Healthcare improvement based on learning from adverse outcomes

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Chapter 7

The association between complications, incidents and patient experience in surgical care: retrospective linkage of routine patient experience surveys and safety reporting

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ABSTRACT

Background

Linkage of safety data to patient experience data may provide information to improve surgical care. This retrospective observational study aimed to assess associations between complications, incidents, patient-reported problems and overall patient experience.

Methods

Routinely collected data from safety reporting on complications and incidents, and patient-reported problems and experience on the Picker Patient Experience Questionnaire-15, covering 7 experience dimensions, were linked for 4236 surgical inpatients from an academic centre (April 2014-December 2015; 41% response). Associations between complication and/or incident occurrence and patient-reported problems, regarding risk of suboptimal experience (i.e. grade of 1-5 out of 10) were studied using multivariable logistic regression.

Results

Patient-reported problems were associated with occurrence of complications/incidents among patients with suboptimal experiences (OR 2.8; 95% CI: 1.6-4.9), but not among patients with positive experiences (OR 1.0; 95% CI: 0.6-1.5). For each patient experience dimension, presence of patient-reported problems increased risk of suboptimal experience (OR range: 2.7-4.4). Patients with complications or incidents but without patient-reported outcomes were at lower risk of a suboptimal experience than patients without any problems (OR 0.5; 95% CI: 0.3-0.9). Occurrence of complications/incidents only increased risk of suboptimal experience when patients also had problems on 'continuity and transition' or 'respect for patient preferences' dimensions.

Conclusions

Linking safety data to patient experience data can reveal ways to optimize surgical care. Surgical staff seem able to ensure positive patient experiences despite complications or incidents. Increased attention should be paid to respecting patient preferences, and continuity and transition, particularly when complications or incidents occur.

Key words: quality improvement; patient experience; patient safety; complications; incident reporting.

INTRODUCTION

Surgical inpatient care aims to ensure high-quality care and patient safety as well as an optimal experience for patients. There is an increasing amount of information available on patient experience, due to surveys such as the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS)[1] or the National Adult Inpatient Survey.[2] Other means are used to collect data on safety from the perspective of surgical staff, such as reporting systems or record review. Greater insight into the relationship between patient experience and markers of safety, such as complications or incidents (e.g. postoperative hemorrhage, medication error), could help to optimize surgical care and ensure positive patient experiences.

Much remains unknown about the interplay between patient experience and complications or incidents. Previous studies that assessed patient experience in relation to quality and safety outcomes were mostly at the hospital level, and have produced conflicting results in terms of whether an association existed.[3–10] Part of this may be due to the fact that these data are not typically linked at the patient level because of the anonymity of patient surveys. The level of analysis matters because relations observed at the group level (i.e., hospital) are not necessarily the same at the individual level (i.e., patient), which is referred to as 'the ecological fallacy.'[11,12] After all, when hospitals with high patient satisfaction rates also have high-quality outcomes, it cannot be inferred that these two actually occurred in the same individual patients.

Greater insight into these associations is necessary to understand how we could use patient experiences to improve quality of care. Aim of the present study was to examine the association between complications, incidents and patient-reported experiences at the patient level. In comparison to previous studies, this study included more detailed information on patient experience dimensions and timing of survey response to allow for more comprehensive analyses. We hypothesized that patient-level linkage of data on complications, incidents and patient experiences, collected through routine safety reporting by surgical staff and patient surveys, may reveal valuable information to improve surgical inpatient care.

METHODS

This retrospective observational study linked all routinely collected data on admissions, patient experiences, and complications/incidents collected through safety reporting, for surgical inpatients of a Dutch academic hospital.

Patients and definitions

Data for all 6708 surgical inpatients discharged between April 2014 and December 2015 were included. The requirement for ethical approval was waived by the local Ethics Committee (#G17.073) based on the Dutch Medical Research Involving Human Subject Act.

Patient experience survey

'Patient-reported problems' were defined as ≥1 problems reported on any of the 15 items of the Picker Patient Experience Questionnaire (PPE-15) (Appendix 1). This is a validated survey covering seven patients' experience dimensions (Table 1).[13] For local implementation, the survey was translated into Dutch and then back-translated to English according to the customary procedure for translation verification.[14] Presence of a 'problem' is coded dichotomously (0=no, 1=yes) for each of the survey items, which are summarised into a total number of reported problems (maximum: 15). More details on this method can be found elsewhere.[13] Two final questions ask patients for a global rating of patients' hospitalisation (i.e. a 'school grade' on a scale of 1 to 10), and how likely they would recommend this ward to friends and family (4-point scale) (Appendix 1). This recommendation question is identical to the American HCHAPS survey[8] and similar to the 'friends and family test' (6-point scale).[15,16] A positive recommendation was defined as a response of 'definitely' to this question.[8]

The patient experience survey has been routinely distributed among surgical inpatients since March 2014. In the week following discharge, patients receive an invitation letter with a unique access code for the anonymous online survey. For patient above 75 years of age, a paper version of the survey is attached. A reminder/thank you card is sent one week later. Exclusion criteria for survey participation include: deceased patients; patients below 16 years of age; living abroad; transfers to another hospital, psychiatric institution or unknown destination; or a length of stay shorter than three hours. To avoid burdening patients with multiple surveys, invited patients will be blocked in the system for another survey invitation for a period of six months.

Complications and incidents

In this academic centre, complications (e.g. surgical site infection) are routinely reported for all inpatients by treating physicians (or residents under supervision) in electronic health records during patients' hospitalisation and/or at discharge..[17,18] A complication (or 'adverse event') is defined as *any unintended or unwanted event or state, occurring during or following medical care, that is so harmful to a patient's health that adjustment of treatment is required or that permanent damage results*.[17,18] This definition is broader than the commonly used WHO definition (ie, *injury caused by medical management rather than underlying disease*[19]), because it does not exclude complications that may be related to primary disease or comorbidities. This simplifies reporting because interpretation of causality is not required: all complications that require treatment or cause harm are reported. Serious complications are those that require (re)operation or cause irreversible patient harm (or death, but not applicable in this study), which is reflected in reported severity scores.[17,18]

Incidents (e.g. medication error) are voluntarily reported through an electronic hospital-wide reporting system that is accessible for both doctors and nurses, but reports are mostly filed by nurses, similar to many other hospitals.[20,21] A patient safety incident is defined as *an*

Table 1. Items of the PPE-15 questionnaire sorted by related dimensions of patients' experience with numbers referring to the order in the survey.[1]

Dimension	Item and problem identified (item number)
Information and education	Doctors' answers to questions not clear (#1) Nurses' answers to questions not clear (#2)
Coordination of care	Conflicting information from staff (#3)
Physical comfort	Staff did not do enough to control pain (#10)
Emotional support	Anxieties or fears not discussed with doctors (#4) Anxieties or fears not discussed with nurses (#8) Not easy to find someone to talk about concerns (#9)
Respect for patient preferences	Doctors sometimes talked as if I wasn't there (#5) Insufficiently involved in decisions (#6) Not always treated with respect and dignity (#7)
Involvement of family and friends	Family didn't get opportunity to talk to doctor (#11) Family not given information needed to help recovery (#12)
Continuity and transition	Purposes of medicines not explained (#13) Not told about medication side effects (#14) Not told about danger signals to look for at home (#15)
Overall impression	*A. Grade for the admission on this ward (scale 1-10)* *B. Whether the patient would recommend the ward to family and friends if they would needed similar care (4-point Likert scale)*

[1] Adapted from Jenkinson et al, Int J Qual Health Care 2002;14:353-358. Complete questions and response categories are shown in Appendix 1.

event or circumstance which could have resulted, or did result in unnecessary harm to a patient, which follows the commonly used definition of the World Health Organization.[19]

Data and methods

Patient-level admission data were already linked to complication data in the registry and were linked to the separately archived incident data using patient identifiers, incident reporting date and date of admission and discharge. Because the anonymous patient experience data did not include patient identifiers, these were linked to admission data using patient gender, age, admission date and discharge date. Of the 6708 discharged inpatients, 4462 were invited to participate in the survey, of which 4236 (94.9%) could be linked to corresponding admissions as described above. Failed matches were the result of missing values or two or more cases having the same age, gender as well as admission and discharge date. Another potential reason for non-matches was that corrections to the admission data had occurred which had not been made in the separate patient experience database.

Patient experience was categorised according to patients' global ratings. Grades between 1 and 5 were considered 'negative' (equivalent to failing an exam in Dutch schools), grades between 6 and 8 were considered 'neutral' and grades above 8 were considered 'positive'.

This categorisation was supported by prior studies demonstrating that a global rating is the most suitable overarching measure of patient experience.[22,23] Moreover, one of these studies indicated that Dutch patients who give a grade of '6' are best regarded as passives rather than negatives or positives, which is likely related to the fact that a 6 is the threshold for passing a test in the national school grading system.[22]

Statistical analyses

Respondents were compared to patients who were not invited or did not respond on patient characteristics, including age, gender, undergoing surgery or not, American Society of Anaesthesiologists (ASA) physical and emergency status at the first surgical procedure, length of stay, readmission within 30 days, as well as presence of complications/incidents. Among respondents, descriptive statistics were used to describe presence of complications/incidents and patient-reported problems, and distribution of overall patient experiences. Patients with positive experiences were compared to those with a suboptimal (i.e. neutral or negative) experience on patient characteristics as above, as well as the presence and total number of patient-reported problems and serious complications. For categorical variables, χ^2 tests were used, and Mann-Whitney U tests were used for variables age, length of stay and total number of reported problems. Multivariable logistic regression, adjusting for age, gender, undergoing surgery or not and ASA status, was used to examine the association between complications/incidents and patient-reported problems, overall and separately among patients with positive or suboptimal experiences. Similarly, logistic regression was used to examine likelihood of a suboptimal experience for patients with only complications/incidents, only patient-reported problems, or both, in comparison to patients without any problems (i.e., neither patient-reported problems nor complications/incidents), adjusting for patient characteristics as above. Patients with only patient-reported problems were compared to those with also complications/incidents on total number of problems (Mann-Whitney U test) as well as on presence of suboptimal experiences or problems on experience dimensions (χ^2 tests). For each experience dimension (Table 1), multivariable logistic regression was used to examine whether patient-reported problems increased the likelihood of a suboptimal experience, adjusting for age, gender, receiving surgery, ASA status and complication/incident occurrence. In addition, an interaction term was included in these models to study impact of complications/incidents given problems on this dimension (i.e. patient-reported problems for this dimension * complication/incident occurrence). Statistical analyses were conducted using SPSS Statistics (IBM, version 23) with a 0.05 alpha level of significance.

RESULTS

A total of 1748 patients responded to the survey out of the 4236 who were invited and could be linked to admission data (response rate: 41.3%), on average 15 days after discharge (94% of respondents ≤ 30 days). Compared to non-invited or non-responding patients, respondents seemed more often older patients, undergoing elective surgery, with lower ASA status and without readmission, but complication and/or incident occurrence was just as common in both groups (data not shown).

Characteristics of patients with positive and suboptimal experiences

Positive experiences were reported by 687 patients (39.3% of 1748). Suboptimal experiences were reported by 1061 patients, including 1010 (57.8%) neutral experiences and 51 (2.9%) negative experiences (Table 2). Most patients reporting positive experiences (90.2%) would definitely recommend the ward to family and friends, whereas this was 50.2% among patients with neutral experiences, and 0% among patients with negative experiences. Patients with positive experiences had similar characteristics to those with suboptimal experiences, except for patients with positive experiences being older (median age 66.0 vs. 63.0 years; p<.001), and less often having serious complications (1.9% vs. 4.1%; p=.029). Overall, readmission was not associated with patient experience (p=.489). Although patients readmitted *after* survey response (n=80) were just as likely as other respondents to report positive experiences (45.0% vs. 39.0%; p=.285), they were more likely positive than patients who were readmitted *before* responding to the survey about their initial admission (45.0% vs. 27.1%; p=.024).

Table 2. Positive, neutral and negative experiences among patients with and without patient-reported problems and complications/incidents, and number of reported problems per group.

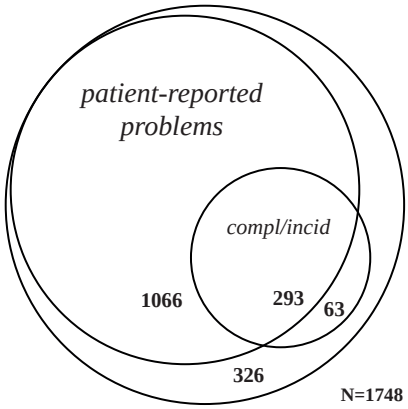
	Overall patient experience						*Number of problems*	
	Positive (n=687, 39.3%)		**Neutral** (n=1010, 57.8%)		**Negative** (n=51, 2.9%)		**Compl/ Incid**	**Patient-reported**
Reported problems								
Only compl/incid (n=63)	48	(76.2)	15	(23.8)	0	-	1.0	-
Only patient (n=1066)	362	(34.0)	666	(62.5)	38	(6.6)	-	2.0
Both (n=293)	78	(26.6)	202	(68.9)	13	(4.4)	1.0	3.0
Neither (n=326)	199	(61.0)	127	(39.0)	0	-	-	-
Number of problems								
Compl/inc	0.0		0.0		0.0			
patient-reported	1.0		3.0		8.0			

Compl/incid, occurrence of complications and/or incidents. Row percentages. Number of problems displays median number of reported problems on the patient experience survey.

Association between patient-reported problems and complications/incidents

Most patients with complications and/or incidents reported problems in the survey (82.3% of 356), but vice versa, only 21.5% of patients reporting problems had complications/incidents (Figure 1). After adjustment for patient characteristics, patients with complications/incidents were more likely to have patient-reported problems than those without (OR 1.5; 95% CI 1.1-2.1). However, when taking overall patient experience into account, the association between complications/incidents and patient-reported problems was only present among patients with suboptimal experiences (OR 2.8; 95% CI 1.6-04.9), and not among those with positive experiences (OR 1.0; 95% CI: 0.6-1.5).

Figure 1. Occurrence of patient-reported problems (total n=1359, 77.4% of 1748) and complications/incidents (total n=356, 20.4%) among patients.



Compl/incid, occurrence of complications and/or incidents.
Numbers in circles refer to the number of cases within that part of the circle (e.g. 1066 cases with only patient-reported problems).

Impact of reported problems on overall experience

Of the 1061 patients with suboptimal experiences, 230 (21.7%) had experienced complications and/or incidents (Table 2). In bivariate analyses, no association was found between complications/incidents and overall patient experience (p=.091), but respondents with patient-reported problems more commonly had suboptimal experiences than those without (67.6% vs. 36.5%; p<.001). In multivariable analysis, adjusting for patient characteristics, risk of suboptimal experience remained greater for cases with patient-reported problems compared to patients without problems or complications/incidents (only patient-reported problems: OR 3.0; 95% CI: 2.3-3.9; both patient-reported problems and complications/incidents: OR 4.4; 95% CI: 3.1 to 6.2). However, remarkably, patients with only complications/incidents were at lower risk of suboptimal experience than patients without problems or complications/incidents (OR 0.5; 95% CI 0.3 to 0.9). This difference disappeared when only serious complications were included (data not shown). Patients with both complications/incidents and patient-reported

Table 3. Distribution of patient-reported problems per dimension and their association with risk of suboptimal experience.

Patients' experience dimension[1]	**Patients reporting problems** n (% of 1748)		**Risk of suboptimal experience** OR (95% CI)
Information and education	342	(19.8)	4.2 (3.1 to 5.8)
Coordination of care	502	(29.1)	2.7 (2.1 to 3.4)
Physical comfort	149	(8.9)	4.4 (2.7 to 7.1)
Emotional support	478	(27.6)	3.7 (2.8 to 4.7)
Respect for patient preferences	691	(39.9)	2.9 (2.3 to 3.6)
Involvement of family	439	(25.4)	4.1 (3.1 to 5.4)
Continuity and transition	897	(52.0)	2.4 (2.0 to 2.9)

[1] Missing values per dimension: information and education (n=19, 1.1%); coordination of care (n=25, 1.4%); physical comfort (n=79, 4.5%); emotional support (n=13, 0.7%); respect for patients preferences (n=17, 1.0%); involvement of family (n=23, 1.3%); continuity and transition (n=23, 1.3%)

problems, reported a higher number of problems in the survey (median 3.0 vs. 2.0; p<.001) and were at greater risk of suboptimal experience (OR 1.4; 95% CI: 1.1-1.9) than cases with only patient-reported problems.

Impact of reported problems in relation to experience dimensions

Patients most frequently reported problems with 'continuity and transition' (52.0%) (Table 3), both among patients with positive and suboptimal experiences. Problems with 'physical comfort' were least common (8.9%) (Table 3). For each patient experience dimension, patients reporting problems were at increased odds of a suboptimal experience, with adjusted odds ratios ranging from 2.4 ('continuity and transition') to 4.4 ('physical comfort) (Table 3). Complication and/or incident occurrence only increased the odds of a suboptimal experience when combined with either patient-reported problems about 'continuity and transition' (OR 1.9; 95% CI: 1.1-3.2) or 'respect for patient preferences' (OR 2.2; 95% CI: 1.3-3.7), but not for any of the other dimensions. Patients who reported problems and experienced complications and/or incidents more commonly reported problems on each dimension than patients who reported problems but had no complications/incidents, except for the dimensions 'involvement of family' (35.5% vs 31.7%; p=.219) and 'physical comfort' (10.7% vs. 14.3%; p=.091).

DISCUSSION

This study examined how complications, incidents and patient-reported problems were associated with overall patient experience on a patient level, to reveal ways to improve surgical care. Many patients who reported problems in the survey had no complications/incidents, which

confirms that patient feedback serves as a complementary source of information on quality and safety.[24–27] The study findings increase insight into how complications and incidents may affect patient experience. Complications/incidents only increased risk of suboptimal experience, when patients reported problems with 'continuity and transition' (e.g. danger signals) or 'respect for patient preferences' (e.g. being treated with respect), but not for any of the other dimensions, suggesting that these dimensions are of particular importance for patients with complications and/or incidents. Patients with only complications/incidents but without patient-reported problems were even at lower risk of suboptimal experience than patients without any problems, potentially suggesting adequate responses from staff to ensure positive experiences despite occurrence of complications and/or incidents.

Impact of complications/incidents

Complication/incident occurrence was only associated with presence of patient-reported problems among patients with a suboptimal experience overall, and not among patients with positive experiences. This may suggest that in the suboptimal experience group, complications/incidents had, directly or indirectly, triggered problems related to patient experience dimensions, which may have negatively affected overall experience. In the positive group, these problems may have been absent, prevented or solved by adequate responses from staff. That healthcare professionals are able to successfully respond to complications and/or incidents might also be reflected in the remarkable finding that patients with only complications/incidents were at lower risk of suboptimal experience than patients without any complications/incidents or patient-reported problems. Some of these patients may simply have a 'higher threshold' for (reporting) problems and a suboptimal experience, but this may also reflect that staff on surgical wards successfully responded to the situation (e.g. by providing more information or emotional support). This would align with a previous study demonstrating that staff responses to complications have an important impact on patient experience, with the potential to ensure a positive experience in spite of these adverse events.[28] Staff responses may also explain why patients with complications and/or incidents were not more likely to report problems with 'physical comfort' or 'involvement of family' dimensions, whereas they did more frequently report problems on all other dimensions. This reflects the clinical experience that complications or incidents can trigger increased attention to pain management (i.e. physicial comfort dimension) as well as additional conversations with the patient's family.

Impact of patient-reported problems

Patient-reported problems in the survey increased the risk of a suboptimal experience, and this applied to all experience dimensions. Complication and/or incident occurrence only increased risk of suboptimal experiences when combined with patient-reported problems on 'respect for patient preferences' or 'continuity and transition' dimensions. Although the study design does not allow inference on the sequence of these problems (e.g. complication first,

problems with respect second), we know that 'continuity and transition' concerns information provided at discharge, and that most complications/incidents occurred during hospitalisation.[29] Therefore, this finding might reflect that a suboptimal discharge process has more impact on patient experience when patients also have complications/incidents, for example because they notice that they were not adequately informed on how to monitor or care for these complications at home after discharge. That complications/incidents increased the risk of suboptimal experience when problems with 'respect for patient preferences' were also present could indicate that patients are less 'forgiving' of complications/incidents when they also experience problems with this dimension. These findings call for increased attention to the process of discharge information and respect for patient preferences in cases with complications/incidents, and adds to previous studies demonstrating that good communication and being treated with respect and dignity are most important for patient experience in general.[30,31]

Strengths and limitations

Specific strengths of this study include that it used patient-level data on complications, incidents and patient experience, with detailed information on patient experience dimensions. Patient-level analyses of these data are more informative for improvement than hospital-level analyses, because it allows studying whether certain patient experiences, such as suboptimal experiences overall or with a specific dimension, and suboptimal outcomes, such as complications and incidents, actually occur in the same inpatient cases. However, the single centre design is a significant study limitation that may limit generalisability of our findings to other centers or countries. Although the content of patient feedback may differ in other settings, the impact of certain problems in context of each other may be more similar, which needs to be tested in future studies. Underreporting could have affected complication/incident rates, but underreporting will likely be similar in cases with and without patient-reported problems or suboptimal experience and therefore not affect our main findings. Moreover, the data used in this study will likely have an accuracy that is equal to studies dependent record review[32] or billing data.[5] That respondents returned the survey on average 15 days after discharge will have limited recall bias, but the response rate of this routine survey still shows room for improvement even though it is higher than generally observed for patient surveys,[10] and similar to the response rate of the Adult Inpatient Survey.[33] Moreover, respondents did not differ from non-respondents on complication/incident occurrence, which was the outcome of interest. Another limitation of this study is that (fulfilment of) patients' expectations, an important and separate predictor of overall satisfaction,[31,34] could not be taken into account.

Practical implications

While complications and incidents are often the focus of learning, for example, at morbidity and mortality conferences, this study reveals how such an approach would leave most (78%) patients with suboptimal experiences undiscussed. The positive message this study

offers is that patients' experiences are not necessarily negatively affected by complications or incidents ('not all is lost'), and that efforts to respond to the patient's needs does seem to matter. However, it seems that a patient's needs may change in context of complications and/or incidents, in which case some aspects are of particular importance, such as feeling treated with respect and adequately informed for the transition home. The findings of this study call for increased attention to the 'respect for patient preferences' and 'continuity and transition' dimensions of patient experience, particularly in cases with complications and incidents. It is necessary to seek ways to strengthen patient involvement and tailor discharge instructions in these cases. While this was a single centre study, patient-reported problems with information at discharge seem more universal: an international comparison of patient surveys showed that 'danger signals' (i.e. item 15) was the item with the highest percentage of patients reporting a problem in the UK (59.9% of 3529 respondents), and second-highest in Switzerland, Sweden and Germany.[13]

Future directions

Relations between complications, incidents and patient experience are complex and thus require in-depth investigations, such as analyses in context of each other. Although these type of studies are complicated by the fact that patient survey data are often anonymous and aggregated at the provider level, patients themselves may be supportive of data linkage for care improvement.[35] Important avenues for further study include how patients' experience and needs may change when complications/incidents emerge and how we should respond adequately–requiring qualitative rather than quantitative study designs. Moreover, studies should explore how patients' expectations may play an additional role. Future studies should also take data on timing of survey response into account when studying the relation between readmission and patient experience, as the present study demonstrated that the relation between readmission and patient experience was affected by timing of survey response (i.e. before or after readmission). Moreover, data on timing could be used to examine the potential for recall bias in surveys by assessing the number of days between discharge and response.

CONCLUSIONS

This study assessed the association between complications and incidents reported by surgical staff and specific problems and overall experiences reported by patients. The study highlighted how patient-level data linkage of patient experience data and staff safety reporting data can reveal ways to improve surgical inpatient care. The findings confirm that patient experiences serve as a complementary source of information on quality and safety, because many patients who reported problems in the survey had no complications/incidents. Other findings reflected the value of staff responses to complications/incidents to meet the patients' needs, such as

regarding physical comfort and family involvement. Although complications/incidents did not independently increase the risk of a suboptimal experience, they did when patients also reported problems on 'patient preferences' or 'continuity and transition' dimensions, suggesting that increased attention is needed for these matters in surgical inpatient care, particularly when complications and/or incidents occur.

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