individual’s physical and psychological capabilities, their opportunities – or context –, and their motivation (Michie et al. 2011).

In the case of our study into the effects of e-learning, the participating hospitals were already involved in a national quality improvement project, FEP. This meant two important things for the context in which we introduced the delirium e-learning course:

A. There was external pressure on hospitals, through the Healthcare Inspectorate, to successfully implement FEP and change delirium care.

B. Hospitals had already made organisational changes aimed at improving delirium care.

The external pressure on hospitals to successfully implement all parts of the national Patient Safety Programme, including FEP, meant that, at least on the management level, a sense of urgency was created and hospitals were willing to change clinical practice.
Figure 8.1  COM-B model for understanding behaviour, combined with the domains from the Theoretical Domains Framework (Cane et al 2012, Michie et al. 2011)

The organisational changes hospitals made in order to implement FEP generally involved creating risk-screening forms and delirium observations forms to include in patient records – either on paper or electronically – and rewriting care protocols to take into account the FEP delirium guideline. This created an environment in which nursing staff could more easily change their behaviour and follow the delirium guideline, after completing the e-learning course which advised them to do so.

Overall, it appears that the organisational and national context in Dutch hospitals paved the way for the e-learning course and ensured it had a good chance of successfully changing nursing staff’s behaviour.
3. Acknowledge the views of healthcare professionals involved in the improvement projects.

Other aspects of the context in which FEP was introduced, however, were less conducive to change than the organisational context described above. In our interviews with healthcare professionals, it became clear that there was a discrepancy between what the FEP delirium guideline recommended, and how nursing staff viewed their professional role and what they considered to be their core business. Nurses did not consider delirium risk screening to be an intrinsic part of their job, and there was an apparent lack of clarity of the benefits and goals of screening. Added to this, the screening instrument was sometimes seen as limiting nurses’ autonomy, while they had little faith in the usefulness of the instrument itself. In addition, we found that there is a sense among nursing staff that caring for older patients and dealing with specific geriatric syndromes is not their core business. Similarly, Andrew Teodorczuk and colleagues found a lack of ownership of confused older patients in hospital staff (Teodorczuk et al. 2013). How healthcare professionals define their work and which core activities make up their profession influences how those professionals respond to certain guidelines and patient groups.

Policymakers need to take healthcare professionals’ perceptions of their professional roles and of patient care into account when formulating new guidelines, to ensure expectations of guideline adherence are realistic and professional autonomy is respected. Otherwise, resistance to the guideline is to be expected, as well as a lack of motivation. This aspect of the social context into which FEP was introduced created obstacles for a successful implementation of FEP and might explain why, even though the e-learning course had a significant positive effect, guideline adherence still remained relatively low.

4. Focus on improving care for older patients in general, instead of on identifying patients at risk for preventable adverse events (AEs).

We were unable to develop a reliable model to predict the risk of preventable AEs, showing that the ability to identify older at-risk patients is limited when using only routinely collected data that are available on admission. Other information, which is more difficult or costly to measure, might contain stronger predictors of preventable AEs. For instance, more
detailed information on the frailty of older patients (Avelino-Silva et al. 2014, Martocchia et al. 2013, Jones et al. 2005) and specific laboratory results regarding physical fitness or disease severity (Knaus et al. 1985) could provide better predictors, if they were available on, or directly after, admission. However, taking these extra measurements for every older patient would include additional investments of time, money and effort on the part of healthcare professionals. An alternative approach would be to investigate more specific types of preventable AEs. However, developing separate predictive models for the numerous types of preventable AEs would not only require substantial research, but would hardly simplify life for clinicians.

All in all, perhaps the focus should not be on attempting to create or to perfect ways of identifying patients at risk of preventable AEs during hospitalisation, but on improving care for all older patients. Such a broad approach would be relatively simple to implement in daily practice, and could help prevent many different geriatric syndromes. Improving care for older patients should in that case at least include making an effort to improve the general condition of older hospitalised patients – treating malnutrition and dehydration, increasing the use of hearing and visual aids, decreasing polypharmacy, et cetera –. When the physical condition of older patients improves, the risk of developing geriatric syndromes such as delirium and falls decreases.

**Methodological considerations**

*Stepped wedge trial*

An important element of this thesis was the cluster randomized stepped wedge trial focusing on the effects of e-learning on delirium care. The number of studies using a stepped wedge design in order to evaluate the effectiveness of an intervention in routine practice is steadily increasing (Mdege et al. 2011). The defining feature of this design is that the intervention will be introduced to all clusters – or in this instance, hospitals – in a sequential order (Mdege et al. 2011, Hussey & Hughes 2007). At the start of the study, no hospital had access to the intervention, while at the end all hospitals had been given access. In a ‘traditional’ parallel trial, hospitals in the control group would not have received the intervention.
The reasons for using the stepped wedge design in our study were varied: first, it offered an opportunity to introduce the intervention to all participants, which had the ethical advantages of withholding the potentially beneficial intervention from no one. Second, the fact that the intervention was made available to all participating hospitals made participating in the study more attractive, ensuring sufficient hospitals could be included in this study. Third, because the stepped wedge design resulted in gathered data from all hospitals for both the control and the intervention group, each hospital acted as its own control, thereby reducing contamination bias (Brown & Lilford 2006).

**Patient record review**
A data collection method often used in this thesis was the patient record review. While this research method can offer us a wide range of data on patient characteristics, provided care and patient outcomes, there are some obvious limitations to using patient records as a data source. It is for instance reliant on not only how well healthcare professionals recognize and diagnose medical conditions, but also on how well they record these conditions in patient records. This makes it difficult to use patient records as a means of generating data on delirium occurrence rates. Several studies have found that delirium was poorly documented in patient records, even for patients with a confirmed diagnosis of delirium (Milisen et al. 2002, Hey et al. 2015, Hope et al. 2014).

Different methods of using patient records as source of information are currently being explored. This is especially relevant, given the rise of electronic patient records, potentially offering not only researchers but also healthcare organisations a readymade database from which to gather data. A recently validated chart abstraction method for retrospectively diagnosing delirium in hospitalised patients based on symptoms recorded in the patient record might offer a means of gathering more reliable data on delirium rates using patient records (Kuhn et al. 2014). This method is still dependent on the quality of record keeping. However, an important benefit of using patient records as a data source is that it is less labour-intensive and less invasive for the patient than for instance gathering data directly at the bedside.
Implications and recommendations

Based on the research presented in this thesis, several recommendations can be made for practice, policy, and future research.

Implications for practice

When healthcare organisations want to improve care for older patients, several actions can be taken to improve their chance of success. Based on this thesis, four recommendations can be made for healthcare organisations planning or starting quality improvement projects:

1. **Invest in knowledge**
   
   As we have shown, educating professionals on specific risks or healthcare problems can help improve the care provided. Education can give them the knowledge they need to be able to perform new behaviour, but can also help convince professionals of the benefits of changing their behaviour and create a sense of urgency.

2. **Make sure the organisational context is ready**
   
   Knowledge alone is probably not enough to ensure a change in practice. The organisation needs to be ready for professionals to show the new behaviour and, where possible, needs to support and encourage professionals to change their practice. This can mean ensuring management is supportive of the changes taking place, but also providing practical tools and materials to support the behaviour change.

3. **Take into account the attitude of healthcare professionals**
   
   While knowledge and organisational context are important, if the attitude of healthcare professionals is not conducive to the implementation of the quality improvement project, its success might still be limited. Healthcare organisations should explore the attitudes of their staff towards the topic or patient population at which the project is aimed, and take these attitudes into account when formulating project goals and guidelines. It might also be worthwhile to try to influence these attitudes – if necessary – as part of any educational efforts taking place.

4. **Invest in the quality of documentation in patient records**
   
   The use of electronic patient records offers healthcare organisations working on quality improvement an important source of information on patients, provided care and healthcare outcomes. Using this information would offer these organisations a means of monitoring...
their quality of care, making the effects of quality improvement efforts visible for the professionals involved. However, such use of electronic patient records requires that the data collected from the records is reliable. Organisations should therefore pay attention to the quality of documentation in electronic patient records, to ensure results can be measured and disseminated properly.

Implications for policy
When formulating nationwide policy or guidelines, policymakers need to take healthcare professionals’ perceptions of their professional roles and of patient care into account, to ensure that expectations of guideline adherence are realistic and the professionals’ autonomy is respected. Otherwise, resistance to the guideline is to be expected, as well as a lack of motivation. Policymakers should not underestimate the impact national attention can have on an improvement project. This attention can help local project leaders in gaining support from management and convincing management and colleagues of the importance of the project. Added pressure on organisations to implement the improvement project, for instance through the attention of the Healthcare Inspectorate, can add to a sense of urgency within management levels of healthcare organisations regarding the project.

Recommendations for future research
The rise of electronic patient records in hospitals potentially offers hospitals and researchers alike a readily available source of information on patients, provided care and healthcare outcomes. This could offer hospitals an opportunity to monitor their quality of care on specific healthcare problems or patient groups, such as delirium in older patients. However, such use of electronic patient records requires not only that the technical side of the records needs to support such use, but also that the data collected from the records is reliable. As studies on documentation of delirium in patient records have shown, delirium diagnosis are not always recorded in patient records. Future research should therefore look into other ways of using data from patient records to gather information on delirium occurrence. A recently validated chart abstraction method for retrospectively diagnosing delirium in hospitalised patients, using symptoms recorded in the patient record instead of recorded diagnosis (Kuhn et al. 2014), might offer an interesting starting point for research into the use of electronic records as source of information on quality of delirium care.
Quality of delirium care can be divided into different aspects, including recognition of delirious patients and proper documentation of symptoms and diagnosis in order to communicate findings with other members of the healthcare team. International studies have shown that both of these aspects of delirium care – recognition and documentation – leave something to be desired (Hope et al. 2014, Rice et al. 2011, Flagg et al. 2010, Milisen et al. 2002). It is unclear how Dutch hospitals perform on these two aspects of delirium care, while this would provide valuable information for future quality improvement projects aimed at delirium care. Research into the recognition of delirious patients by nurses and physicians, and the documentation of delirium, could help determine where further improvement efforts should be focused.

While our study focused on delirium in hospitals, the increasingly frail population of Dutch nursing homes means that delirium is a relevant topic for these organisations as well (Boockvar et al. 2013, Boorsma et al. 2012, Han et al. 2009). It would be worthwhile to investigate whether delirium in nursing homes can be prevented by improving knowledge and awareness of delirium among staff, family and informal caregivers. If this is the case, such an improvement could potentially help prevent hospital admittance of nursing home residents due to delirium or the consequences of delirium – such as falls and physical injuries –, leading to a reduction in healthcare costs.
References


Chapter 8


