Chapter 8

General discussion
8.1 Introduction

Education of health care workers in patient safety is considered an important method that could contribute to improving the safety for patients. Medical residents are key figures in delivering care and an important target group for patient safety education. By educating residents in patient safety issues, we expected to influence their behavior and the antecedents of their behavior concerning patient safety improvement. The studies described in this thesis primarily focused on the development and the effects of patient safety education for medical residents. Moreover, insight was gained into the factors influencing residents’ patient safety improvement behavior.

The primary research questions and the related sub-questions of this thesis were:
I. How should patient safety education for residents be designed?
   A. What patient safety educational methods and content are described in the literature?
   B. What do residents and supervisors consider important for patient safety education for residents, and how can this be integrated into the development of a patient safety course for residents?
   C. How do course participants evaluate the design of the patient safety course?
II. What are the effects of patient safety education for residents?
   A. What effects of patient safety education for residents are described in the literature?
   B. How does a patient safety course influence residents’ knowledge, skills, attitudes, intentions and behavior?
III. What influences residents’ behavior to improve patient safety?
   A. Which barriers and promoting factors are experienced by residents in taking action to improve patient safety?
   B. Which solutions do residents have for taking away the barriers and stimulating patient safety improvement behavior?

In this chapter the main findings and methodological considerations of the studies are summarized and discussed. Moreover, recommendations are given for hospital managers and medical educators to organize patient safety education for residents and to increase residents’ participation in patient safety improvements. Finally, suggestions for future research are proposed.

8.2 Main results

8.2.1 Research question I-A: What patient safety educational methods and content are described in the literature?

Chapter 2 described a systematic review of the literature to give insight into the characteristics and the effects of patient safety education for residents. By searching PubMed, Cochrane Library, EMBASE, CINAHL, PsycINFO and ERIC, we identified 17 relevant articles that contained original data. More than one third of these studies were published in the past two years and all studies were conducted in the USA. The patient safety
educational programs that were described mostly consisted of multiple sessions in which residents were trained as a group. All articles described multiple teaching methods, among which interactive and experiential educational methods were found most frequently (i.e. discussions, feedback, role-play, simulations). Topics most often found in the educational programs were “learning from mistakes: error reporting and analysis” and “systems thinking and cultural change”. The theoretical framework used most frequently for developing the interventions was the framework of the Accreditation Council for Graduate Medical Education (ACGME) competencies, with a focus on the competencies “systems-based practice” and “practice-based learning and improvement”.

8.2.2 Research question I-B: What do residents and supervisors consider important for patient safety education for residents, and how can this be integrated into the development of a patient safety course for residents?

Chapter 3 described the development and content of a patient safety course for residents. By means of questionnaires we investigated residents’ and supervisors’ perspectives on the current patient safety performance and the educational needs of residents. One-hundred-sixteen (64%) respondents filled out the questionnaire. Residents rated healthcare significantly safer than supervisors. Close links were found between the patient safety risks mentioned and the expressed patient safety educational needs. The perspectives were classified according to the factors that influence daily practice, as described in the London Protocol. Residents and supervisors appointed educational needs that were predominantly related to team factors, work environmental factors and individual factors. Selections of course content and corresponding educational methods were made by an expert panel and based on the questionnaires’ outcomes. The following principal course themes were selected: 1] principles of patient safety; 2] human factors; 3] effective teamwork; 4] contribution to safer care; and 5] medico-legal aspects of patient safety. Workshops, practice assignments, mentoring and assessments were among the chosen educational methods.

8.2.3 Research question I-C: How do course participants evaluate the design of the patient safety course?

Chapter 6 of this thesis included an assessment of residents’ reactions towards the educational program. This study included four multi-specialty 2-day patient safety courses, in which 71 residents participated. Two courses were organized at an academic center and two at a general teaching hospital. Each course consisted of two days with plenary sessions and small group sessions to stimulate interactive learning. The course announcement poster and the course program of the courses at the general teaching hospital can be found in appendix I & II. To stimulate experiential learning, residents received practice assignments for a period of four to six weeks between the course meetings. Three months after the course, semi-structured interviews were scheduled with these residents. One of the questions that was proposed in these interviews was how residents experienced the design of the patient safety course. Sixty-nine (97%) residents were interviewed. Most residents were very enthusiastic about the course. They mentioned it was enjoyable and interesting, and they acknowledged the importance of teaching these principles to residents. Most residents were also satisfied with the
structure and educational methods of the course. Some residents proposed suggestions for improvement of the education, for example to offer this course to residents who are at the beginning of their residency, to offer the course to other health care workers as well, and to organize fresh-up moments to help keeping up attention for the important topics presented in the course.

8.2.4 Research question II-A: What effects of patient safety education for residents are described in the literature?
The systematic review described in chapter 2 incorporated a focus on the effects of patient safety education for residents. All of the 17 included articles described positive effects following the education. Almost half of the articles mentioned equivocal results as well. Evaluations mostly focused on attendants’ participation or modification of knowledge, skills or behavior. However, strength of findings was limited in all studies. More than three-quarters of the included studies contained non-comparative data and only just over half used a pre-post design. Two studies were randomized trials. All but one of the studies used subjective outcome measures (e.g. self-assessment of knowledge gained and attitudes concerning education) and only just over half the studies included objective outcome measures (e.g. conference attendance, chart audits and OSCE’s). None of the identified studies used validated evaluation tools.

8.2.5 Research question II-B: How does a patient safety course influence residents’ knowledge, skills, attitudes, intentions and behavior?
Chapter 4 and 5 gave insight into the effects of a patient safety course for residents on their incident reporting behavior, and chapter 6 focused on patient safety actions in a broader perspective. All the evaluated courses aimed at increasing residents’ knowledge, attitudes and skills in order to recognize and cope with unintended events and unsafe situations at an early stage.

Chapter 4 focused on the attitudes, intentions and behavior concerning the reporting of incidents by residents. We collected data by means of a questionnaire before, immediately after and six months after the course was given. At all three points in time the response rate was 100% (n=33) and significant changes in incident reporting attitudes and intentions were found immediately after the course as well as during follow-up. However, no significant changes were found in residents’ incident reporting behavior.

Chapter 5 focused on residents’ knowledge, skills, attitudes, intentions and behavior concerning incident reporting. We used a controlled design with follow-up measurements and three data collection methods: 1] questionnaires distributed before, immediately after and three months after the course; 2] incident reporting cards filled out by course participants during the course; and 3] residents’ reporting data gathered from hospital incident reporting systems. Forty-four residents participated in the intervention group and attended the patient safety course. Thirty-two residents from another hospital participated in the control group. Positive changes in knowledge, skills and attitudes were found after the course. Residents’ intentions to report incidents were positive at all measurements. Participants filled out 165 incident reporting cards, demonstrating the skills to notice incidents. Residents who had reported incidents before, reported more after the
course. An increase in reported incidents was also registered by the reporting system of the intervention hospital. However, the number of reporting residents did not increase. Chapter 6 of this thesis included an assessment of the effects of patient safety education for residents on their intentions and actions concerning patient safety improvement in general. At the end of the patient safety courses we asked the participants to formulate an action point to improve patient safety. During semi-structured interviews three months after the course, we asked these residents, among other things, about the extent to which they carried out their action point. An inductive theory approach was used to analyze the answers given. Action points and influencing factors were classified according to three levels of health care as defined by Grol & Wensing (2004): 1] the individual professional corresponds to the resident; 2] the social context refers to residents’ colleagues or department; 3] organizational context represents the organization the resident works for. Sixty-nine (97%) residents, who had formulated 91 action points in total, were interviewed. Action points mainly focused on the individual professional or the social context of residents. Action points most often mentioned were: improving organization of own work / follow policies; and improving culture / educate colleagues about patient safety. Sixty-two (90%) residents declared to have taken action, although just 50 (55%) action points had been fully carried out. Actions taken were most often at the level of the individual professional, and less frequently at the level of their social or organizational context. Results of actions included: adjustment of own structure of work; having organized patient safety education for colleagues; more efficient and structured communication towards colleagues; and reporting of incidents.

8.2.6 Research question III-A: Which barriers and promoting factors are experienced by residents in taking action to improve patient safety?

Chapter 6 and 7 reported the barriers and promoting factors that residents experience in taking action to improve patient safety and that influence their behavior. Chapter 6 assessed factors influencing patient safety behavior in a broader context and chapter 7 focused on incident reporting in particular. Promoters for action that residents mentioned during the interviews mostly related to the individual professional or their social context, and included: awareness of the importance of the action to be taken; supportive attitude of colleagues; and having received patient safety education. Barriers were mentioned more frequently and were mostly related to the organizational context or the social context. They included: attitudes of colleagues; high work-pressure; hierarchy; and switching of work stations. The organizational context barrier hugeness of organization / bureaucracy was more of concern in the academic setting. The barrier high work-pressure, on the other hand, was mostly mentioned in a non-academic context. Chapter 7 of this thesis provided insight into the barriers that residents experience in reporting incidents. For this study, focus group sessions were organized and an inductive approach was used to analyze the transcribed discussions. After three focus group sessions, information saturation had been reached. In each of these focus groups, six to eight residents participated, resulting in a total number of 22 participants. Residents declared not to report all incidents because of a negative attitude towards incident
reporting, because they experience a non-stimulating culture, and because of a lack of (perceived) ability to report.

8.2.7 Research question III-B: Which solutions do residents have for taking away the barriers and stimulating patient safety improvement behavior?
Chapter 6 and 7 reported solutions suggested by residents to take away the experienced barriers and to increase patient safety improvement behavior. Suggestions to enlarge the value of patient safety education included: offer patient safety courses at the beginning of the residency; keep paying attention to patient safety; and train the colleagues of residents as well. Solutions to remove barriers related to incident reporting included: providing possibilities to report anonymously; providing feedback; creating an incident reporting culture; simplifying the procedure; clarifying what and how to report; and exciting residents to report incidents.

8.3 General interpretation
8.3.1 Design of patient safety education for residents
Various experiences with educating residents in patient safety were traced by our systematic review of the literature. Especially over the past two years, an enormous increase in publications on this topic of research was found, which might demonstrate an increased awareness of the importance of educating residents in patient safety issues. The USA can be considered forerunners in this field, as all identified studies were conducted there. These studies can offer inspiration for the development of patient safety education elsewhere. The identified studies mainly described positive effects in short-term. However, the effectiveness of these educational programs was difficult to judge because of limitations in the research designs and therefore further research is recommended. Our needs assessment among residents and their supervisors provided valuable input for the development of our patient safety course for residents and involved respondents in the development process. It demonstrated that residents seem not to be fully aware of potential risks of their work and of their own role in patient safety, which underlines the need for an explicit focus on patient safety issues during their training. Residents as well as supervisors mentioned educational needs that were predominantly related to team factors, work environmental factors and individual factors. These outcomes were used for the selection of the course themes and the formulation of learning goals. The course themes fit well with the patient safety related elements of the CanMEDS competencies, which were explained in chapter 1 of this thesis. Table 1 demonstrates how the themes and the learning goals of our patient safety course corresponded with the CanMEDS roles and elements. Each of the themes covered several of the CanMEDS roles and elements, and each role was dealt with repeatedly within our patient safety curriculum.
<table>
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<th>Themes</th>
<th>Learning goals: after the course, residents can...</th>
<th>CanMEDS roles: elements</th>
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| 1. Basic principles of patient safety | - Explain definitions and give examples of incidents.  
- Point out main research outcomes concerning the occurrence of adverse events.  
- Describe the roles of different parties regarding patient safety. | - **Medical expert**: principles of patient safety and avoiding adverse events.  
- **Health advocate**: patient safety.  
- **Scholar**: moral and professional obligation to maintain competence and be accountable. |
| 2. Human factors                    | - Explain how incidents can occur.  
- Describe the role of human factors with regard to patient safety.  
- Demonstrate ways to minimize risks related to human factors.  
- Explain what health care can learn from other high-risk industries. | - **Medical expert**: knowing limits of expertise.  
- **Collaborator**: recognizing one’s own roles and limits.  
- **Health advocate**: patient safety.  
- **Scholar**: self-assessment; identifying gaps in knowledge.  
- **Professional**: self awareness; self-assessment. |
| 3. Effective teamwork               | - Describe different aspects of effective teamwork.  
- Recognize aspects of teamwork that can be risky and explain why they can be risky.  
- Clarify why an open culture is important for improving patient safety.  
- Explain ways to cope with the hierarchical structure in a hospital while protecting the safety for patients.  
- Express ways to improve information transfer (verbal and written).  
- Explain why giving and receiving feedback is important.  
- Describe how other team factors can be improved. | - **Communicator**: shared decision making; efficiency; accuracy; conveying effective oral and written information for patient care; use of expert verbal and non-verbal communication; appropriate documentation.  
- **Collaborator**: collaborative care, culture and environment; shared decision making; sharing of knowledge and information; effective teams; multi-professional health care.  
- **Manager**: supervising others; administration; consideration of justice, efficiency and effectiveness in the allocation of finite health care resources for optimal care; priority setting.  
- **Health advocate**: patient safety.  
- **Scholar**: reflection on all aspects of practice; giving feedback; teacher-student ethics, power issues, confidentiality, boundaries; learning together. |
4. Contribution to safer care
- Clarify risks of the hospitals’ processes.
- Recognize unsafe situations or processes in an early stage.
- Demonstrate what should be done when an unsafe situation or process is noticed.
- Describe what and how one can learn from analyzing errors.
- Point out different methods that can be used to analyze incidents/risky processes.
- Demonstrate analysis of own incidents.
- Describe other methods that can improve the safety for patients.

5. Medico-legal aspects of patient safety
- Explain the role of protocols.
- Demonstrate what to do after an incident has occurred.
- Make clear what may be told to a patient after an incident has occurred.
- Point out how patients want to be approached after an incident.
- Describe potential consequences of an incident.
- Show actions that reduce the risk for claims.

- Manager: quality assurance and improvement; information technology for healthcare.
- Health advocate: patient safety.
- Scholar: evidence-based medicine.
- Professional: commitment to professional standards.

- Medical expert: application of ethical principles for patient care.
- Communicator: disclosure of error or adverse events.
- Health advocate: patient safety.
- Professional: integrity and honesty; medico-legal frameworks governing practice; disclosure of error or adverse events.
The course announcement poster and the program of the courses offered at the general teaching hospital can be found in appendix I & II. Most residents evaluated the course very positively. The content of the course was considered relevant and interesting. Some residents proposed suggestions to achieve better and longer-lasting outcomes. These improvements were mostly in line with the perceived barriers, as described in chapter 6 and 7 of this thesis, and related to organizational aspects of the education. Recommendations to enlarge the benefits of patient safety education for residents, based on the suggestions made by residents, are outlined in the Implications for practice section of this chapter.

8.3.2 Effects of patient safety education for residents
We found some promising effects of 2-day patient safety courses for residents. Our evaluation studies demonstrated that patient safety education can have immediate and long-term positive effects on knowledge, skills and attitudes, but only modestly influences the reporting behavior of residents. A discrepancy between residents’ reporting intentions and their reporting behavior was also found in research elsewhere. In addition we found that residents had various intentions to contribute to patient safety improvement at the end of the course. Studies in the USA also found that residents were very capable of formulating action plans for themselves. In our study residents declared to have taken numerous actions three months after the course. Nevertheless, a gap remained between their intentions and their actual behavior. So although the antecedents of patient safety behavior seemed to be present, these turned out not to be a direct predictor of factual patient safety behavior. These findings underline the need to further explore the factors influencing residents’ behavior in relation to patient safety improvements. Therefore we decided to further investigate the barriers and promoting factors that influence residents’ patient safety behavior.

8.3.3 Factors influencing residents’ behavior to improve patient safety
Residents mentioned far more barriers than stimulating factors when asked what had influenced their behavior to improve patient safety. The stimulating factors mostly related to the individual professional (i.e. the resident) or their social context (i.e. residents’ colleagues or their department). The barriers that residents experienced in taking action mostly related to residents’ social and organizational context; thus relating to their colleagues, their department or to the organization the resident is working for. The barriers that we found can be weighed in relation to the elements of the Theory of Planned Behavior (TPB), which was explained in chapter 1 of this thesis. Weighing the barriers according to the TPB could be useful as this could provide directions for improvement interventions.

Residents’ attitude was not a major inhibiting factor for carrying out the action points, as they were free to choose an action point. However, residents’ negative attitude was among the identified barriers that inhibited incident reporting behavior (e.g. making a report was not considered useful when there had been no negative consequences for the patient). Barriers related to subjective norms and perceived behavioral control were mentioned more frequently, like a non-stimulating attitude of colleagues (in particular of residents’ supervisors) and high work-pressure. Barriers fitting these two elements of the
TPB were predominantly related to the social context and the organizational context of residents. These barriers are hard to overcome by educating residents; they could best be tackled by training the context of residents as well and by stimulating a *generative culture*, in which there is active participation at all levels and where safety is perceived to be an inherent part of the business.\(^{10}\) Other barriers could be tackled more easily. For instance, *forgetting the action point* could be prevented by sending reminders to residents with descriptions of their action points.

Thus, to increase residents’ participation in patient safety improvement, it is important that, next to educational efforts, attention is also paid to removing the experienced barriers. Residents offered practical suggestions to remove some of these barriers. Based on these suggestions, recommendations are given in the *Implications for practice* section further on in this chapter to overcome the barriers and enlarge residents’ participation in learning from incidents and in patient safety improvement in general.

### 8.4 Methodological considerations

One of the strengths of the studies in this thesis is that we used a combination of research methods to gain insight into the development and effects of patient safety education for residents and into the aspects influencing residents patient safety behavior. We studied our research questions in multiple hospitals, focusing on multiple patient safety courses. One of our studies had a controlled design. In total, 25 supervisors and 200 residents participated within the studies described in this thesis. Questionnaires’ response rates varied between 54% and 100% (mean response rate: 81%).

There are some methodological aspects that need to be considered in the interpretation of the results. In the following four paragraphs, we address the methodological considerations of the studies in this thesis and we discuss how we tried to prevent potential biases. Moreover, we provide suggestions for preventing these biases in future studies whenever possible.

#### 8.4.1 Number of respondents

While the total number of respondents that participated in the research for this thesis was very high and the response rates to the questionnaires were rather high as well, the number of respondents and institutions participating in some of the studies was limited. The number of participants per study varied from 22 to 116 people. Two of the studies, which were outlined in chapter 6 and 7 of this thesis, made use of qualitative data collection methods, which typically have a limited number of respondents while providing more comprehensive dimensions of understanding.\(^{11}\) However, the study described in chapter 4 had a quantitative character and yet it included only 33 residents. This number of participants was considered low and we argued that this might explain the lack of measured reporting behavior, as the number of respondents might have been too small to detect changes in behavior. However, the follow-up study described in chapter 5 showed that the lack of reporting behavior could not be explained as a result of a low number of respondents. This follow-up study also assessed residents’ reporting behavior but included more respondents and had a stronger research design. Nevertheless, it led to similar results concerning residents’ reporting behavior as the study described in chapter 4.
The three studies described in chapter 2, 3 and 7 focused on just one hospital, which means that generalizations must be made with some caution. However, for course evaluations there are no reasons to assume that other settings will lead to other outcomes. Moreover, Dutch residents are considered a dynamic group, as many of them have experience in diverse settings, which provides them with a broad perspective on the risks and opportunities for improvements in health care. This could have been of benefit to the assessment of the patient safety perspectives and educational needs (chapter 2), and to the inventory of barriers and solutions concerning patient safety improvements in general (chapter 6) and incident reporting in particular (chapter 7).

8.4.2 Social desirability
It is important to keep in mind that a major part of the outcomes of our studies was based on (subjective) declarations of residents, which might provoke a social desirability bias. In future studies social desirability might be avoided by using more objective outcome measures, such as data from hospitals’ incident reporting systems, patient records, or observations in practice. However, qualitative studies, which in this thesis were present in chapter 3, 6 and 7, aim at exploring processes and relations by focusing on people’s views. In that way qualitative studies depend on subjective data and therefore they all may be sensitive to social desirability. In our research, we tried to reduce this limitation by letting independent researchers collect all data and by underlining the confidentiality of our study methods before collecting data.

8.4.3 Interpretation bias
The researchers’ influence on the interpretation of the research data, also called *interpretation bias,* is often cited as a critical aspect of qualitative research. Conversely, in their book on qualitative research for education, Bogdan & Knopp Biklen (1992) state that the data collected in qualitative research is thick, rich and deep, which often overrides preconceived attitudes of the researcher. Nevertheless, we tried to reduce this bias at several stages in our research process. First, we tried to ensure that we had derived a realistic representation of the respondents’ view by means of *member checking.* We sent the transcript or a summary of the transcript to the respondents and asked them whether they considered this an accurate representation of their view. We also gave respondents the opportunity to add revisions if they wanted to. Later, during the coding process of the qualitative data, we tried to avoid *interpretation bias* by involving other researchers in the analysis process as well.

To reduce *interpretation bias* in future research, we recommend, next to the actions we took to avoid *interpretation bias*, to use, whenever possible, a combination of different data collection methods (triangulation). This enables verification of outcomes and can empower the conclusions, especially if appropriate objective outcome measures are included.

8.4.4 Non-validated study tools
Most of the studies described in this thesis made use of non-validated tools, as for most studies we could not find suitable validated data collection tools. Neither did our systematic review of the literature about evaluations of patient safety education for
residents identify studies that had used validated tools. This is of concern, as validation is required to ascertain whether the assessment actually measures what it claims to measure. To cope with the lack of validated data collection tools, we decided to use non-validated tools that had proved to be useful before elsewhere, or we developed the required data collection tools ourselves. There were three existing tools we used. First, for our systematic review, described in chapter 2, we used the Best Evidence Medical Education Guidelines (BEME). To assess the attitudes, intentions and behavior of residents concerning incident reporting (chapter 5 and 6), we developed a set of items based on a questionnaire that had demonstrated to be useful for the evaluation of patient safety education for residents in the USA. To assess residents’ skills in noticing and reporting incidents (chapter 5), we used colored pocket-size reporting cards that also had demonstrated to be useful previously. To cope with the lack of validated research methods, we created an expert panel that consisted of three physicians, one psychologist, one sociologist and one health scientist, all of whom had many years of experience in patient safety research, medical educational research or medical education itself. The broad range of expertise represented in this panel was applied to the development of the data collection tools.

8.5 Implications for practice

We found some promising results of 2-day patient safety courses for residents. However, while the attitudes and intentions towards patient safety behavior often were positive, multiple inhibiting influences were found in the context of residents. Therefore, when making efforts to increase residents’ participation in patient safety improvement, we recommend that hospital managers and medical educators pay attention to these contextual factors. In line with this, the implications for practice that resulted from the studies of this thesis are related not only to the design of the patient safety education, but also to adjustments within residents’ social and organizational context.

8.5.1 Implications related to the design of the patient safety education

8.5.1.1 Involve people in developing patient safety education

We recommend to involve relevant parties in the development of patient safety education for residents, such as didactical experts, patient safety experts, hospital managers, residents and supervisors. This can be very useful for uniting a broad range of expertise, which can be of benefit for the development of the educational program. Simultaneously, this process also stimulates the involved parties to think about the subject, which might contribute to a feeling of commitment to the educational program in progress. The residents and supervisors in our study (chapter 3) were very willing to share their views about current patient safety risks in hospitals and about the design of the patient safety course for residents. At the same time, it is important to keep the focus on feasible changes and to prevent becoming locked in a negative spiral, in which all the attention is concentrated on insurmountable barriers. Tess et al. (2009) also described the problem of resistance and their strategies to cope with it: 1] presentation of a compelling need for change by demonstrating existing inefficiencies and deficiencies in education and clinical
care; 2] early and explicit engagement of visible skeptics to become part of the change process and evaluation; and 3] addressing of unanticipated operational hurdles using real-time problem solving with residents, especially in the early phases of implementation.

8.5.1.2 Train multiple residents per department
When organizing a patient safety course, we recommend to train multiple residents per department. In one of our studies (chapter 6) this was mentioned as a stimulating factor for taking action to improve patient safety in practice. When multiple residents per department are trained in the same patient safety principles, they can more easily collaborate in taking actions to improve patient safety on their department. Having attended the patient safety course together could result in a feeling of alliance, and the trained residents can support each other once they are back in daily practice. Moreover, training multiple residents per department might stimulate discussions about this theme on the department.

8.5.1.3 Offer patient safety courses at the beginning of residency
We recommend to offer patient safety courses to residents shortly after they start their residency, between ½ and 1½ year after the start of the residency. The trained residents in our study (chapter 6) mentioned that this would be the most useful period to attend the patient safety education. In the beginning residents are still searching for the right working methods and are more flexible to incorporate new strategies in their daily practice in order to improve patient safety. Besides, at the beginning of their residency, residents have a relatively low level of experience and this is considered a risky factor that could endanger patient safety. However, residents also mentioned that the patient safety education should not be offered immediately at the beginning of their work in a particular hospital, as they are then very busy coping with all the new impressions that come with their novel working station.

8.5.1.4 Stimulate creating action plans & keep paying attention
For education aiming at changing residents patient safety improvement behavior in daily practice, we recommend the creation of action plans during the education. This stimulates thinking and discussion about barriers that could play a role and how to overcome these in advance, thus making it more likely that actions will actually be taken eventually. Positive outcomes of patient safety education for residents using this method were described by Holland et al. (2009) and Tess et al. (2009). A plan for action could be made according to the Plan-Do-Act-Cycle, for example (chapter 2). To prevent the intentions from silting up, it is important that attention is continuously paid to these action plans. We recommend to organize follow-up sessions in the patient safety educational program that pay attention to the progress of the intended actions. Our studies demonstrated that follow-up moments stimulated residents to take action to improve patient safety (chapter 5). Next to this, it could be useful to send reminders to residents in the meanwhile, to help them remain focused on the issue. In our study (chapter 6), residents repeatedly mentioned that when they were back in daily practice for a while, their intentions to improve patient safety were forgotten. Another option could be to involve the supervisors who regularly assess residents’ work, for example by making patient safety improvement actions a
required item in the portfolio of residents. An adequate preliminary training of the supervisors is advisable, as will be outlined later on in paragraph 8.5.2.2 of this chapter.

8.5.1.5 Make use of residents’ experiences
We found that residents had many reality-based casuistic present in which patient safety was at risk, and that these residents were willing to discuss this in a group with other residents (chapter 6 & 7). We recommend to make use of these casuistic whenever possible, as this enables residents to easily link the course matter to their own daily practice. The use of their own casuistic can be especially valuable for incident analysis and to formulate strategies for prevention.
It is important to keep in mind that in a course group with residents from various disciplines the casuistic and discussions are also likely to be diverse. Therefore, adequate guidance is required to keep the discussions interesting for most of the course participants. In our courses (chapter 6), some residents considered major parts of the discussions irrelevant to their own specialty. Nevertheless, most residents were very positive about the multi-specialty approach, as this created opportunities to discuss and learn from other disciplines (chapter 6).

8.5.1.6 Integrate patient safety into other educational moments
Integration of patient safety matter into other educational moments could function as fresh-up moments, which stimulates maintenance of the lessons learned before (chapter 6). Moreover, when patient safety is incorporated into educational moments in practice, this may help linking patient safety principles to the daily practice of residents. As we mentioned in the introductory chapter of this thesis, it is important that education is closely related to clinical practice, and wherever possible it needs to be incorporated into the attendants’ daily practice, because what people learn in one context will not necessarily apply in another setting.16

8.5.2 Implications related to adjustments in residents’ social and organizational context
8.5.2.1 Focus on and inform about patient safety
There should be an explicit, solid focus on patient safety in the hospitals’ management and in residents’ education. This is especially of concern for hospital managers and for people involved in the development and delivery of graduate medical education (chapter 6). Residents should be informed about the efforts that are made, about the results of these efforts and about what is yet to come. In doing so, it is wise to spread information using an encouraging approach and to explain how residents themselves can contribute to further improvements. Residents in our study (chapter 7) suggested that distributing posters and mailings that include tips for patient safety improvements can be useful in this respect.

8.5.2.2 Train the context of residents as well
It is recommended to train residents’ colleagues in patient safety principles as well, and to stimulate a patient safety culture. Residents’ supervisors in particular are an important target group that can strongly influence residents’ behavior, as they are the residents’ teachers and they evaluate residents’ performances (chapter 6 & 7). Because of this
dependency, it is very important that supervisors demonstrate that they consider patient safety to be important and that they stimulate an open conversation about this topic. In our research (chapter 6 & 7), some residents mentioned that their supervisors did not stimulate them to actively improve patient safety (e.g. report and discuss errors) and that as a result, residents were discouraged to carry out their intended actions to improve patient safety.

To help stimulating a patient safety culture by educating health care workers, residents could also play an important role. For example, as residents are used to giving presentations on their department to educate their colleagues, they could easily integrate patient safety issues as well. In that respect, the patient safety course could be considered a *teach the teacher* course. Moreover, this could also be very useful for residents themselves, as educating others requires a very good understanding of the teaching matter. The didactical *Learning Pyramid* suggests that teaching others is the most effective learning strategy (figure 1).\(^\text{17}\)

### 8.5.2.3 Encourage patient safety initiatives

To achieve and maintain appropriate patient safety behavior, it is important to encourage and praise the preferred behavior. Residents in our studies (chapter 6 & 7) frequently mentioned that they were demotivated when their patient safety actions were not visibly appreciated by their colleagues, for example when an unsafe situation was reported or discussed by the resident, but nothing was done about it. So if residents’ active participation in patient safety improvement is desired, their efforts should be encouraged and praised.

**Figure 1.** Learning Pyramid - average retention rate of information following teaching or activities by the method indicated

![Learning Pyramid](image)
8.5.2.4 Simplify systems and procedures
It is important that systems and procedures are easily accessible and easy to use. Therefore it is recommended to simplify systems and procedures whenever possible (chapter 7). Complex systems and procedures were frequently mentioned as barriers that inhibited actions in order to improve patient safety (chapter 6 & 7). To become aware of the bottlenecks in existing systems and procedures, it is recommended to speak about this with the users. In our studies (chapter 6 & 7) residents were all willing to talk about their experiences with the procedures and systems, and they were able to identify bottlenecks and suggest practical solutions to remove them. However, residents often did not consider the adjustment of systems and procedures to be their own responsibility, but rather that of their supervisors or the hospital managers.

8.5.2.5 Actively involve residents in patient safety improvements
It is recommended to actively involve residents in patient safety improvements. As mentioned in the previous section, many residents are willing to think about identifying and solving problems concerning patient safety (chapter 6 & 7). We experienced that many residents have a lot of good ideas for problem solving (chapter 6 & 7). This is due to the unique position that residents have, because each time they are switching to another work station they concurrently build up a diverse set of experiences in the hospitals’ daily practice. They experience where things go smoothly and where they do not, and they see the positive and the negative aspects in the various settings. Therefore, they are especially capable of giving feedback and tips for systems improvement. This was also demonstrated by Singh et al. (2005)\(^\text{18}\) and Holland et al. (2009).\(^\text{7}\)

8.5.2.6 Restrict residents’ work-pressure
In order to improve patient safety, it is important to restrict residents’ work-pressure. In our studies (chapter 6 & 7) we often found that residents did not undertake patient safety improvement actions because of a lack of time. For example, high work-pressure was frequently appointed as a contributing factor in not reporting an incident. This was especially of concern at the general teaching hospitals (chapter 6). It should be kept in mind that adjusting behavior might take some extra time, both to exercise the new behavior and to integrate this behavior into existing routines. Residents should be allowed this extra time if they are expected to change their behavior in a sustained way. If this time is not allowed, it is likely that residents, like other people, will relapse into their old familiar behavioral patterns.\(^\text{19}\) During the educational courses in our studies, we experienced that residents often did not get the opportunity to attend the course because of high work-pressure. Alternatively, if residents did attend the course, their work on the wards often accumulated excessively.

8.6 Implications for future research
The studies described in this thesis provided some insight into the development and the effects of patient safety education for residents and the factors influencing residents’ patient safety improvement behavior. To our knowledge, these are the first published research experiences with multi-specialty patient safety education for residents in Dutch
hospitals. We found some promising results of the education. However, we also had to conclude that residents’ context brought up many barriers that inhibited residents’ intended actions to improve patient safety. For future research it would be interesting to further investigate the effectiveness of the education and explore the possibilities and results of taking away the identified barriers. In this section, recommendations for such future research are outlined in more detail.

8.6.1 Effectiveness of education

More research is desired to further investigate the effects of our patient safety education, as it is conceivable that our education caused additional effects, which were not traced by the data collection methods we used. More research is also required to discover the most effective method to influence patient safety improvement behavior of residents. In our studies, we focused on the effects of 2-day patient safety courses in multiple-specialty groups of residents. It would also be interesting to assess effects of mono-specialty training programs (e.g. patient safety education integrated into existing learning settings), and to investigate results of training residents together with other health care workers (e.g. nurses and supervisors). Future evaluative studies should also further investigate the relation between specific curricular content and their outcomes.

For future evaluations we recommend to make use of multiple outcome measures, including, if possible, objective outcome measures (e.g. independent observations in practice, investigations of patient records or data of the hospitals’ reporting systems). Research designs should preferably include control groups, randomization to groups, long-term follow-up measurements and validated measurement tools. As we could not find appropriate validated measurement tools, we also recommend for future research to validate existing tools and to pay attention to the validation when developing new tools. When investigators pursue evaluations of patient safety education, they are advised to adhere to the Standards for QUality Improvement Reporting Excellence guidelines (SQUIRE), which provide an understanding of publication requirements and a detailed approach to reporting methods and findings.

8.6.2 Barriers inhibiting patient safety behavior

In this thesis we identified many barriers related to residents’ context that inhibited their intentions to take action. Major barriers were a negative attitude of colleagues concerning patient safety improvements; user-unfriendliness of the incident reporting system; and experiencing a high work-pressure. However, our studies identifying the barriers were based on qualitative data. To get more insight into the relative importance of these barriers we recommend to conduct a quantitative survey-based study which measures the opinions of a larger number of people. Since the barriers that were found can be categorized using the TPB, one could also apply a TPB-questionnaire for further investigation. A next step should be an investigation of the possibilities to overcome the most important barriers. When introducing interventions to overcome these barriers, we recommend to also investigate, if possible, the effects of these interventions on specific patient safety behavior (e.g. incident reporting or communication).
8.7 Conclusion

Educating residents in patient safety principles is just one of a variety of interventions to contribute to patient safety improvement. Other efforts to improve patient safety are also undertaken on various levels of health care, and they are necessary to help reducing the risks that endanger patient safety. However, in view of the importance of patient safety, the positive effects that were measured after educating residents on patient safety topics plead for integrating patient safety as a permanent element of medical education. The studies in this thesis demonstrated that a 2-day patient safety course for medical residents could help to create patient safety awareness in this group, could help to positively influence residents’ attitudes and intentions, and could stimulate the development of specific patient safety skills, such as noticing and analyzing incidents. How this could be transposed to long-lasting patient safety improvement behavior is an important topic for further research, but we believe that this goal can only be reached if patient safety education is integrated as a permanent element of formal and non-formal learning.
Reference list