Improving patient safety culture

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Abstract

Purpose – Improving hospital patient safety means an open and stimulating culture is needed. This article aims to describe a patient safety culture improvement approach in five Belgian hospitals.

Design/methodology/approach – Patient safety culture was measured using a validated Belgian adaptation of the Hospital Survey on Patient Safety Culture (HSOPSC) questionnaire. Studies before (autumn 2005) and after (spring 2007) the improvement approach was implemented were completed. Using HSOPSC, safety culture was measured using 12 dimensions. Results are presented as evolving dimension scores.

Findings – Overall, 3,940 and 3,626 individuals responded respectively to the first and second surveys (overall response rate was 77 and 68 percent respectively). After an 18 to 26 month period, significant improvement was observed for the "hospital management support for patient safety" dimension – all main effects were found to be significant. Regression analysis suggests there is a significant difference between professional subgroups. In one hospital the "supervisor expectations and actions promoting safety" improved. The dimension "teamwork within hospital units" received the highest scores in both surveys. There was no improvement and sometimes declining scores in the lowest scoring dimensions: "hospital transfers and transitions", "non-punitive response to error", and "staffing".

Research limitations/implications – The five participating hospitals were not randomly selected and therefore no representative conclusions can be made for the Belgian hospital sector as a whole. Only a quantitative approach to measuring safety culture was used. Qualitative approaches, focussing on specific safety cultures in specific parts of the participating hospitals, were not used.

Practical implications – Although much needs to be done on the road towards better hospital patient safety, the study presents lessons from various perspectives. It illustrates that hospital staff are highly motivated to participate in measuring patient safety culture. Safety domains that urgently need improvement in these hospitals are identified: hospital transfers and transitions; non-punitive response to error; and staffing. It confirms that realising progress in patient safety culture, demonstrating at the same time that it is possible to improve management support, is complex.

Originality/value – Safety is an important service quality aspect. By measuring safety culture in hospitals, with a validated questionnaire, dimensions that need improvement were revealed thereby contributing to an enhancement plan.

Keywords Safety, Quality improvement, Patient care, Hospitals, Belgium

Paper type Research paper

Introduction

Council of Europe Committee Ministers advocated in "Recommendation (2006) 7 on management of patient safety and prevention of adverse events in healthcare" that governments need to develop a coherent and comprehensive patient safety policy framework. The framework's objectives include promoting safety cultures at all healthcare levels, adopting a proactive and preventive approach to designing health systems for patient safety reasons, emphasizing patient safety as a leadership and management priority and encouraging learning from patient-safety incidents (Council of Europe, 2006). Safety culture is a performance shaping factor that guides healthcare professional behaviour toward viewing patient safety as one of their highest priorities (Nieva and Sorra, 2003, p. 17). According to Reason (1997), four safety culture aspects are important: justice or fairness; flexibility; learning; and systematic reporting. Kizer defined patient safety culture as "an integrated pattern of individual and organizational behaviour based upon shared beliefs and values that continuously seek to minimize patient harm that may occur from the care delivery process" (Aspden *et al.*, 2004, p. 174). The safety literature usually refers to four categories that affect medical safety (Jha *et al.*, 2008):

(1) Healthcare workers and managers are often more interested in individual accountability instead of developing a systems approach to patient safety that addresses latent factors that allow an error to occur (or fail to prevent it).

(2) Clinicians often encounter numerous errors during clinical practice, leading to the impression that such problems are inevitable.

(3) Medical care is typically organized hierarchically and so reporting "problems" is often viewed as a personal attack rather than an effort to improve.

(4) There has been little emphasis on developing a learning environment for front-line workers in healthcare.

Although the relationship between culture and safety is compelling, the healthcare literature remains limited (Jha *et al.*, 2008). Following the European Committee recommendation (op cit), the first stage in developing safety culture is to measure and define the organization's safety culture.

Research questions

Assessing a hospital's patient safety culture is a challenge. There are quantitative and qualitative approaches but there is no clear consensus about the best method for investigating safety culture in specific healthcare contexts. There is also no clear understanding about safety culture dimensions, their interaction with professional cultures or their relative importance. The results of our first safety culture survey were described in Hellings *et al.* (2007), but there remains limited research or information about best practices on how hospital patient safety culture can be improved. Our research questions, therefore, address gaps in the existing research:

• How can hospital patient safety culture be improved? We describe our improvement elements and how we measured progress using a questionnaire in five Belgian acute hospitals, after an 18 to 26 month intervention period before our study's conclusions and limitations were formulated.

• What can we learn after the intervention period? We analyse our improvement approach and we discuss its evolution and formulate recommendations.

Method

Several instruments are available to assess hospital safety culture (Pronovost and Sexton, 2005; Pronovost *et al.*, 2003; Kho *et al.*, 2005; Singer *et al.*, 2003; Modak *et al.*, 2007; Katz-Navon *et al.*, 2005). In 2005, Colla *et al.* (2005) reviewed nine patient safety climate surveys. Psychometric quantity and quality varied considerably. Similarly, Flin *et al.* (2006) published their systematic literature review and statistical analysis. We conclude that more consideration should be given to instrument psychometrics. The Hospital Survey on Patient Safety Culture (HSPSC) met more of the specified psychometric criteria owing to its systematic testing than the other instruments although findings are based only on a 29 percent response rate (1,437 staff in 21 US hospitals; www.ahrq.gov/qual/hospculture). After a critical review, the HSPSC was selected for this study based on its psychometric validation and detailed user guidelines. The HSPSC includes 42 items for measuring 12 areas or patient safety culture composites (Figure 1) and is designed to assess hospital staff opinions about patient safety issues, medical error and event reporting. After translation into Dutch, a psychometric (re)validation based on pilot hospital data was done using the original questionnaire validation strategy (www.ahrq.gov/qual/hospculture; Wenqi, 2005; Hellings *et al.*, 2007). Validation suggested improving the "teamwork within hospital units" dimension by removing item a11. Therefore, we calculated this dimension using three instead of four items. The complete Belgian HSPSC validation report is available (www.zol.be/patientveiligheid).

Sample

We selected five hospitals in February 2005 based on: institutional status (three private and one public hospital); beds; and leaders' willingness to cooperate in a three year patient safety research project. Beds totalled 2,670 (1,256 public and 1,414 private), ranging from 422 beds to 812 beds per hospital. The safety research project was approved by two ethics committees.

Questionnaire distribution

We completed the first measurement between September and October 2005, except for the hospital 5 pilot, which was done between April and May, 2005. The second measurement was done between April and August, 2007. All individuals working in
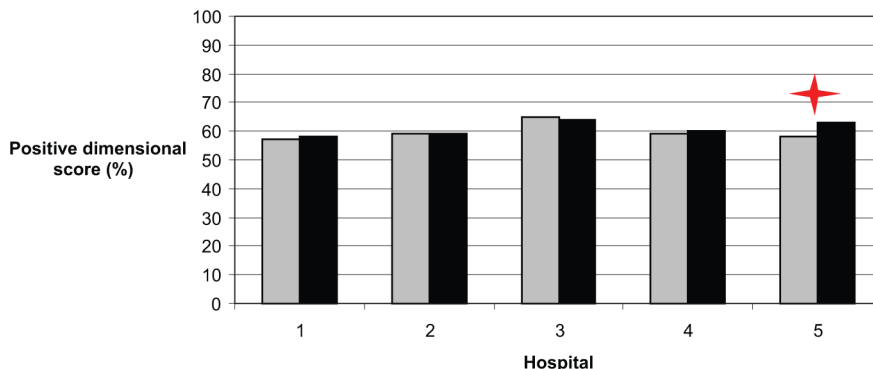
Figure 1.
Supervisor/manager
expectations and actions
promoting patient safety

Notes: Gray: measurement 1; Black: measurement 2; Star: difference ≥ 5%

direct or indirect clinical contact with patients were invited to participate. The original questionnaire instructions were strictly followed (www.ahrq.gov/qual/hospculture); including a notification letter from hospital managers one week prior to distribution and two reminders after distribution, each mail shot having a two-week interval. Questionnaires were attached to reminder letters. Each questionnaire included an identifier code, which allowed us to selectively send reminders. Anonymity was guaranteed by separating distribution (by personnel department staff) from questionnaire receipt and analysis and by not identifying the hospital unit. All physicians were included, also incorporating those working only a few hours per week in the hospital. The physicians' questionnaire did not have an identifier code so questionnaires were attached to all reminders.

Analysis
Our strategy meant that all questionnaires were analysed anonymously. Incomplete questionnaires were abandoned; exclusion criteria were:

- an entire survey section was incomplete complete;
- fewer than half of the items throughout the entire survey answered; and
- all items answered the same (i.e. response set).

Each dimension included three or four items with an answer scale from 1 to 5. Percentages were calculated on the number of respondents to specific question or dimension. Answers on the questions with score 1 and 2 were considered negative towards patient safety; 3 was neutral, 4 and 5 were positive. Some questions were negatively worded so answers were reversed prior to recoding into positive, neutral or negative.

The hospital level dimensional scores were expressed as percentage of positive answers towards patient safety within each dimension. According to the HSPSC manual, a difference or change in dimensional score of at least five percent can be considered substantial. To allow multivariate analyses, the dimensional scores needed to be calculated at individual respondent rather than hospital level. For each individual, an average score (range 1-5) for an item on each dimension was calculated. If the (rounded) average score was greater than or equal to four, the dimensional score was considered positive towards patient safety. Univariate analysis was done using the chi-square test. Because the study was exploratory, probability levels were given without assigning a significance level or correction for multiple testing. Multivariate analysis was done using logistic regression. All variables were first examined using a univariate model. In a following step, all main effects were modelled using conditional backward logistic regression ($p_{in} = 0.05$; $p_{out} = 0.10$). In a final step, all main effects including interaction of all main effects within the measurement period were modelled using backward logistic regression. Because of anonymity, individuals were not given the same identifier in the two measurements. Clustering was, therefore, not taken into account. All analyses were done using SPSS 16.0.

Findings
The way in which information about patient safety initiatives flows in the organisation must be followed-up (Westrum, 2004). A detailed report of all 2005 survey results was provided to each hospital, including its position on each dimension among four other

hospitals. The research team presented reports orally in each hospital and the feedback's importance to senior managers and front-line staff was underlined. Feedback and action planning sessions must be designed with care, however, by bringing together multidisciplinary groups – recognizing hospital complexities and their clinical and administrative authority structures (Nieva and Sorra, 2003). Organisational culture cannot be tackled in isolation from organisational structure, financial arrangements, control lines and accountability, strategy formulation or personnel initiatives (O'Davies *et al.*, 2000). It illustrates the need for full management involvement in this matter. Inspiration for developing and evaluating hospital-wide cultural change programs or implementing a "comprehensive unit-based safety program" (CUSP) is given in different case reports (Cohen *et al.*, 2004; Yates *et al.*, 2004; ECRI, 2005). Assessing patient safety culture has a corollary effect of raising awareness levels about culture role promoting a safer patient environment. Therefore, the first hospital action by the patient safety committee is important (Nieva and Sorra, 2003). Defining patient safety culture targets in a time frame was an essential part of an improvement plan. Hospital staff were free to choose their specific targets and implementation approaches, but working on better management support for patient safety was essential as this support is strongly needed for building safer hospital care systems.

Installing a multidisciplinary patient safety committee and involving hospital managers
A patient safety committee is necessary for promoting hospital safety culture, overseeing and integrating observations and efforts, developing expertise, stimulating improvement projects and safeguarding resources (JCHAO, 2004). The committee plays an important role developing cultural transformation strategies for successfully achieving a "cultural fit" between hospital managers and the medical profession. These two groups are rooted in a different professional culture, which often interferes with smooth collaboration in the hospital. There can, however, be no misunderstanding about physician role and responsibility for improving patient safety (Classen and Killbridge, 2002). Involving leading physician, nurse and administrator (including the chief medical, nursing and executive officers), safety officer, infection control staff and individuals who are knowledgeable and respected among their peers is essential for an effective patient safety committee (JCHAO, 2004). Changing a culture, even a few practices and policies, requires a common vision and strong hospital leadership (Leape and Berwick, 2005; Pronovost *et al.*, 2003). Management support for patient safety is therefore essential.

Educating staff about patient safety and raising awareness about culture role for a safer hospital environment
The combination of complexity, professional fragmentation and an individualism tradition are strong barriers to hospital patient safety progress (Amalberti *et al.*, 2005; Leape and Berwick, 2005). Raising awareness must be combined with education about patient safety "science" because people want to know what they can do to improve things. Patient safety brings new knowledge into service quality by introducing disciplines such as human-factors engineering and organisational psychology, sociology and informatics. It will take time for these sciences to change and enrich quality (Brennan *et al.*, 2005). Hospital staff wanting to make patient care safer will,

therefore, have to involve almost all departments and systems (Berwick, 2003). Improving clinical care requires organisational change (Moss, 2004), which is not possible without understanding how systems work, what needs to be done to change them and without the right skills to implement these changes. We developed a patient safety framework package (seminars, papers and literature) for participating hospital staff.

Working with focussed improvement projects
In the broader medication safety project context, staff in four participating hospitals focussed on improving medication safety in four wards. Combined approaches were implemented:

- drug knowledge and administration;
- patient involvement and drug administration; and
- reporting events and analysing incidents with a focus on internal communication.

Drug-related events in each ward were measured using the trigger tool method. In the 2005 survey, 3,940 individuals responded (77 per cent) – ranging from 74 to 83 per cent in the five hospitals. Among physicians, the response rate was 55 per cent (range: 51-59 per cent), compared to 82 per cent (range: 77-90 per cent) for other staff. Overall, 3,552 (90 per cent) respondents had direct interaction or contact with patients. In the 2007 study, 3,630 individuals responded. The overall response rate decreased to 68 per cent, with a large reduction in hospital 1 (from 75 to 58 per cent). The response rate in five participating hospitals ranged from 58 to 82 per cent. Among physicians, the response rate was 40 per cent (range: 29-69 per cent), compared to 73 per cent (range: 78-90 per cent) for other staff. Overall, 90 per cent had direct interaction or contact with patients. The 2005 and 2007 survey respondent characteristics are presented in Table I. Although the response rate declined, population characteristics are comparable.

A total of 12 dimension score changes are shown in Figures 1-12. Positive scores must be read as encouraging patient safety. Only for "hospital management support for patient safety" dimension (Figure 8) was a general progress observed and so only for this dimension can we give a positive answer to our first research question. Table II shows the dimensions' evolving changes for respondent subgroups. Our regression analysis suggests there is a significant difference between subgroups and a significant improvement towards the second measurement. Differences within subgroups were not demonstrated. Table III shows the uni- and multivariate logistic regression on the "hospital management support for patient safety" dimension. One hospital also made progress in the dimension "supervisor expectations and actions promoting patient safety" (from 58 to 63 per cent). Because this effect is not present in the other hospitals, no further analysis was performed. On the negative side, "handoffs and transitions" dimension is most prominent, ranging from 31 to 36 per cent in the 2005 survey. This score was even lower in the 2007 survey, although the decrease is only substantial in hospital 4 where a 5 per cent decline in the positive scores was observed in the "staffing" dimension. In hospital 3, a 5 per cent decline in the positive scores was observed in the "organisational learning and continuous improvement" dimension.

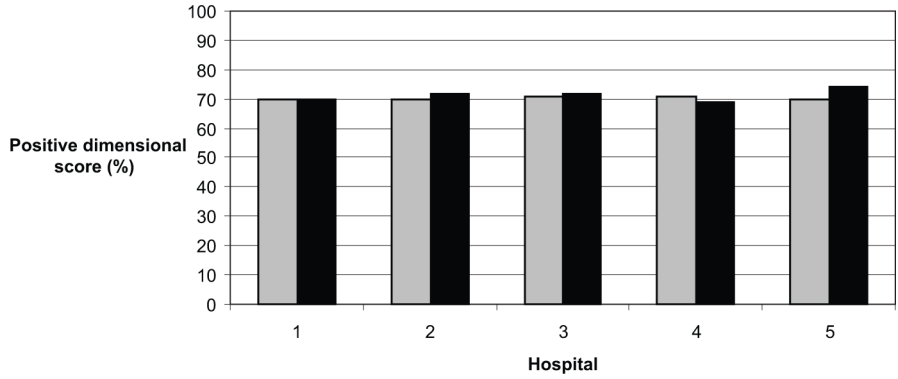|	Measurement			
	1		2	
	n	%	*n*	%
Work environment				
Different units	287	7.3	260	7.2
Internal medicine	490	12.4	449	12.4
Surgical units	492	12.5	483	13.3
Operating theatre	308	7.8	273	7.5
Gynaecology	241	6.1	229	6.3
Pediatrics	107	2.7	126	3.5
Intensive care	243	6.2	202	5.6
Urgency department	146	3.7	107	2.9
Revalidation	94	2.4	119	3.3
Geriatrics	273	6.9	257	7.1
Psychiatrics	62	1.6	64	1.8
Medical-technical units	506	12.8	407	11.2
Pharmacy	66	1.7	71	2.0
Other	393	10.0	458	12.6
Missing	232	5.9	125	3.4
Professional background				
Nurse	2,373	60.2	2,035	56.1
Head nurse	154	3.9	157	4.3
Nurse assistant	286	7.3	349	9.6
Physician	356	9.0	334	9.2
Head physician	72	1.8	79	2.2
Junior physician	34	0.9	30	0.8
Pharmacist	20	0.5	24	0.7
Pharmacy assistant	44	1.1	43	1.2
Middle management	23	0.6	32	0.9
Technician	188	4.8	155	4.3
Paramedical	209	5.3	213	5.9
Other	135	3.4	148	4.1
Missing	46	1.2	31	0.9
Direct patient interaction				
Direct interaction	3,552	90.2	3,249	89.5
Indirect contact	313	7.9	311	8.6
Missing	75	1.9	70	1.9
Professional experience				
Less than a year	160	4.1	123	3.4
From one to five years	805	20.4	663	18.3
From six to ten years	671	17.0	653	18.0
From 11 to 15 years	643	16.3	513	14.1
From 16 to 20 years	584	14.8	537	14.8
More than 20 years	1,014	25.7	1,087	29.9
Missing	63	1.6	54	1.5
Total	3,940	100	3,630	100

Table I.
Respondent
characteristics

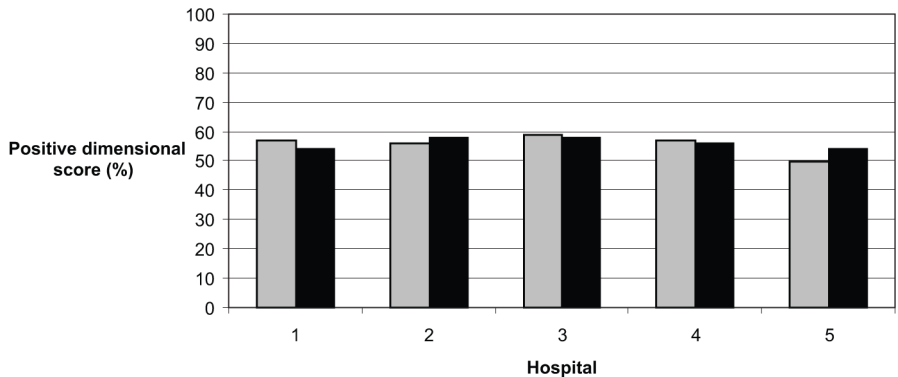**Figure 2.**
Organizational learning
and continuous
improvement
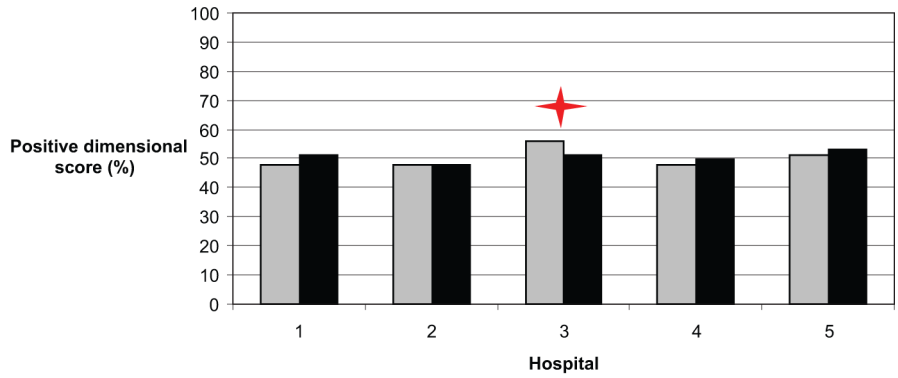
Notes: Gray: measurement 1; Black: measurement 2; Star: difference ≥ 5%

Figure 3.
Teamwork within hospital
units
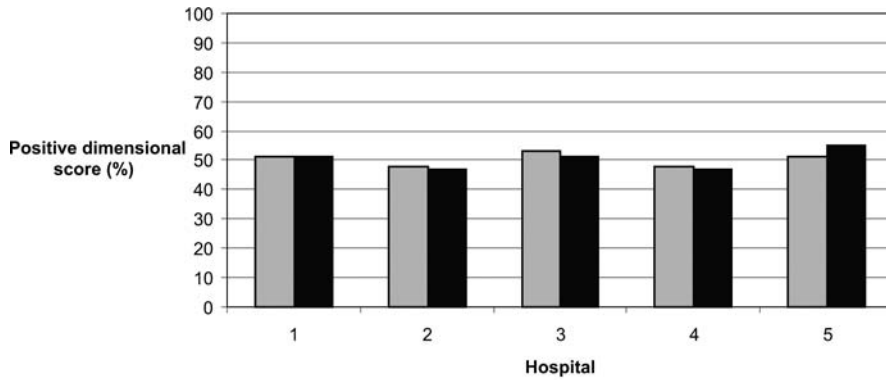
Notes: Gray: measurement 1; Black: measurement 2; Star: difference ≥ 5%

Figure 4.
Communication openness

Notes: Gray: measurement 1; Black: measurement 2; Star: difference ≥ 5%

Notes: Gray: measurement 1; Black: measurement 2; Star: difference ≥ 5%

Figure 5.
Feedback and
communication about
error

Notes: Gray: measurement 1; Black: measurement 2; Star: difference ≥ 5%

Figure 6.
Non-punitive response to
error

Notes: Gray: measurement 1; Black: measurement 2; Star: difference ≥ 5%

Figure 7.
Staffing

Figure 8.
Hospital management
support for patient safety

Notes: Gray: measurement 1; Black: measurement 2; Star: difference ≥ 5%
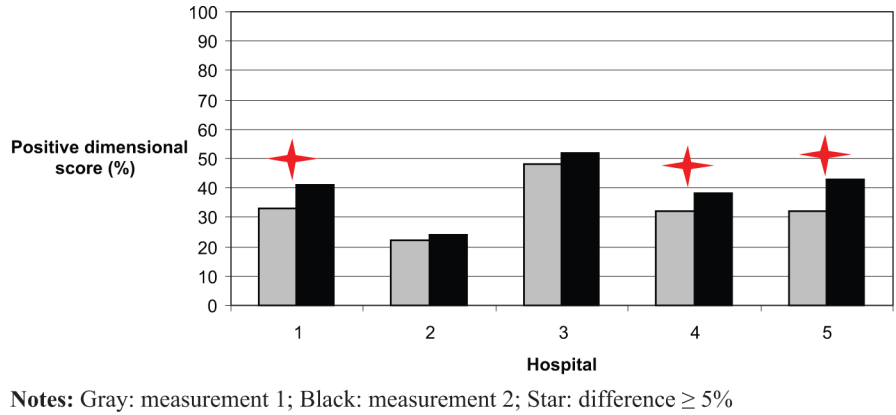
Figure 9.
Teamwork across hospital
units

Notes: Gray: measurement 1; Black: measurement 2; Star: difference ≥ 5%
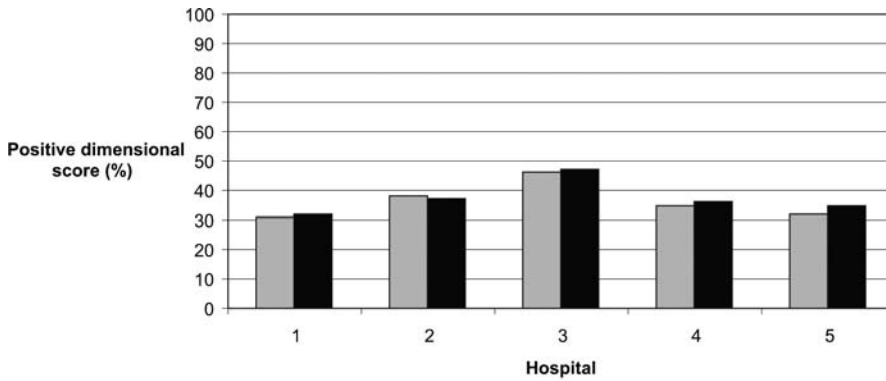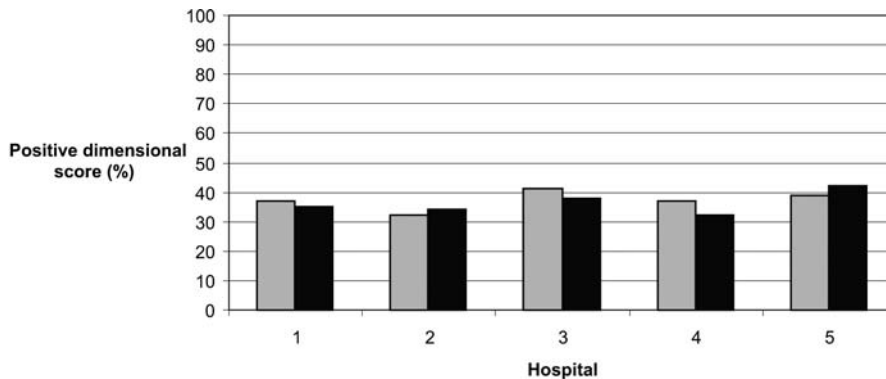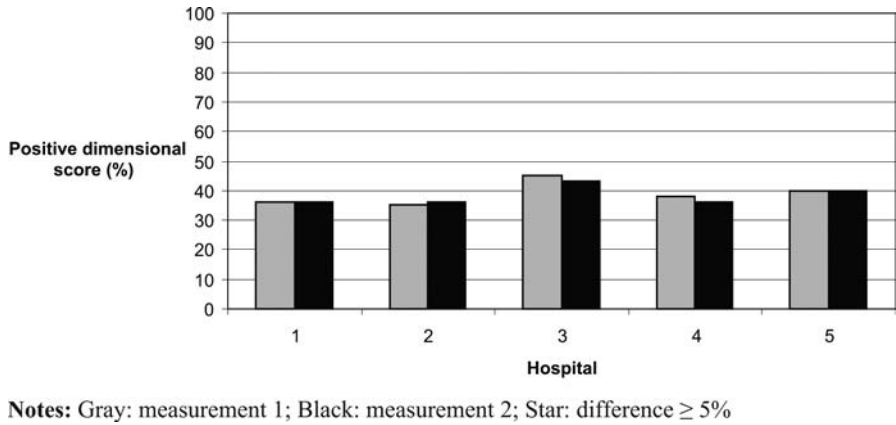

Figure 10.
Hospital hand-offs and
transitions

Notes: Gray: measurement 1; Black: measurement 2; Star: difference ≥ 5%
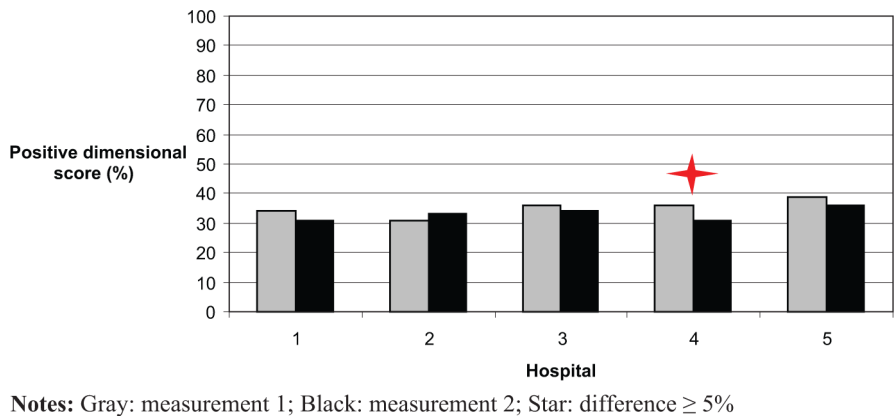
Notes: Gray: measurement 1; Black: measurement 2; Star: difference ≥ 5%

Figure 11.
Overall safety perceptions

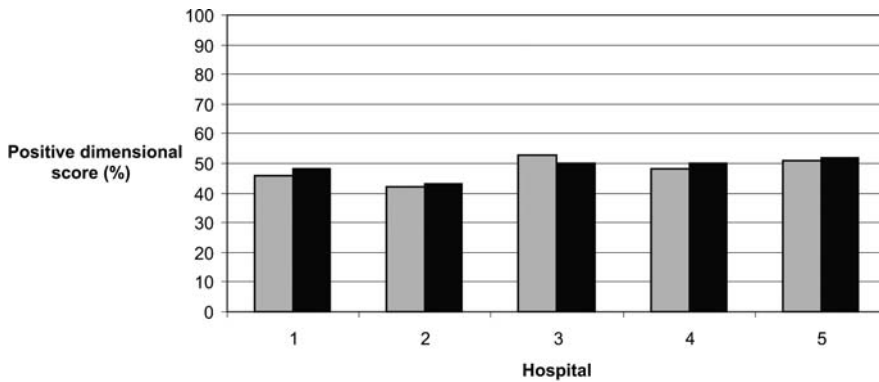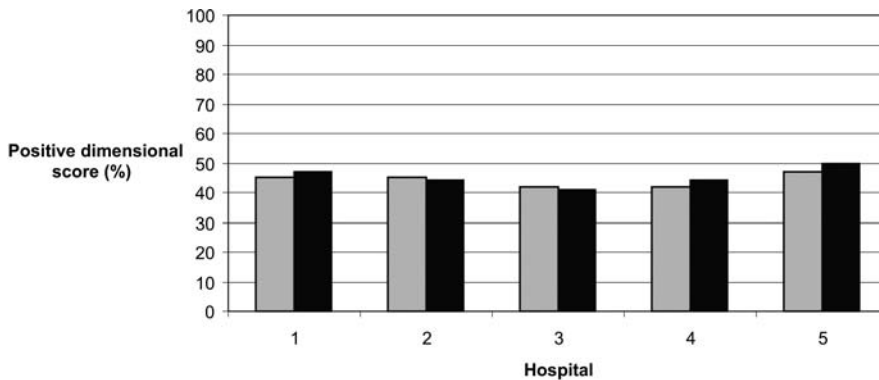**Notes:** Gray: measurement 1; Black: measurement 2; Star: difference ≥ 5%

Figure 12.
Frequency of event
reporting

Limitations

Our study has several limitations. First, participating hospitals were not randomly selected and therefore no representative conclusions can be made for the Belgian hospital sector as a whole. Second, although the overall 68 per cent response rate was high, it is unclear why the second survey overall response decreased 9 per cent. In hospital 1, the response rate decreased from 75 to 58 per cent and only 29 per cent of the physicians responded. If response rates fall below 60 per cent then data represent opinions rather than culture and the results should be used cautiously (Pronovost and Sexton, 2005). Third, for confidentiality reasons, some respondents did not receive a unique number, so score changes cannot be analysed individually.

While the 2005 and 2007 population characteristics were comparable, conclusions can only be formulated from the perspective of these populations. Beside the mandatory focus on a better management support for patient safety, hospital staff were free to develop their own improvement projects, which stimulated improvement

	Measurement 1		Measurement 2		
	n	% positive	n	% positive	p
Work environment					
Different units	286	28.3	257	42.4	0.001
Internal medicine	489	31.9	446	37.9	0.05
Surgical units	487	29.8	482	36.3	0.03
Operating theatre	305	30.8	273	29.7	0.76
Gynaecology	240	20.8	228	36.0	<0.001
Pediatrics	107	30.8	124	41.9	0.08
Intensive care	241	14.9	201	18.9	0.27
Urgency department	146	15.1	106	24.5	0.06
Revalidation	93	37.6	118	39.0	0.84
Geriatrics	273	37.4	256	41.8	0.30
Psychiatrics	62	37.1	64	37.5	0.96
Medical-technical units	494	30.4	397	39.5	0.004
Pharmacy	64	37.5	70	48.6	0.20
Other	391	38.1	452	40.7	0.44
Professional background					
Nurse	2,360	27.2	2,024	31.1	0.005
Head nurse	154	41.6	157	52.2	0.06
Nurse assistant	284	35.9	347	39.5	0.36
Physician	354	31.9	331	46.5	<0.001
Head physician	72	44.4	79	62.0	0.03
Junior physician	33	21.2	30	30.0	0.42
Pharmacist	20	35.0	24	58.3	0.12
Pharmacy assistant	42	35.7	42	42.9	0.50
Middle management	23	65.2	32	71.9	0.60
Technician	182	31.9	148	35.8	0.45
Paramedical	207	26.6	210	41.4	0.001
Other	132	43.9	145	38.6	0.37
Direct patient interaction					
Direct interaction	3,531	30.0	3,233	36.4	<0.001
Indirect contact	303	33.3	301	40.9	0.03
Professional experience					
Less than a year	156	37.8	123	37.4	0.94
From one to five years	797	30.7	658	34.0	0.18
From six to ten years	670	29.3	650	36.8	0.004
From 11 to 15 years	639	25.5	509	35.2	<0.001
From 16 to 20 years	580	27.9	530	34.5	0.02
More than 20 years	1,004	34.0	1,078	40.3	0.003

Table II.
Positive scores on the
"hospital management
support for patient
safety" dimension for
different subgroups

plan acceptance, but it complicated the search for a causal relationship between developing specific actions, their implementation and the second survey results.

We used a quantitative approach to measure safety culture. With this approach there is a risk that one selects and measures dimensions that are not relevant or important in terms of organisation's cultural dynamics. There are doubts whether our questionnaire is actually reliable and valid, since validating something as deep and

	Univariate			Multivariable		
	OR	95.0% CI		OR	95.0% CI	
Measurement						
1	1			1		
2	1.33	1.21	1.47	1.41	1.27	1.57
Hospital						
1	1	–	–	1	–	–
2	0.46	0.38	0.57	0.46	0.38	0.57
3	1.79	1.53	2.10	1.98	1.67	2.35
4	0.88	0.73	1.06	0.86	0.71	1.05
5	0.98	0.84	1.15	1.11	0.93	1.31
Work environment						
Different units	1	–	–	1	–	–
Internal medicine	0.99	0.79	1.24	1.12	0.87	1.43
Surgical units	0.92	0.73	1.14	1.16	0.91	1.49
Operating theatre	0.81	0.63	1.04	1.06	0.80	1.39
Gynaecology	0.73	0.56	0.95	0.78	0.59	1.05
Pediatrics	1.08	0.79	1.49	1.21	0.86	1.70
Intensive care	0.37	0.28	0.51	0.49	0.36	0.68
Urgency department	0.44	0.30	0.63	0.55	0.37	0.80
Revalidation	1.16	0.83	1.61	1.62	1.14	2.31
Geriatrics	1.21	0.95	1.55	1.65	1.26	2.16
Psychiatrics	1.11	0.74	1.65	1.40	0.92	2.13
Medical-technical units	0.98	0.78	1.22	1.07	0.82	1.40
Pharmacy	1.42	0.97	2.08	3.01	0.74	12.19
Other	1.21	0.97	1.52	1.26	0.99	1.61
Professional background						
Nurse	1	–	–	1	–	–
Head nurse	2.16	1.71	2.73	2.16	1.69	2.76
Nurse assistant	1.49	1.25	1.77	1.34	1.10	1.62
Physician	1.56	1.32	1.84	1.73	1.44	2.08
Head physician	2.83	2.04	3.92	2.92	2.04	4.18
Junior physician	0.83	0.47	1.47	0.50	0.25	1.00
Pharmacist	2.23	1.23	4.05	1.01	0.22	4.54
Pharmacy assistant	1.58	1.02	2.46	0.62	0.15	2.60
Middle management	5.46	3.07	9.71	7.34	3.71	14.53
Technician	1.24	0.98	1.57	1.41	1.03	1.92
Paramedical	1.26	1.02	1.56	1.02	0.80	1.30
Other	1.71	1.33	2.19	1.65	1.25	2.17
Direct patient interaction						
Direct interaction	1	–	–	1	–	–
Indirect contact	1.19	1.00	1.42	0.77	0.60	0.97
Professional experience						
Less than a year	1	–	–	1	–	–
From one to five years	0.79	0.60	1.03	0.80	0.60	1.07
From six to ten years	0.81	0.62	1.06	0.81	0.60	1.08
From 11 to 15 years	0.70	0.54	0.92	0.70	0.52	0.95
From 16 to 20 years	0.75	0.57	0.98	0.76	0.57	1.03
More than 20 years	0.98	0.76	1.27	0.90	0.68	1.20

Notes: OR = Odds ratio for having a positive dimensional score; CI = Confidence interval; backward conditional logistic regression: all two-way interactions with measurement were included but not withheld

Table III.
Uni- and multivariate
logistic regression on
"Hospital management
support for patient
safety" dimension

complex as cultural assumptions is intrinsically difficult (Schein, 2004). It would be interesting, therefore, to explore more in-depth specific topics that were revealed by the survey using qualitative approaches, like interviews or focus groups. From a qualitative perspective, it would be interesting to investigate specific safety culture issues in different wards and departments, and also interaction between professional cultures

Discussion

In this section we answer the second research question: "What can we learn after the interventions?" Improvement was only observed in the "hospital management support for patient safety" dimension. This overall lack of effect can be explained by different arguments. One possible explanation is that improvement efforts were actually not effective, or not effectively applied. Another argument is the intervention period's limited duration; 18-26 months is likely to be insufficient to induce cultural changes in complex organisations such as hospitals. Overall limited progress was also observed in the results from second measurement using HSOPSC after one year in 98 US hospitals. After they received results from the 2005 survey, four hospitals in our study had actually only 14-15 months left to work on improvement. In the fifth hospital, the period between the first and second survey lasted 26 months. Although one recommendation is to measure safety culture annually (Pronovost and Sexton, 2005), this study shows that at least two years is needed to realise even a limited improvement. Measuring safety culture therefore asks simultaneously for an integrated improvement approach, concrete actions and a well-organised communication plan. When this is out of balance, decreasing dimensional scores can be the consequence, as is partially demonstrated in hospital 4. When scores decrease further, investigation is advised using qualitative approaches. Hospital 3 demonstrated in the 2005 survey that safety culture can be defined as a hospital differentiator on the basis of safety culture dimension differences. In Hospital 5 the 2005 survey was the starting point for including the medical director, nursing director, physician – clinical risk manager, quality advisor and the CEO. These officers met weekly to work on the topic and communicated strongly with leading staff (physicians, nurses, management and supporting services). The hospital's results confirm the importance of middle manager's strategic involvement (Carney, 2006).

Feedback sessions about safety culture and action planning must be designed with care, bringing together multidisciplinary groups while recognizing hospital complexities and their clinical and administrative authority structures (Nieva and Sorra, 2003). The organisational culture cannot be tackled in isolation from such issues as organisational structure, financial arrangements, control lines and accountability, strategy formulation or human resource initiatives (O'Davies *et al.*, 2000). It illustrates the need for full management involvement. Inspiration for developing and evaluating a hospital-wide cultural change program or CUSP implementation is given in different case reports (Cohen *et al.*, 2004; Yates *et al.*, 2004; ECRI, 2005). Assessing patient safety culture has a corollary effect of raising awareness about culture's role promoting a safer patient environment and therefore it is the patient safety committee's first action (Nieva and Sorra, 2003).

After feeding back the 2005 measurement results, staff must first experience enough "disequilibrium" to create a motivation to change (Schein, 2004). Connecting data to

important goals and ideals in the patient safety field may cause anxiety and guilt, and therefore psychological safety is necessary. In this climate, members can discover ways of solving problems and learning something new without identity or integrity loss. This "transformative change" implies that a person or group targeted for change must unlearn something as well as learn something new (Schein, 2004). In this complex process, leadership involvement in stimulating and creating a learning atmosphere is important. This was observed in four from five hospitals, also leading to progress in the "management support for patient safety" scores.

For all five participating hospitals, the dimensional positive scores are low to average compared to the 2007 and 2008 Comparative Database Reports (Sorra *et al.*, 2007, 2008). Comparing our results with this database, however, must be done carefully. There are important differences in the respondents' characteristics; that is, in the Comparative Database Report 2007, only 76 per cent reported direct patient interaction, versus 90 per cent in our survey. A total of 40 per cent were registered nurses, licensed practical nurses and nurse practitioners in the Comparative Database Report 2007 versus 64.9 per cent in our survey. In the Comparative Database Report, less than 4 per cent were staff physicians, resident physicians or physician assistants versus 11.8 per cent in our survey. In the 2008 Comparative Database Report, results from 98 hospitals conducting the survey for the second time are presented (Sorra *et al.*, 2008). From average scores, no dimensional score improvement larger than 5 per cent could be observed, illustrating again how complex safety culture progress realisation can be.

Overall limited progress was realised. Although much needs to be done on the road towards hospital patient safety, this study can present lessons from various perspectives. First, it illustrates that hospital staff are highly motivated to participate in measuring patient safety culture. Second, it identifies safety domains that urgently need improvement in these hospitals; that is, hospital transfers and transitions, non-punitive response to errors. Third, it confirms how complex realising patient safety culture progress can be, demonstrating at the same time that it is possible to improve management patient safety support.

Recommendations

We suggest that patient safety culture should be measured every three years. But one must in every case be careful with timing because measuring raises staff expectations. Improving safety culture and looking at different safety culture dimensions, we believe that three, conceptual "dimensional clusters" can be identified:

(1) Supervisor expectations and actions promoting patient safety and management support can be combined with working on a non-punitive culture.

(2) Communication openness, stimulating event reporting, giving feedback and organisational learning can be integrated in a comprehensive approach.

(3) Teamwork within units and across units can be combined with improvement projects focussing on handoffs and transitions.

Working on staffing is also best integrated in this package. Although an integrated approach and involving all stakeholders in these clusters is needed for realising improvement, different emphases in the developmental approaches can be made, combined with theoretical input from different perspectives. In cluster (1), specific

expectations can be formulated towards hospital management itself by working on new management approaches that have a more supportive and stimulating focus. Regular contact and interaction with hospital staff and visits from patient safety committee delegates to the wards are strongly recommended (Botwick *et al.*, 2006). In cluster (2) specific input comes from domains like organisational behaviour, psychology and sociology, in interaction with supportive hospital management. Creating an open and learning environment also needs support from organisations outside the hospital, like the Aktionsbündnis Patientensicherheit projects with their actions "Aus Fehlern lernen" demonstrated in Germany this year (Nellen, 2008). In cluster (3), input and support from head physicians and nurses with the capacity to build and inspire teamwork within and across units is essential. Focussing on hospital transfers and transitions and interaction with hospital managers is important. Personnel department staff input to important quantitative and qualitative staffing challenges are more than desirable in this area. We think that improving patient safety culture needs coordinated inputs from different professional disciplines working in the three clusters. Integrating this multidisciplinary input to the hospital's daily operations is challenging. It needs a comprehensive approach over time and strong interaction with front-line professionals. While surveys may detect hospital staff's patient safety concerns, there is only limited evidence that survey scores are related to patient safety outcomes (Jha *et al.*, 2008). Therefore, it is essential to initiate further research on how to use safety culture data for developing the most effective patient safety strategies and projects in specific health care systems.

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