Chapter 7:

Are the quality of the patient record and the adequacy of written handovers for hip fracture patients related to complications, adverse events and preventable adverse events?

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Submitted
Chapter 7

ABSTRACT

Background and objective: A high quality patient record with adequate written handover information is a prerequisite for safe care. The objective of this study is to provide insight into the quality of patient records, the adequacy of written handover information and how these are related to complications, adverse events and their preventability.

Design, setting and measurements: 616 hospital admissions of hip fracture patients of 65 years and older in four hospitals were analysed with a structured retrospective record review method. The reviewers graded the quality of the medical record. They also scored the completeness of the information in the patient record in general and for various handover moments using the I PASS the BATON structure (Introduction, Patient, Assessment, Situation, Safety concerns, Background, Actions, Timing, Ownership, Next). A structured record review form was used to establish the occurrence of complications, adverse events and preventable adverse events.

Results: Complications (p<0.05) and adverse events (p<0.001) were identified significantly more often in patient records with a low grade for the quality, but there was no significant association for preventable adverse events. The I PASS the BATON structure was often incomplete. There was no significant association between the number of adequately registered I PASS the BATON-elements and complications, adverse events and preventable adverse events.

Conclusion: Improvement of the quality of the patient record is necessary and adequate registration of handover information is advised to ensure continuity of care for patients. Care providers should not rely on verbal handovers alone for an adequate transfer of information.
INTRODUCTION

Clinical handovers and the transfer of information between care professionals in general are important for safe hospital care. Clinical handovers can be defined as: “The transfer of professional responsibility and accountability for some or all aspects of care for a patient, or group of patients, to another person or professional group on a temporary or permanent basis” [1]. The transfer of information between shifts and departments within a hospital has been identified as a high-risk procedure in care which may lead to patient harm and previous studies have provided various recommendations to improve this [2,3]. Many factors can contribute to a suboptimal transfer of information, such as differences in communication styles between medical and nursing staff, poor quality of the information recorded in the patient record, a lack of standardised protocols, fatigue, a lack of time and suboptimal collaboration between departments [2]. Several instruments for a structured handover of information have been developed to reduce the influence of these factors, such as SBAR (Situation, Background, Assessment, Recommendation) [4] and I PASS the BATON (Introduction, Patient, Assessment, Situation, Safety concerns, Background, Actions, Timing, Ownership, Next) [5].

Due to a reduction in working hours for care professionals in Dutch hospitals and the increase in the number of people working part-time, the number of care professionals involved in patient care increases [6]. Although a review did not show adverse effects of this development on education and clinical outcomes so far [7], the number of handover moments due to shorter shifts will also increase. In addition, the average length of stay in hospitals has decreased substantially in the last decades [8]. Therefore, the chance that care professionals are familiar with the background and status of a patient becomes less likely and therefore their reliance on the information in the patient record increases. They should at least have easy access to the current status of the patient, the actions that need to be taken, the potential risks and safety concerns. Research has shown that verbal handovers do not suffice for this goal; essential information is lost in an unstructured verbal handover alone [2,9]. This is not only important for the shift changes within departments but also for transfers between departments.

One patient group that goes through many transfers during admission are older hip fracture patients. They usually come in through the emergency department, undergo a surgical procedure and transfer to the ward. Hip fracture patients typically are of high age and have one or more other coexisting diseases (multimorbidity). These characteristics are associated with an increased risk of rehospitalisation and mortality [10]. The complication rate is high, only 50% regains their pre-fracture functional status [11] and the one year mortality rate is up to 30% [12]. The rate of preventable adverse events (AE) in this patient
group was found to be 8% in Dutch hospitals [13]. This incidence is more than
twice the incidence in the general Dutch hospital population of 65 years and
older [14]. Insight into the quality of the records of this patient group and the
possible relation with complications and adverse events is therefore important.

The first objective in this study was to gain insight into the quality and potential
for improvement of patient records and the adequacy of written handover
information using the I PASS the BATON structure. The second objective was
to look whether this measure of adequate record keeping and a general
grade given by reviewers showed any association when looking at the rate of
complications, AEs and preventable AEs.

METHODS

Study design and setting

Four hospitals from one region in the Netherlands participated in this study: one
university, two tertiary teaching and one general hospital. The hospitals were
recruited for participation from the existing network of the study researchers
and included all three hospital types in the Netherlands. To be eligible for
participation, a minimum of 100 hip fracture operations a year was required.
From each hospital, all acute admissions in 2007 of hip fracture patients of 65
years and older were selected. We excluded pathological fractures, polytraumas
and patients with fractures that were not surgically repaired because these
patients do not follow the usual path for hip fracture treatment. The medical,
nursing and, if available, outpatient record of the patients were collected
for retrospective record review. The medical record typically included the
medical progress notes, report of medical history and physical examination,
procedure reports, diagnostic imaging results, laboratory/pathology-anatomy
test results and discharge. The nursing record included the nursing progress
notes, physician orders for the nurses and, if applicable, the medication list.
The outpatient record included the relevant information collected during the
outpatient visits of the patient.

Structured record review process

Between June 2008 and July 2009 616 patient records were reviewed by nine
experienced reviewers. They were all recently retired surgeons with at least
15 years of clinical experience in surgery, experience with treatment of hip
fractures and a good clinical reputation. There was an additional half-day
training for this study during which the review manual, process and form were
discussed, followed by a practical session using cases. For each patient record,
reviewers used a standardised procedure and review form. The methods of this
record review study and the complete research programme are described in
detail elsewhere [15].
Measurement of the quality and adequacy of the patient record

The reviewers had to grade the quality of the patient record on a scale from one to ten based on their impression of the complete patient record. In addition, they scored the adequacy of the handover information using the I PASS the BATON structure for the complete record and specifically for two handover moments: from emergency department (ED) to surgical ward and from operating room back to the surgical ward, e.g. the postoperative instructions. The aim of this instrument is to structure verbal and written handovers and to provide a clear framework for an efficient transfer of information. It was derived from the structured handover moments that occur in the military and high-risk chemical industry [5]. The reviewers had to indicate which information components (Patient, Assessment, Situation, Safety Concerns, Background, Actions, Timing, Ownership, Next) of the I PASS the BATON structure were adequately described (yes/no) in the record in general. In this study, adequately means that it had to be complete and correct as judged by the reviewer. For the transfer from ED to surgical ward, reviewers were asked to judge whether specific elements of I PASS the BATON were adequately described (yes/no/not applicable). The Introduction was not included in the score as this personal introduction of a care professional is for verbal handover moments. For the transfer from operating room (OR) to surgical ward the elements of I PASS the BATON that are of specific interest in that situation were Safety concerns, Actions, Timing, and Next. All other elements should, at this stage, be already recorded in the patient record and are not expected to change in this specific situation.

Outcome measures

The outcome measures used in this study were as following: A complication was an unintended and unwanted outcome during or following medical treatment that requires the health care professional to adjust the treatment or when irreparable damage has occurred [16]. It is broader than an AE because it can also be the result of a calculated risk. An AE was defined as an unintended injury that results in temporary or permanent disability, death or prolonged hospital stay, and is caused by healthcare management rather than by the patient’s underlying disease process [17]. AEs were included if they occurred during the index admission and were detected during or within six months after the index admission. A preventable AE is an AE resulting from an error in management due to failure to follow accepted practice at an individual or system level. Accepted practice was defined as ‘the current level of expected performance for the average practitioner or system that manages the condition in question’ [18]. The reviewers made a judgement whether accepted practice was followed based on their knowledge of the procedures, current protocols and guidelines. Preventability was measured on a six-point scale, an AE was considered preventable with a score of four and higher. One researcher
was present during the whole review process to answer questions from the reviewers and explain possible methodological and procedural uncertainties.

**Statistical analysis**

All statistical analyses were performed using SPSS for Windows version 20.0. Background characteristics and adequacy of handover information elements were analysed using descriptive statistics and frequency tables. The association between the grade for the quality and the adequacy of handover information elements of the patient record with the number of complications, AEs and preventable AEs was tested with Chi-square tests. A p-value below 0.05 was considered as significant. The grade as a measure of the quality of the patient record was divided into three categories: 0-5 (insufficient), 6-7 (sufficient), 8-10 (good). The adequacy of handover information measured as the number of elements of I PASS the BATON-structure was also divided into three categories: 0-3, 4-6, 7-9 items registered.

This study is a substudy of the research programme on Patient Safety and Complex Care [15]. The study and methods have been granted ethical approval by the ethics committee of the VU University Medical Center, Amsterdam, the Netherlands.
RESULTS

Background characteristics of the 616 hip fracture patients are described in table 1. The mean age of the hip fracture patients in this study is 83 years, and three-quarter is female. More than 40% of patients experienced one or more complications, AEs occurred in almost one-fifth of the patients and a preventable AE occurred in 8% of the patients [13].

Table 1: Background characteristics of study population [13]

<table>
<thead>
<tr>
<th>Patient characteristics</th>
<th>N=616</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age in years (SD)</td>
<td>83.6 (7.5)</td>
</tr>
<tr>
<td>% female</td>
<td>76.1</td>
</tr>
<tr>
<td>% alive at discharge</td>
<td>94.2</td>
</tr>
<tr>
<td>% discharged to nursing home</td>
<td>44.0</td>
</tr>
<tr>
<td>% with significant co-morbidity</td>
<td>34.9</td>
</tr>
<tr>
<td>% with one or more complications*</td>
<td>42.9</td>
</tr>
<tr>
<td>% with one or more AEs**</td>
<td>18.5</td>
</tr>
<tr>
<td>% with one or more preventable AEs***</td>
<td>8.0</td>
</tr>
</tbody>
</table>

* A complication is an unintended and unwanted outcome during or following medical treatment that requires the health care professional to adjust the treatment or when irreparable damage has occurred [16].

** An AE was defined as an unintended injury that results in temporary or permanent disability, death or prolonged hospital stay, and is caused by healthcare management rather than by the patient’s underlying disease process [17].

*** A preventable AE is an AE resulting from an error in management due to failure to follow accepted practice at an individual or system level. Accepted practice was defined as 'the current level of expected performance for the average practitioner or system that manages the condition in question' [18].

The reviewers graded the medical records with respect to the quality with a mean score of 6.6 (SD=0.91, range 1-9 on a scale of 1-10). In table 2, some general items on the quality and available elements within the record are described. For more than 40% of the patients it was unclear from the patient record which care professional was responsible for decisions and changes in the treatment. The medical record of more than one-third of the patients was judged as incomplete or inadequate by the reviewers. In addition, the results show that for almost one-third of the patients, no complete or adequate physical examination at admission was included in the patient record.
Table 2: General assessment on quality and completeness of patient record

<table>
<thead>
<tr>
<th>Component of quality and completeness</th>
<th>Percentage of records in which the reviewers identified the following shortcomings</th>
<th>N=616</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unclear who is responsible for decisions and changes in treatment</td>
<td>41.2</td>
<td></td>
</tr>
<tr>
<td>Medical record incomplete or inadequate</td>
<td>34.1</td>
<td></td>
</tr>
<tr>
<td>Complete and adequate physical examination at admission unavailable</td>
<td>32.1</td>
<td></td>
</tr>
<tr>
<td>Task list from physician unavailable</td>
<td>27.8</td>
<td></td>
</tr>
<tr>
<td>Discharge letter inadequate</td>
<td>16.7</td>
<td></td>
</tr>
<tr>
<td>Unclear description of decisions and changes in treatment</td>
<td>14.4</td>
<td></td>
</tr>
<tr>
<td>Medication list unavailable</td>
<td>2.3</td>
<td></td>
</tr>
<tr>
<td>Discharge letter unavailable</td>
<td>1.1</td>
<td></td>
</tr>
</tbody>
</table>

Table 3 shows the percentage of medical records in which a specific I PASS the BATON element was registered inadequately and specifically for the transfer from the emergency department to the ward and from the OR to the ward staff. The results show that many items were missing during the first transfer of the patient from the emergency department to the surgical ward. The items Situation, Safety Concerns, Background and Action were added to the file at a later stage for many patients. The Timing and Ownership of actions often remains unclear in the record during the complete admission.
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Table 3: Inadequately registered handover elements in the medical record

<table>
<thead>
<tr>
<th>Record components</th>
<th>Medical record in general, % of records inadequate</th>
<th>ED* → surgical ward, % of records inadequate</th>
<th>OR* → ward physician; % of records inadequate</th>
<th>OR* → ward nurses; % of records inadequate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P</strong> Patient: name, identifiers, age, sex, location</td>
<td>0.8</td>
<td>12.7</td>
<td>NA**</td>
<td>NA**</td>
</tr>
<tr>
<td><strong>A</strong> Assessment: presenting chief complaint, vital signs and symptoms and diagnosis</td>
<td>6.5</td>
<td>21.1</td>
<td>NA**</td>
<td>NA**</td>
</tr>
<tr>
<td><strong>S</strong> Situation: current status/ circumstances, including code status, level of (un) certainty, recent changes, response to treatment</td>
<td>16.4</td>
<td>38.1</td>
<td>NA**</td>
<td>NA**</td>
</tr>
<tr>
<td><strong>S</strong> Safety Concerns: critical lab values/reports, socio-economic factors, allergies, alerts</td>
<td>32.1</td>
<td>54.1</td>
<td>34.7</td>
<td>38.3</td>
</tr>
<tr>
<td><strong>THE</strong> Background: co-morbidities, previous episodes, current medications, family history</td>
<td>12.5</td>
<td>36.5</td>
<td>NA**</td>
<td>NA**</td>
</tr>
<tr>
<td><strong>A</strong> Actions: taken or required and brief rationale</td>
<td>24.0</td>
<td>34.7</td>
<td>40.4</td>
<td>40.7</td>
</tr>
<tr>
<td><strong>T</strong> Timing: level of urgency and explicit timing, prioritisation of actions</td>
<td>60.7</td>
<td>60.9</td>
<td>64.4</td>
<td>65.3</td>
</tr>
<tr>
<td><strong>O</strong> Ownership: who is responsible</td>
<td>55.2</td>
<td>56.8</td>
<td>NA**</td>
<td>NA**</td>
</tr>
<tr>
<td><strong>N</strong> Next: what will happen next, anticipated changes, plan for the patient</td>
<td>34.9</td>
<td>44.0</td>
<td>58.4</td>
<td>57.5</td>
</tr>
</tbody>
</table>

*ED = emergency department, OR = operating room

**NA= Not Applicable, these items were not measured for these specific transfers as they should already be present in the patient record at this stage.

Table 4 shows the percentages of complications, AEs and preventable AEs in association with the grade for the quality of the patient record given by the reviewer and the number of adequate I PASS the BATON handover elements in the record. The percentages of complications, AEs and preventable AEs are highest in the lowest grade category measuring the quality of the patient record. This association was significant for the occurrence of complications and AEs, p<0.05 and p<0.001 respectively. For the number of adequately registered I PASS the BATON items, the percentages of complications, AEs and preventable AEs were also highest in the patient records with the least items adequately registered. However, none of the associations between number of adequate handover elements and the outcomes were significant.
Table 4: Quality grade and elements of written handover in relation to complications, AEs and preventable AEs

<table>
<thead>
<tr>
<th>Reviewer grade quality of patient record*</th>
<th>Number of records</th>
<th>Complication (% yes)</th>
<th>Adverse Event (% yes)</th>
<th>Preventable Adverse Event (% yes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>598</td>
<td>43.8</td>
<td>18.4</td>
<td>7.7</td>
</tr>
<tr>
<td>Insufficient (0-5)</td>
<td>67</td>
<td>56.7</td>
<td>35.8</td>
<td>14.9</td>
</tr>
<tr>
<td>Sufficient (6-7)</td>
<td>458</td>
<td>43.0</td>
<td>16.2</td>
<td>6.6</td>
</tr>
<tr>
<td>Good (8-10)</td>
<td>73</td>
<td>37.0</td>
<td>16.4</td>
<td>8.2</td>
</tr>
</tbody>
</table>

Number of I PASS the BATON elements adequately in medical record

<table>
<thead>
<tr>
<th></th>
<th>Number of records</th>
<th>Complication (% yes)</th>
<th>Adverse Event (% yes)</th>
<th>Preventable Adverse Event (% yes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>530</td>
<td>45.5</td>
<td>19.4</td>
<td>8.3</td>
</tr>
<tr>
<td>0-3 items</td>
<td>29</td>
<td>51.7</td>
<td>24.1</td>
<td>17.2</td>
</tr>
<tr>
<td>4-6 items</td>
<td>237</td>
<td>47.3</td>
<td>20.3</td>
<td>8.0</td>
</tr>
<tr>
<td>7-9 items</td>
<td>275</td>
<td>43.3</td>
<td>18.2</td>
<td>7.6</td>
</tr>
</tbody>
</table>

* There is a significantly higher percentage of complications (p<0.05) and AEs (p<0.001) in the lower grade category

**DISCUSSION**

**Main results**

This record review study shows that valuable information on safety concerns, actions that need to be taken, the timing of these actions, the responsibilities and the plan for the patient were often not adequately registered in the medical record. In addition, there was a significant negative association between the grade measuring the quality of the medical record and the occurrence of complications and adverse events such as pneumonia due to inadequate treatment or monitoring. They were more often found in records with a lower quality. No significant associations were found for the adequacy of the written handover information in the records as based on the number of elements of I PASS the BATON. Even though no cause and effect can be established within the current study design, the negative relation between the quality of the patient record and the higher occurrence of complications and adverse events indicates that there is potential for improvement.

**Implications for practice**

Our findings are similar to the outcomes of a study done by Zegers et al. [19]. They looked at the association between the presence and quality of patient information in relation to the occurrence of AEs. They reported that poor quality of the information in the patient record was associated with higher AE
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rates [19]. Other studies also emphasize the need for a complete description of all relevant information in the patient record and suggest a structured format or technological solution [3]. Studies have indicated that the gap in written information transfer can have severe consequences for the continuity and safety of care [3,20]. Verbal handovers alone do not suffice for the transfer of essential information in patient care [9], it should be accompanied by an adequate and complete written transfer of information within the patient record. In addition to previous findings, the current study gives detailed insight into the elements of the patient record that need improvement, such as safety concerns, description of actions with their timing and responsibilities. Although it is possible that these elements are discussed during verbal handover moments, they should still be included in the patient record to ensure a complete transfer of information.

In recent years initiatives were undertaken in the Netherlands which already address some of the identified shortcomings. For example, a guide on assigning responsibility for collaboration in care was developed and is supported by relevant field parties [21]. This is also an important topic for visitation and regulation. To create further awareness on the importance of adequate registration in the patient record among nurses and physicians they could be encouraged to do patient record reviews. In addition, hospitals could develop or adapt standard formats, such as I PASS the BATON, for the different handover moments between shifts and departments, preferably based on (inter)national guidelines. These could, for example, be incorporated into technical solutions, such as the electronic patient record. This makes the information easily available to all care professionals who are involved in patient care and reduces the chance that information cannot be accessed because the paper record is unavailable. In addition, it can increase the ease of recording, completeness, and standardisation of patient information [22]. Future research can provide more insight into the possible effectiveness of these developments on the quality and adequacy of the patient record and written handovers.

**Strengths and limitations of the study**

The current study adds knowledge to the existing literature on the importance of the quality of patient records and the adequacy of written handover information. We used a large sample of records of hip fracture patient for review to establish the quality of the patient record and the adequacy of written handover information. Also, a well-established method to measure adverse events and preventable adverse events was used [23]. However, this study also has some limitations. We focused on one patient group and did not strive for a national representative sample of hospitals in our study, although they represent all three existing hospital types in the Netherlands. Our results
cannot be extrapolated to other patient groups, although we assume that the identified shortcomings can also be an issue in other patient groups. A second limitation, hindsight bias, is a limitation for record review studies in general [24]. It means that knowing the outcome may influence judgement. In the case of the current study this could result in a lower grade of the quality of the patient record when a severe AE was found.

CONCLUSION

This study showed that improvement of the quality of patient records for older hip fracture patients is necessary since lower quality is related to more complications and adverse events. Also, many elements required for a complete handover, such as safety concerns, actions with their timing and responsibilities and what should be done next were not described adequately in the patient record. Creating awareness among care professionals and facilitating structured handovers could be useful for improvement.
REFERENCES


21. http://knmg.artsennet.nl/web/file?uuid=ee03a7af-abe7-42e3-9c1f-e3ac45c9b6a0&owner=a8a9ce0e-f42b-47a5-960e-be08025b7b04&contentid=71963. Last accessed July 16, 2015.


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