



Effects of an educational patient safety campaign on patients' safety behaviours and adverse events

David L.B. Schwappach MPH PhD,¹ Olga Frank PhD,² Ute Buschmann PhD³ and Reto Babst MD PhD⁴

¹Scientific Head, Swiss Patient Safety Foundation, Zurich and Professor, Institute of Social and Preventive Medicine, University of Bern, Bern, Switzerland

²Project Manager, Swiss Patient Safety Foundation, Zurich, Switzerland

³Risk Manager, Division of Risk Management, Cantonal Hospital Lucerne, Lucerne, Switzerland

⁴Head, Department of Trauma Surgery, Cantonal Hospital Lucerne, Lucerne, Switzerland

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Correspondence

Dr David L.B. Schwappach
Swiss Patient Safety Foundation
Asylstrasse 77
8032 Zurich
Switzerland
E-mail: schwappach@patientensicherheit.ch

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Abstract

Rationale, aims and objectives The study aims to investigate the effects of a patient safety advisory on patients' risk perceptions, perceived behavioural control, performance of safety behaviours and experience of adverse incidents.

Method Quasi-experimental intervention study with non-equivalent group comparison was used. Patients admitted to the surgical department of a Swiss large non-university hospital were included. Patients in the intervention group received a safety advisory at their first clinical encounter. Outcomes were assessed using a questionnaire at discharge. Odds ratios for control versus intervention group were calculated. Regression analysis was used to model the effects of the intervention and safety behaviours on the experience of safety incidents.

Results Two hundred eighteen patients in the control and 202 in the intervention group completed the survey (75 and 77% response rates, respectively). Patients in the intervention group were less likely to feel poorly informed about medical errors (OR = 0.55, $P = 0.043$). There were 73.1% in the intervention and 84.3% in the control group who underestimated the risk for infection (OR = 0.51, CI 0.31–0.84, $P = 0.009$). Perceived behavioural control was lower in the control group (mean_{con} = 3.2, mean_{int} = 3.5, $P = 0.010$). Performance of safety-related behaviours was unaffected by the intervention. Patients in the intervention group were less likely to experience any safety-related incident or unsafe situation (OR for intervention group = 0.57, CI 0.38–0.87, $P = 0.009$). There were no differences in concerns for errors during hospitalization. There were 96% of patients (intervention) who would recommend other patients to read the advisory.

Conclusions The results suggest that the safety advisory decreases experiences of adverse events and unsafe situations. It renders awareness and perceived behavioural control without increasing concerns for safety and can thus serve as a useful instrument for communication about safety between health care workers and patients.

Introduction

Involvement of patients in prevention of medical errors has gained increasing attention in the past years [1]. Many organizations now provide educational materials that intend to motivate patients to engage in their safety [2]. Examples are the 'Speak up' initiative of the US Joint Commission [3], or the 'Your Health Care–Be Involved' campaign of the Ontario Hospital Association [4]. Safety actions commonly recommended to patients include traditional messages, for example, ensuring proper transmission of information to and from providers. But more challenging behaviours are also advocated, such as asking staff whether they washed their

hands. Despite the proliferation of patient advisories for safer care, there is still limited evidence regarding the effectiveness of this approach. Interventions embedded within clinical settings have been successful to some extent, but evaluations of broader educational campaigns, such as flyers or booklets, are largely lacking [1,5]. Davis *et al.* recently examined patients' attitudes towards a video aimed at promoting patient involvement in safety in a within-subject, pre-post design [6]. They report that after watching the video, patients had more positive attitudes towards asking staff if they had washed their hands. Willingness to perform other safety-related behaviours, for example, notifying staff if they have not received their medication, was unaffected.

The Swiss Patient Safety Foundation published an educational patient booklet for use in hospital care ('Help prevent errors! Your safety in hospital', available from the author upon request). This safety advisory was developed in an iterative procedure including a systematic review of the evidence, review of international campaigns, expert consultations, focus groups with patients and relatives, and formal tests of readability. The material covers key aspects of hospital care (e.g. communication, surgical site marking, patient identification, hand hygiene, medication). The advisory encourages patient involvement in safety through vigilance, communication and cooperation. Patients are provided specific safety-related information together with recommendations about which issues to monitor, which actions to take, when, how and toward whom ('safety behaviours'). Two case studies of intervening patients are also presented. The advisory is organized in 10 chapters and has 19 pages of content. The average patient needs approximately 15 minutes to read the advisory. In a pilot study conducted in three hospitals, this safety advisory was well accepted and evaluated positively by patients and health care workers (HCWs) [7]. While these results are encouraging, little is known about the actual effects of the advisory on patients' behaviours and safety outcomes. To have positive effects on safety, patients need to be aware of and read the advisory, process the presented information and adapt to the recommended behaviour, for example, asking questions or monitor HCWs' safety practices. As adoption of safety-related behaviour has been linked to attitudes, norms, perceived behavioural control, knowledge and potentially perceptions of risk and preventability, these constructs may serve as central antecedents for safety and may on their own represent important outcomes [1,8–12]. The main objective of this study was to investigate the effects of the Swiss patient safety advisory in terms of risk perceptions, perceived behavioural control, performance of safety behaviours, and experience of adverse events and unsafe practices.

Methods

To investigate the effects of the advisory, a quasi-experimental intervention study with non-equivalent group post-test comparison was conducted. Outcomes were assessed using a self-administered questionnaire. In the pre-intervention (control) period, patients received standard care. In the intervention period, patients received the advisory at their first non-emergency clinical encounter at admission, usually the initial nursing assessment after admission. Patients were instructed to study the advisory and follow the recommendations. Between control and intervention periods, clinical staff participated in teaching and information meetings to make them familiar with the advisory and ensure that HCW was adequately prepared for patients' questions, patients' pointing to (potential) errors and other relevant interactions. During this implementation phase, no patients were included in the study to allow for optimization of processes and teachings of staff.

Survey instrument

Based on prior surveys and the literature, a questionnaire was constructed to assess the effects of the advisory [7,13,14]. The survey consisted of a general part (equal for both groups) and an advisory specific part, only included in the intervention group

surveys. Constructs and items of the general part are presented in Table 1. Subjects in the intervention group were also asked several questions regarding the *advisory*, e.g. whether they read the advisory, whether they learned things they did not know before, whether their awareness and behaviour in hospital had changed due to the advisory, whether they believed that adoption of the recommendations would prevent errors and whether they would recommend other patients to read the advisory. Finally, patients were asked to rate the quality of several dimensions of the advisory (e.g. content, illustration). Patients' age, gender, length of stay and level of education were also obtained in both surveys.

Sample and procedures

The study was conducted at the surgical department of one large non-university hospital in the German part of Switzerland. To minimize heterogeneity in groups and effects not attributable to the intervention, distinct wards with rather homogenous patient groups were selected for this study (trauma surgery, general/visceral surgery, orthopaedic surgery). In addition, we chose observational periods that are only little affected by temporal variation (e.g. the periods covering Christmas and skiing holidays were excluded). We estimated that to detect a small effect size of 0.3 in a difference in group means (e.g. the mean scale score of Likert-type items), based on power = 0.8, probability of alpha error = 0.05, 180 subjects are required in each group [15]. Based on an odds ratio = 2 (for differences in proportions between groups), power = 0.8, probability of alpha error = 0.05, a sample size of 200 in both groups was required. Patients hospitalized at one of the study wards during the two observational periods (control and intervention) received the survey at discharge by trained research assistants. No interventions or additional measures were utilized. Patients were consecutively included until the required sample sizes were achieved. Patients were eligible for participation if they were aged 18 and above and had no severe cognitive, physical, or language limitations that hinder self-completion of the questionnaire. Completion of the survey was regarded as informed consent. The study was approved by the local ethics committee (ref. 1028).

Data analysis

All negatively formulated items were reverse coded. Reporting items were dichotomized to yes (yes/rather yes) and no (no/rather no). Odds ratios for control versus intervention group were calculated. For multiple-item constructs that asked for level of agreement with attitudinal statements, for example, nosocomial infection risk perceptions or perceived behavioural control, mean scale scores were computed. *t*-Tests were used to test for differences in scores between groups. Multiple logistic regression analysis was used to model the effects of the intervention and patients' safety behaviours on the experience of safety incidents. A *P*-value < 0.05 was considered statistically significant.

Results

In total, 420 surveys were completed [218 control (75% response rate), 202 intervention (77% response rate)]. Basic sample characteristics are provided in Table 2. There were no differences

Table 1 Constructs, items and response scales of the survey (control and intervention groups)

Construct /items	Response scale
Perceived level of information (2 items) How informed they felt about medical errors in hospitals; how informed they felt about surgical site marking	Poorly / somewhat / well informed
Risk perceptions regarding hospital infections (6 items) Patients can acquire a new infection in hospital; a hospital infection is a serious disease; staff can transfer germs between patients that can cause infections; it is solely a matter of chance whether patients acquire an infection in hospital; with the right measures, a hospital can prevent many new infections Quantitative task that asked patients to select the rate that would most closely match the nosocomial infection rate in this hospital.	Strongly agree / agree / neither agree nor disagree / disagree / strongly disagree List of seven numerical rates (ranging between 0.1 and 50%)
Attitudes towards patient involvement in safety (2 items) Medical errors are a serious problem of our health care system; patients can help to prevent errors	Strongly agree / agree / neither agree nor disagree / disagree / strongly disagree
Perceived behavioural control (3 items) I know how to protect myself from errors in hospital; I am confident that I can protect myself from errors in hospital; I know what to do in case I feel an error occurred in my treatment	Strongly agree / agree / neither agree nor disagree / disagree / strongly disagree
Perceived subjective norms (2 items) This hospital takes the prevention of errors seriously; in this hospital it is appreciated if patients watch for errors	Strongly agree / agree / neither agree nor disagree / disagree / strongly disagree
Safety-related behaviours (13 items) Whether patients asked HCW to mark the surgical site; whether patients monitored that the correct site was marked; whether they asked questions about site marking; whether they pointed HCW to potential errors in marking; whether they informed HCW about the drugs they take; whether they asked HCW for the purpose or correct use of drugs; whether they monitored HCW hand washing practices; whether they pointed HCW to hand washing; whether they proactively notified HCW about their identity; whether they asked HCW all questions they wanted to; whether there were situations in which they did not dare to ask questions; whether they gave all information to HCW they wanted; whether they notified HCW about any potential error.	Yes / rather yes / rather no / no
Experience of safety-related incidents and unsafe situations (10 items) Whether they knew at any time which drugs they received and why; whether they were given the wrong drug, at the wrong dose or at the wrong time; whether they knew prior to surgery which operation will be performed; whether they knew prior to surgery which site and side will be operated; whether the surgical site was marked prior to surgery; whether they acquired an infection; whether they had been confused with other patients; whether they had been called by the wrong name by HCW; whether they received tests, treatments or drugs that were not intended for them; whether they feel a medical error was made in their care	Yes / rather yes / rather no / no
Concerns for safety (1 item) Whether they were concerned about safety or medical errors during their stay	Very / somewhat / not at all concerned
Willingness to recommend (1 item) Whether they would recommend the hospital to friends	Yes / rather yes / rather no / no

HCW, health care worker.

Table 2 Basic characteristics of sample

	Control (<i>n</i> = 218)	Intervention (<i>n</i> = 202)	<i>P</i>
Mean age, years	54.1	56.4	0.248
Female gender, %	42.5	48.8	0.203
Mean length of stay, days	8.6	7.9	0.498
Education, %			<0.001
Primary education	16.6	35.6	
Secondary education	58.5	45.0	
Tertiary education	24.9	19.4	

between the two groups in terms of age, gender and length of stay, but patients who completed the survey in the intervention period were significantly more likely to have primary education.

Patients in the intervention group were less likely to feel poorly informed about medical errors in hospital (10.8% versus 18.0%, OR = 0.55, CI 0.31–0.98, $P = 0.043$) and about surgical site marking (12.2% versus 19.6%, OR = 0.57, CI 0.33–0.99, $P = 0.046$). Perceptions of risk associated with nosocomial infections differed considerably between groups. In particular, patients in the intervention group were more likely to agree that patients can acquire infections in hospital and less likely to agree that acquiring an infection is solely a matter of chance. The mean summary scale score of the infection risk perception items (Cronbach's alpha = 0.72) was significantly higher in the intervention group (mean_{Int} = 4.1, raw mean_{Con} = 3.8, $P = 0.005$). Patients also provided systematically lower quantitative estimates for the risk of infection during hospitalization. There were 73.1% in the intervention and 84.3% in the control group who underestimated the risk for infection, that is, estimated the infection rate as $\leq 1\%$ (OR = 0.51, CI 0.31–0.84, $P = 0.009$).

Patients in the control and intervention groups differed slightly in their attitudes, norms and perceived behavioural control. The mean scale scores of the attitude items (Cronbach's alpha = 0.75) were 3.8 in the control and 4.1 in the intervention group, respectively ($P = 0.0378$). The mean scale scores of the norms items (Cronbach's alpha = 0.69) were 4.2 in the control and 4.4 in the intervention group, respectively ($P = 0.0286$). Perceived behavioural control (Cronbach's alpha = 0.82) was lower in the control group (mean_{Con} = 3.2, mean_{Int} = 3.5, $P = 0.010$).

Figure 1 presents frequencies of self-reported safety-related behaviours. Communicative behaviours, such as providing and asking for information, were very common among patients with more than 90% reporting this behaviour. Passive but less established behaviours, such as monitoring surgical site marking or monitoring staff hand hygiene practices, were less frequent but

still reported by every second patient. Proactive and challenging behaviours, for example, asking HCW to wash their hands or to mark the surgical site, pointing to potential errors or notifying staff of one's identity, were considerably less frequent (<20%). Some behaviours were reported more frequently by patients in the control versus the intervention group, but no differences were statistically significant. The number of safety-related behaviours reported was significantly related to the mean score on the perceived behavioural items: For each one point increase in the mean behavioural control score, the average respondent reported 1.2 more behaviours ($P < 0.001$).

Table 3 reports experiences of safety-related incidents and unsafe situations. Overall, a considerable fraction of patients experienced incidents and unsafe situations. There were 6% of patients that acquired an infection, 5% reported a medication error and 5% believed that a medical mistake was made in their care. All except two events (did not know which site/side will be operated; called by the wrong name) were more frequent in the control as in the intervention group. Patients in the intervention group were significantly less likely to report that they did not know which drugs they receive and why. The aggregate measure reveals that more than every third patient in the control group experienced at least one out of the specified events and situations (37.6% in the control versus 25.7% in the intervention group, OR = 0.57, $P = 0.009$). Self-reported safety-related behaviours performed during hospitalization, age, gender, education and length of stay did not predict experience of any safety-related incident or unsafe situation.

There were no differences in patients' concerns for safety (27.9% somewhat or very concerned in the control versus 31.5% in the intervention group; OR = 1.2, $P = 0.424$). Willingness to recommend the hospital did not also differ (80.4% in the control versus 82.2% in the intervention group; OR = 1.13, $P = 0.633$).

Subjects in the intervention group were also asked to evaluate the advisory. Assessed on a 7-point Likert scale (1 = very poor, 7 = very good), the advisory obtained high scores in terms of

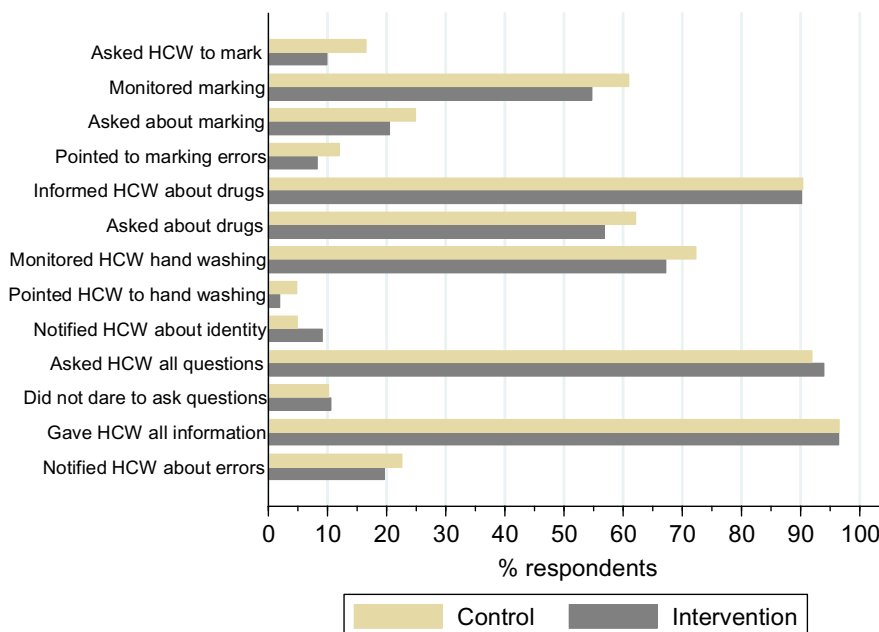


Figure 1 Frequency of self-reported safety-related patient behaviours by intervention group. Differences are not statistically significant. HCW, health care worker.

Table 3 Differences in self-reported experiences of safety-related incidents and unsafe situations between control and intervention groups

	Frequency %		OR*	P
	Control	Intervention		
Error during hospitalization	5.7	4.1	0.71	0.463
Did not know which drugs they received	19.2	10.2	0.47	0.011
Received wrong medication	6.2	4.2	0.66	0.360
Did not know which operation will be performed	5.6	4.2	0.75	0.548
Did not know which site / side will be operated	2.1	2.7	1.3	0.701
Acquired infection	6.3	5.6	0.88	0.758
Confused with other patients	4.8	3.5	0.73	0.530
Called by the wrong name	3.4	4.1	1.22	0.711
Received care not intended for them	1.5	0	–	–
Any of the above (calculated)	37.6	25.7	0.57	0.009

*Odds ratio intervention versus control group.

content (mean = 6.1, CI 5.9–6.3), relevance (mean = 6.09, CI 5.9–6.3), comprehensibility (mean = 6.22, CI 6.1–6.4), applicability (mean = 6.03, CI 5.9–6.2), illustration (mean = 6.0, CI 5.8–6.2) and overall quality (mean = 6.12, CI 6.0–6.3). There were 79.3% who reported to have learned things they did not know before. Further, 87.2% believed that adoption of the recommendations would prevent errors. Sixty-eight percent of patients felt that awareness for their safety in hospital had changed by reading the advisory (8.1% strongly; 60.3% partly) and 47% perceived changes in behaviour (5% strongly; 42.2% partly). Nearly all patients would recommend to read the advisory to other patients (60.7% yes, 35.2% rather yes).

Discussion

This study investigated the effects of a patient safety advisory on patients' safety behaviours and experiences of adverse events and unsafe situations. To the authors' knowledge, this is the first evaluation of a broad in-hospital educational safety campaign directed towards patients. The results of our study are mixed. As in a prior pilot study, patients provided positive judgments about the advisory and nearly all patients would recommend other patients to read the advisory. We found no effect of the advisory on patients' concerns for safety. As it has been warned that involvement of patients in safety may increase fears and erode trust in the health care system, this is a positive result [16]. Patients who received the advisory were more likely to feel well informed, had on average more realistic infection risk perceptions, in particular regarding preventability, and were less likely to underestimate infection risk. Patients in the intervention group reported higher perceived behavioural control. This is an important result as behavioural control has been identified as the main force for patients to engage in their safety [8–10,12,17]. Our study confirms that perceived behavioural control is directly linked to safety-related behaviours and suggests that it can be modulated.

Though a considerable fraction of patients identified changes in their behaviour in hospital, we observed no differences in the performance of safety-related behaviours recommended in the advisory between control and intervention groups. Concomitantly, patients in the intervention group were less likely to report safety-related events and unsafe situations as indicated by the aggregate measure. In fact, the intervention predicted report of any safety

event even after controlling for safety behaviours. Several factors may help to explain this counter-intuitive result. The lower frequency of unsafe practices and adverse events in the intervention period may result from changes in professionals' rather than patients' behaviours. As staff working on the participating wards were not blinded to the intervention, it seems likely that information about the safety advisory and educational workshops conducted in the implementation period affected staff safety practices. Similar effects have been reported by McGuckin *et al.* [5]. In this study, soap usage by staff increased considerably before the intervention – engaging patients to ask staff to disinfect their hands – was readily installed. Contrary, the advisory may not have affected the incidence of incidents at all but rather patients' reporting of these events. For example, patients in the intervention group may have had a clearer understanding of the events and practices that were asked for in the survey. In effect, this would have eliminated over-reporting in the intervention group compared with the control group. While evidence shows that patients' reports of adverse events are often in well concordance with other detection methods, for example, record review, it is unclear whether the accuracy of reporting behaviours and incidents is itself affected by the intervention [18–21].

Our study has several limitations that need to be considered: First, due to the study design, we cannot infer that any differences between the two groups were in fact caused by the intervention. Second, we sampled patients from one hospital only and the generalizability of our results remains therefore unclear. Finally, we have little information about how the advisory was utilized in practice. Evidence suggests that patient staff interactions are crucial for patients' engagement in safety [1,22–24]. While staff participated in educational trainings, we do not know whether and how they communicated with patients about the advisory and the recommended safety practices.

Despite these limitations, our study has important implications for further research: First, an investigation into the effects of the advisory or similar interventions using other methods is required. Studies employing ethnographic observation methods could help to identify relevant safety behaviours and staff–patient interactions and overcome the limits of self-reports. In particular, other research designs would shed light on our finding that patient behaviours were unaffected by the intervention but outcomes differed between intervention and control group in terms of patient-reported

safety-related events. Observation studies may help to explain *how* the advisory affects care by adding context to observed incidents rather than 'counting numbers'. Second, this research focused on patients' behaviours and experiences and there is to date very little evidence relating to HCWs' perspectives on patient involvement in safety. Future research should examine factors that determine HCWs' approval of patients' safety-related behaviours and HCWs' responses to patients intervening. For example, some patient behaviours may be more acceptable to HCWs than others.

Third, for the purpose of this study, it was intended to include a relative homogenous patient group. However, as Davis *et al.* suggest, patient and illness-related factors may affect patients' abilities and preferences to get involved in safety [17]. Research in larger and heterogeneous patient cohorts is needed to examine the relationship between these factors. Future work is also required to outline how interventions that aim to foster patient empowerment in safety are implemented successfully in organizations. Previous research showed that patients' perceived subjective norms are important drivers for their engagement in safety [9]. In this study, perceived norms were slightly affected by the intervention, including educational sessions for staff. However, it remains unclear how norms can be substantially rendered in hospitals in a way that is perceived positively by patients and relatives.

This study provides new evidence regarding patient involvement in safety. Our results suggest that the safety advisory decreases experiences of adverse events and unsafe situations. It renders awareness and perceived behavioural control without increasing concerns for safety and can thus serve as a useful instrument for communication about safety between HCWs and patients.

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Competing interests

None

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