Evidence-Based Quality Improvement: A recipe for improving medication safety and handover of care

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CHAPTER 8

Best of both worlds: combining evidence with local context to develop a nursing shift handover blueprint

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Submitted
ABSTRACT
Objective
Standardization of the handover process is deemed necessary to ensure continuity and safety of care. However, local context is considered of equal importance to improve the handover process. Our objective was to determine what recommendations on standardized shift handover nurses make if we combine evidence from the literature with the local context of the nurses.

Design
A RAND modified Delphi consensus process that combines evidence from systematic reviews with expert opinion of local nurses and an evaluation of the consensus process with a survey.

Setting; participants
One academic medical center in the Netherlands. 20 nurses

Results
Four systematic reviews on nursing handover were included and used to compose provisional recommendations on how, what, where and the preconditions of shift handover. Nurses reached consensus on a final set of 18 recommendations for handover: how (1 recommendation), what (12 recommendations), where (3 recommendations) and the preconditions (2 recommendations). The recommendations were bundled in a blueprint on nursing shift handover and structured with the mnemonic NURSEPASS. The nurses assessed the method as an effective approach to develop a local blueprint.

Conclusions
Evidence-based consensus is a feasible method to combine evidence from the literature with local context. We anticipate that implementation of the resulting tailored blueprint for nursing shift handover will be facilitated due to the method used. Through evaluation of its effectiveness we intend to add to the body of evidence on development and implementation of effective nursing handover, which is an essential link for continuity and safety of care.

Keywords: Patient Safety, Continuity of Patient Care, Patient Handoff, Quality improvement, Delphi technique, Consensus.
INTRODUCTION
Communication failures threaten patient safety, especially at moments when care is handed over from one healthcare professional to another. In an analysis of sentinel events the Joint Commission identified communication and handover failures as a contributing cause in two out of every three sentinel events. In its 2001 report, 'Crossing the Quality Chasm' the Institute of Medicine (IOM) stated that handovers provide an opportunity for error and that "in a safe system, information is not lost, inaccessible, or forgotten in transitions." In a 2009 hospital survey on patient safety culture hospital staff respondents reported that "important patient care information is often lost during shift changes and patient transfers." Nursing shift handover is such a moment when adequate communication is critical for continuity and safety of care.

If clinically relevant information is shared accurately and in a timely manner, it may prevent adverse events, inappropriate treatment and delay and omission of care. Global initiatives on handover, as well as accreditation bodies, promote standardization of the handover process to enhance continuity of care and patient safety. During the past decade many organizations responded to this call and initiated quality improvement (QI) projects to standardize the handover process.

To determine the effectiveness of those different QI projects for nursing handover, we conducted a Cochrane systematic review (SR) of studies with a randomized controlled study design (RCT). Unfortunately, most studies we found used a simple before-and-after design. In the majority of these initiatives a pragmatic approach was used to develop, implement and test a standardized approach for the handover process. As a consequence, uncertainty remains about the most effective nursing handover process, and one can only rely on insights obtained from SRs of studies with simple before-and-after designs.

In 2010, the global effort by the World Health Organization (WHO) to develop a standardized approach for communication at handover of care was abandoned due to the finding that the handover process is heavily influenced by cultural and environmental issues that are not measurable and easy to standardize. Other research also stresses the importance of local context for the successful implementation of patient safety practices. Local context can be thought of as characteristics of the organization and its environment that influence the implementation and effectiveness of the patient safety practice.

If evidence from the literature as well as local context could be taken into
account, it would be possible to develop an evidence-based standard for handover that is tailored to the local context. Therefore, we developed a local standard called the ‘nursing shift handover blueprint’. We used a formal consensus process that combines both evidence from the literature with expert opinion of local nurses. Specifically, in our study of nurses in the AMC, we addressed the following questions. Can nurses achieve consensus on literature based recommendations for a local shift handover blueprint? What are the resulting recommendations for the blueprint?

**METHODS**

**Setting**
The study was conducted at the Academic Medical Center (AMC), a large tertiary care university hospital in Amsterdam, The Netherlands. Nurses work in three, eight hour shifts and each nurse has designated patients for whom he/she cares. The available time for shift handover varies from 15 minutes to one hour, depending on the time of shift change and the available overlap time for incoming and outgoing nursing shifts, e.g. overlap time for night shift to day shift is 15 minutes.

**RAND modified Delphi**
To develop an evidence-based blueprint on nursing shift handover we formulated four answerable questions with respect to continuity and safety of care and preferences of professionals and patients: (1) ‘How to handover’ (which nursing shift handover style (written and/or verbal and structured or not) has preference), (2) ‘What to handover’ (what topics should be addressed in each nursing shift handover), (3) ‘Where to handover’ (is bedside nursing shift handover preferred over other locations), and (4) ‘Preconditions for handover’ (which preconditions for nursing shift handover are important).

The questions were answered through a stepwise approach based on the RAND modified Delphi method. This iterative method combines expert opinion with evidence in a measurable way. The steps were: (1) literature search, (2) drafting recommendations on nursing shift handover, (3) first questionnaire round, (4) consensus meeting, and (5) second questionnaire round. We concluded the study with (6) an evaluation of the resulting blueprint and method used.
Literature search
The search of our previous Cochrane SR was used to identify other available SRs with results of studies on nursing handover (for the complete search strategy we refer to the SR. To identify relevant SRs the inclusion criteria were: (1) the purpose of the study is a systematic review of the literature, (2) the review includes results on nursing shift handover interventions and (3) the review meets the criteria for identification of and classification as a systematic review as specified by the Database of Abstracts of Reviews of Effects (DARE) screening criteria (Appendix 1 for DARE criteria).

Study quality assessment
To assess the methodological quality of a SR the OQAQ (Overview Quality Assessment Questionnaire) and AMSTAR (Assessing the methodological quality of systematic reviews) instruments are available. Since both of these instruments are validated and have a good reliability, they are generally recommended. Because the available SRs were not based on RCT studies, the OQAQ checklist was the most appropriate to use. This instrument includes nine items pertaining to individual aspects in the reporting of a systematic review (e.g. were the search methods used to find evidence on the primary question stated?). Each item is assessed using a three-point scale (i.e. no, partially/can’t tell or yes).
Both authors independently selected and appraised the SRs according to the inclusion criteria and the OQAQ checklist. Any disagreement was resolved through discussion between both authors. From the included SRs and relevant underlying studies (with results on nursing shift handover interventions) one author (MS) extracted the data to construct an evidence table. The evidence table was checked by the second author (HV).

Drafting the recommendations
Based on the results in the evidence table we synthesized a conclusion per question including the level of supporting evidence. To arrive at recommendations for the specific situation at our hospital, local context is of importance. The local context can be patient preferences, availability of special techniques or expertise, costs or other organization specific issues. The local context was summarized after the conclusion. We then combined the conclusion with the local context and drafted a recommendation per question (how, what, where and preconditions).
First questionnaire round
The head nurses of our clinical departments each proposed nurses that could represent the department in an expert panel. Twenty nurses were invited by email to participate; two male and 18 female with an average age of 33 years (spread 23–55 years) and on average 10 years of working experience (spread 2–32 years). The four questions with conclusions and recommendations were presented to the nurses as a questionnaire. They rated the recommendations on a Likert scale ranging from 1 (‘definitely not appropriate’) to 9 (‘definitely appropriate’), including an answer category ‘cannot assess’. After each recommendation there was an opportunity to give comments. We analyzed the results of the questionnaire with Microsoft Excel 2010. A recommendation was accepted if there was agreement on it. Agreement was defined as: a median score of 7 or higher, 75% of scores in the top percentile (scores 7, 8 or 9) and less than 25% of scores in the low percentile (scores 1, 2 or 3).23,24

Consensus meeting
All nurses were invited for a consensus meeting. To enable as many as possible nurses to attend, two meetings of each 90 minutes were scheduled. The goal of the meeting was (1) to determine whether all recommendations were clear and (2) to adjust the recommendations without agreement. Several scenarios were possible: a recommendation with agreement was clear and needed no further refinement; a recommendation with agreement was not completely clear and needed refinement; a recommendation without agreement needed modification. At the start of the meeting the results of the first round ratings were presented. Subsequently, the nurses discussed each recommendation according to the scenarios.

Second questionnaire round
The refined recommendations with agreement as well as the reformulated recommendations were presented to the nurses in a second questionnaire. The changes were highlighted and the nurses rated the reformulated recommendations on the same Likert scale as in the first round. Analysis and calculation of agreement was done in the same way as in the first round.

Figure 1. The step-wise RAND-modified Delphi method
Step 1. Selection of literature
2178 potentially relevant publications title and abstract screened for relevance
24 publications included + 3 publications added through reference checking
27 publications full text screened
4 publications included
23 publications excluded
No SR n=5
No results on nursing handover interventions n=6
Did not fulfill DARE criteria n=12

Step 2. Drafting of recommendations on four questions
(1) How to handover: n=1
(2) What to handover n=12
(3) Where to handover: n=1
(4) Preconditions for handover: n=1

Step 3. First questionnaire round (n=15)
(1) How to handover: agreement n=1, disagreement n=0
(2) What to handover: agreement n=6, disagreement n=6
(3) Where to handover: agreement n=0, disagreement n=1
(4) Preconditions for handover: agreement n=0, disagreement n=1

Step 4. Consensus meetings
(1) How to handover: n=0
(2) What to handover: reformulated: n=6, additional n=1
(3) Where to handover: reformulated in n=3
(4) Preconditions for handover: reformulated in n=2

Step 5. Second questionnaire round (n=12)
(1) How to handover: no new items
(2) What to handover: agreement n=5, disagreement n=2
(3) Where to handover: agreement n=3, disagreement n=0
(4) Preconditions for handover: agreement n=2, disagreement n=0

Step 6. Evaluation
Final set of recommendations (n=18):
(1) How to handover: n=1
(2) What to handover: n=12
(3) Where to handover: n=3
(4) Preconditions for handover: n=2
PART II - Safe handover of care

Evaluation
We developed a questionnaire in Survey Monkey (www.surveymonkey.com) to evaluate the consensus process and resulting blueprint. All nurses received an email invitation to participate and a reminder email was sent after 4 weeks.

RESULTS
The search strategy from the SR included 2178 publications until 1 March 2013. Independent examination by both authors resulted in retrieval of 24 SRs that were potentially eligible for inclusion, reference checking added another three SRs (n=27). We assessed the full text against the inclusion criteria and included four SRs (Figure 1, step 1). Subsequently, we constructed an evidence table from the four SRs and their relevant underlying studies (Appendix 2).

Study quality assessment
Table 1 presents the results of the methodological quality appraisal. All studies scored well on items one to three (search methods and in- and exclusion of studies) and items seven and eight (reporting of combining findings). However, on study selection bias only two studies scored well.

Drafting the recommendations
We synthesized the evidence from literature into a conclusion, added local context and drafted 15 provisional recommendations for the four questions on how, what, where and preconditions (Figure 1 and Table 2). All conclusions were supported by a level of evidence of C: non-comparative studies.

Table 1. Quality assessment

<table>
<thead>
<tr>
<th>OQAQ items</th>
<th>Arora 2009</th>
<th>Riesenborg 2010</th>
<th>Foster 2012</th>
<th>Staggers 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Were the search methods used to find evidence (original research) on the primary question(s) stated? (Explicit statement of search methods is required)</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>2. Was the search for evidence reasonably comprehensive? (Statement that at least two electronic sources were searched, plus supplemental searches e.g. hand searching, specialized registers. Sources should be named)</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>
### Table 1. Continued

<table>
<thead>
<tr>
<th>OQAQ items</th>
<th>Arora 2009</th>
<th>Riesenberg 2010</th>
<th>Foster 2012</th>
<th>Staggers 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Were the criteria used for deciding which studies to include in the overview reported? <em>(If two or more items mentioned, yes; if less than 2 mentioned, partially; if none mentioned, no)</em></td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>4 Was bias in the selection of studies avoided? <em>(Yes is given if at least two reviewers independently assess for inclusion. A consensus must be reached)</em></td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>5 Were the criteria used for assessing the validity of the included studies reported? <em>(Explicit statement of quality appraisal tool used to assess included primary studies)</em></td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>6 Was the validity of all the studies referred to in the text assessed using appropriate criteria (either in selecting study for inclusion or in analyzing the studies that are cited)? <em>(Yes is given if there is a description of any criteria (either internal or external) used either for inclusion, or for analysis (e.g., sensitivity analysis))</em></td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>7 Were the methods used to combine the findings of the relevant studies (to reach a conclusion) reported? <em>(Explicit statement of data extraction process e.g., independent extractors, consensus procedure for disagreements)</em></td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8 Were the findings of the relevant studies combined appropriately relative to the primary question the overview addresses? <em>(Data from primary studies should be presented in table form e.g., data associated with participant characteristics, data associated with disease/condition under review)</em></td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>9 Were the conclusions made by the author(s) supported by the data and/or analysis reported in the overview? <em>(Explicit statement of methods used to combine findings is required)</em></td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Scoring: ‘no=0 points’, ‘partially/can’t tell= 1 point’ or ‘yes=2 points’
PART II - Safe handover of care

Table 2. Results of the consensus procedure: First Questionnaire, Consensus Meeting, and Second Questionnaire

<table>
<thead>
<tr>
<th>Provisional recommendations</th>
<th>First questionnaire</th>
<th>Second questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>‘How to handover’</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Make use of a structured written format available from the electronic medical record. Handover from day to night shift and indicated patients. Complement handover with a verbal explanation</td>
<td>8.0 89 0 Accepted</td>
<td>Accepted, addition: freedom in how to combine verbal and written, definition of indicated patients specified per department</td>
</tr>
<tr>
<td><strong>‘What to handover’</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Make use of a minimal dataset that is easy to remember through a mnemonic</td>
<td>7.0 80 10 Accepted</td>
<td>Accepted, addition: freedom in verbal content, written content serves as a guide</td>
</tr>
<tr>
<td>Minimal data set</td>
<td>9.0 95 5 Accepted</td>
<td></td>
</tr>
<tr>
<td>3. Patient identification (name, date of birth, gender, allergies, reanimation code, isolation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Attending physician, operating physician, other caretakers, primary responsible nurse, caring nurse</td>
<td>6.0 40 25 Discuss</td>
<td>Adjusted to only physicians: Attending physician, operating physician, other caretakers</td>
</tr>
<tr>
<td>5. Problems (history and diagnosis)</td>
<td>8.0 90 5 Accepted</td>
<td>Reformed: Reason for admittance, relevant history, diagnosis, relevant co-morbidity</td>
</tr>
<tr>
<td>6. Treatment plan (plan and goals)</td>
<td>7.0 63 5 Discuss</td>
<td>Reformulated: Treatment plan, multidisciplinary goals and evaluation of current situation</td>
</tr>
<tr>
<td>7. Care plan (activities, psycho-social, risks (falls, decubitus, infections)</td>
<td>7.0 65 10 Discuss</td>
<td>Reformulated: Care plan (activities, psycho-social, risks (falls, decubitus, infections) and evaluation</td>
</tr>
<tr>
<td>8. Current situation (vitals, pain) and evaluation of care and treatment plan)</td>
<td>8.0 89 6 Accepted</td>
<td>Education and information</td>
</tr>
<tr>
<td>9. Results of investigation and treatment (lab, radiology, etc)</td>
<td>7.0 70 10 Discuss</td>
<td></td>
</tr>
<tr>
<td>10. Medication (changes)</td>
<td>7.0 68 16 Discuss</td>
<td></td>
</tr>
</tbody>
</table>
Consensus meeting | Second questionnaire

‘How to handover’

1. Accepted, addition: freedom in how to combine verbal and written. Definition of indicated patients specified per department

‘What to handover’

2. Accepted, addition: freedom in verbal content. Written content serves as a guide

3. Accepted, with previous addition to only mention verbally if indicated

4. Adjusted to only physicians. Attending physician, operating physician, other caretakers

5. Rephrased: Reason for admittance, relevant history, diagnosis, relevant co-morbidity

6. Reformulated: Treatment plan, multidisciplinary goals and evaluation of current situation

7. Reformulated: Care plan (activities, psycho-social, risks (falls, decubitus, infections) and evaluation

8. Split in separate items: Vitals and pain (consensus, no new scoring round needed) Add evaluation of current situation to treatment plan and care plan

Education and information

9. Reformulated: Relevant results of investigation and treatment

10. Add this item to safety check
Table 2. Continued

<table>
<thead>
<tr>
<th>Provisional recommendations</th>
<th>First questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where to handover’</td>
<td></td>
</tr>
<tr>
<td>11. Planned discharge date</td>
<td>6.0 40 15 Discuss</td>
</tr>
<tr>
<td>12. Assignments and tasks</td>
<td>8.0 88 6 Accepted</td>
</tr>
<tr>
<td>13. Safety check (pumps, lines, catheters, drains, dressings)</td>
<td>9.0 85 5 Accepted</td>
</tr>
<tr>
<td>14. Handover from day to night shift and for indicated patients at the bedside with active involvement of the patient/family and opportunity to ask questions</td>
<td>5.5 35 40 Discuss</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>‘Preconditions for handover’</th>
</tr>
</thead>
<tbody>
<tr>
<td>15. Provide a training in handover for nurses and for each handover provide:</td>
</tr>
<tr>
<td>• Sufficient time</td>
</tr>
<tr>
<td>• Quiet surrounding/no interruptions</td>
</tr>
<tr>
<td>• An opportunity to ask questions</td>
</tr>
<tr>
<td>• Use of verification mechanisms</td>
</tr>
</tbody>
</table>

Scores with agreement in *light blue*, scores without agreement in *dark blue*. 
<table>
<thead>
<tr>
<th>Consensus meeting</th>
<th>Median score</th>
<th>% top percentile</th>
<th>% low percentile</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Where to handover</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Reformulated: only written, not verbal</td>
<td>8.0</td>
<td>82</td>
<td>6</td>
<td>Accepted</td>
</tr>
<tr>
<td><strong>Bedside handover not feasible: time, privacy issues</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive on safety check. Three new recommendations formulated</td>
<td>8.0</td>
<td>88</td>
<td>0</td>
<td>Accepted</td>
</tr>
<tr>
<td>14. Handover in a separate handover room, also to enable preconditions privacy, quiet surrounding and minimal interruptions</td>
<td>8.0</td>
<td>88</td>
<td>0</td>
<td>Accepted</td>
</tr>
<tr>
<td>15. Following handover a safety check for indicated patients at the bedside</td>
<td>8.8</td>
<td>88</td>
<td>0</td>
<td>Accepted</td>
</tr>
<tr>
<td>16. Leaving nurse informs patient of shift change and nurse to take over</td>
<td>7.0</td>
<td>75</td>
<td>0</td>
<td>Accepted</td>
</tr>
<tr>
<td><strong>Preconditions for handover</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Split the recommendation into two separate recommendations</td>
<td>8.0</td>
<td>87</td>
<td>0</td>
<td>Accepted</td>
</tr>
<tr>
<td>17. During handover: time for questions and make use of verification mechanisms</td>
<td>8.0</td>
<td>87</td>
<td>0</td>
<td>Accepted</td>
</tr>
<tr>
<td>18. Training of senior nurses, teach the teacher, role model</td>
<td>7.5</td>
<td>81</td>
<td>0</td>
<td>Accepted</td>
</tr>
</tbody>
</table>
First questionnaire round
All 20 nurses agreed to participate and rated the recommendations (100% response rate). They reached agreement on seven of the 15 recommendations. The nurses did not agree on six out of 11 items for the contents of the dataset, the recommendations of ‘where to handover’ and ‘the preconditions’ needed for effective handover.

Consensus meeting
The meetings were attended in total by 13 nurses (meeting 1: n=6, meeting 2: n=7). In the meeting we adapted six items of the minimal dataset, the recommendation on ‘where to handover’ was reformulated into three separate recommendations and ‘the preconditions of handover’ were adapted to two separate recommendations (Figure 1 and Table 2).

Second questionnaire round
In the final round 17 of the 20 nurses rated the recommendations (85% response rate) and the nurses reached agreement on five of the seven items of the dataset, on all recommendations for ‘where to handover’ as well as ‘the preconditions of handover’ (Figure 1 and Table 2). The recommendations were bundled in a blueprint for nursing shift handover (Figure 2). We conceived of ‘NURSEPASS’ as a mnemonic for the elements of the minimal dataset. The resulting blueprint was sent by email to the nurses.

Evaluation
The evaluation questionnaire was completed by 14 of the 20 nurses (response rate of 70%). Results of the evaluation are in Table 3. Overall the applied method was appreciated: the nurses found it a feasible method that is worth their time and they would also recommend the method to others. However on the expectations for support on implementation the nurses are somewhat divided: there is also some doubt.
This evidence-based blueprint for nursing shift handover in the AMC was developed through combining evidence from the literature with expert opinion of nurses. Through a consensus process, agreement was reached on the 'HOW', 'WHAT', 'WHERE' and 'PRECONDITIONS' of the nursing shift handover.

**HOW**: Nursing shift handover style

A structured written format, which is available in the electronic medical record, is used for each shift handover. For the change of shift from day to evening, as well as for patients with an indication in the other shifts, it is preferred to combine the written handover with a verbal explanation. Preferably, this combined written and verbal handover takes place first and if needed, can be supplemented by further reading the medical record afterwards. Each department determines the criteria for patients that have an indication for a combined written and verbal handover, because this is highly dependent on the type of patients.

**WHAT**: Contents structured format nursing shift handover

Minimal dataset*

<table>
<thead>
<tr>
<th>N</th>
<th>Name and identification of patient</th>
<th>Name, date of birth, gender, allergies, resuscitation status, isolation</th>
</tr>
</thead>
<tbody>
<tr>
<td>U</td>
<td>Care providers</td>
<td>Attending physician, surgeon, other caretakers</td>
</tr>
<tr>
<td>R</td>
<td>Reason for admittance</td>
<td>Reason for admittance, relevant history, diagnosis, relevant co-morbidity</td>
</tr>
<tr>
<td>S</td>
<td>Situation</td>
<td>Relevant results of examinations and treatment (laboratory results, radiology, etc.)</td>
</tr>
<tr>
<td>E</td>
<td>Evaluation</td>
<td>Vital parameters, pain</td>
</tr>
<tr>
<td>P</td>
<td>Plan</td>
<td>Treatment plan, multidisciplinary treatment goals and evaluation, planned discharge date</td>
</tr>
<tr>
<td>A</td>
<td>Actions</td>
<td>Assignments and tasks</td>
</tr>
<tr>
<td>S</td>
<td>Summary</td>
<td>Summary and verification</td>
</tr>
<tr>
<td>S</td>
<td>Safety check at the bedside</td>
<td>(High risk) medication, pumps, drains, catheters and bandages</td>
</tr>
</tbody>
</table>
**WHAT:** Contents structured format nursing shift handover

The complete minimal dataset is presented in the structured written report and generated as much as possible from data in the electronic medical record. The structured written report serves as guidance for the verbal handover. The content of the verbal explanation is left to the professional expertise of the nurses.

**WHERE:** Locations for the elements of the nursing shift handover

Handover takes place at a quiet location that enables sufficient privacy and minimal interruptions.

Following handover a bedside safety check is performed for indicated patients (high risk) medication, pumps, drains, catheters and bandages).

The departing nurse informs the patient about the shift change and the nurse who takes over.

Departments can decide to perform the complete handover at the bedside.

**PRECONDITIONS:** Important preconditions for handover

During handover the nurse makes use of verification mechanisms and there is opportunity to ask questions.

Senior nurses are trained in the process of handover to enable them to act as role models and teachers.

* The letters of the mnemonic NURSEPASS correspond to Dutch terminology for the categories of the minimal dataset.
Table 3. Process evaluation

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer categories: ‘no, not at all’ and ‘a little’ (%)</th>
<th>Answer categories: ‘mostly and yes, completely’ (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Was the method used an agreeable way to develop a blueprint? (n=14)</td>
<td>14</td>
<td>86</td>
</tr>
<tr>
<td>2 Did this method help you to use evidence as well as your personal experience to form an opinion on the future nursing handover? (n=14)</td>
<td>29</td>
<td>71</td>
</tr>
<tr>
<td>3 Was the consensus meeting an adequate way to adjust the recommenda- tion? (n=14)</td>
<td>14*</td>
<td>64*</td>
</tr>
<tr>
<td>4 Did the method enable you to act as a representative for your team? (n=14)</td>
<td>14</td>
<td>86</td>
</tr>
<tr>
<td>5 Did the method result in credible results? (n=13)</td>
<td>23</td>
<td>77</td>
</tr>
<tr>
<td>6 Do you expect that the blueprint can be easily implemented? (n=14)</td>
<td>22</td>
<td>78</td>
</tr>
<tr>
<td>7 Do you think that by using this method the support for implementation of the blueprint has increased? (n=13)</td>
<td>39</td>
<td>62</td>
</tr>
<tr>
<td>8 You invested time in answering the questionnaires and attending the consensus meeting. Do you think this method is worth the invested time? (n=13)</td>
<td>7</td>
<td>93</td>
</tr>
<tr>
<td>9 Would you recommend this method to others that are starting with a project to develop consensus on a blueprint? (n=14)</td>
<td>7</td>
<td>93</td>
</tr>
<tr>
<td>10 How satisfied are you, in general, with the method (give a grade between 1-10) (n=14)</td>
<td></td>
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</tbody>
</table>

\*n=3 (22%) of respondents answered this question as ‘not applicable’ because they did not attend the consensus meeting.
DISCUSSION

In an iterative three round evidence-based consensus approach 20 nurses reached consensus on a set of 18 recommendations for a nursing shift handover blueprint: one recommendation on how to handover (e.g. structured), 12 recommendations on what to handover (e.g. minimal dataset and safety check at the bedside), three recommendations on where to handover (e.g. quiet location) and two recommendations on the preconditions for an effective handover (e.g. communication verification and training).

The consensus process enabled us to tailor the blueprint to the local context and culture of the hospital, which are considered important elements for the acceptability and feasibility of implementation of the blueprint. For example, even though literature shows favorable results for bedside handover and this was our provisional recommendation for ‘where to handover’, a large part of the nurses considered this not feasible. Insufficient time at shift change (especially for the two 15 minute shift changes), fear that involving the patient takes too much time as well as privacy issues and communication of results that have not been discussed with the patient yet, were mentioned as major barriers for bedside handover. On the other hand the proposed bedside safety check of medications, equipment, bandages and drains for indicated patients was received well by the nurses and agreement on this was already established in the first round. It was felt that the safety check has an added value for patient safety. Should we have proceeded with a blueprint based on evidence alone, implementation of bedside handover probably would have failed due to these local context factors.

Studies have shown an increase in valuation of ‘self-made products’, also known as the ‘I designed it myself’ principle. If clinicians know that their views have been incorporated and they have actively developed the solution (in our case the blueprint for nursing handover), they will take ownership of the situation and the change is more likely to be implemented and sustained. Therefore, we expected that the support for implementation of the blueprint would be high. However, from our evaluation it appears that the nurses are still somewhat divided on this. This may be due to the fact that our initial blueprint still needs further refinement based upon initial experimental implementation, before the nurses feel confident that the handover practice fits sufficiently into daily clinical practice.

Since communication at handover is highly dependent on the interaction between deliverer and recipient, as well as the physical environment in which it is delivered, it can be classified as a complex intervention. Complex
interventions are characterized by various interacting components, required behaviors of those delivering or receiving the intervention and variability of outcomes. For a complex improvement intervention, such as handover, to develop into maturity it has to pass through the recommended iterative approach with pilot studies and quasi-experimental designs first. With this approach implementation and evaluation go side by side, on the one hand to identify local context factors that are of importance for implementation and on the other hand to be able to evaluate the effectiveness of the intervention. Through a hybrid design that combines outcomes on effectiveness as well as on implementation, information can be gathered on potential barriers and facilitators, potential modifications to the blueprint that would improve uptake and implementation, as well as the most optimal implementation strategy. This way the intervention will undergo iterative refinement and the local context factors are sufficiently clear before commencing an evaluation by a (cluster)RCT.

Limitations
Since we used the search results of our SR, we included only studies until March 2013. This might have caused us to miss any systematic reviews that were published after this date. On the other hand, current literature in the field of handover still recommends the same principles we applied. Because this is a single center study the generalizability of the blueprint may be limited. However the applied consensus method can be used in other settings as well as for other types of handover situations.

Conclusion
To establish effective communication for the complex process of nursing handover a standardized process that also fits the local situation is required. A formal consensus method has the ability to join evidence and local context, both of which are important ingredients when developing a blueprint. We anticipate that incorporation of the opinions of the nurses in our blueprint will result in increased ownership and support for implementation as well as lasting sustainment. Through an iterative approach of implementation and evaluation of effectiveness of the blueprint, further refinement as well as increased insight in relevant local context factors will be enabled. This will add to the body of evidence on effective nursing handover which is an essential link for continuity and safety of care.
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HV, study design and supervision; MS, analyses and drafting the manuscript; all authors, revising the manuscript for intellectual content and final approval.

Competing interest
The authors declare that they have no competing interests.

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PART II - Safe handover of care


