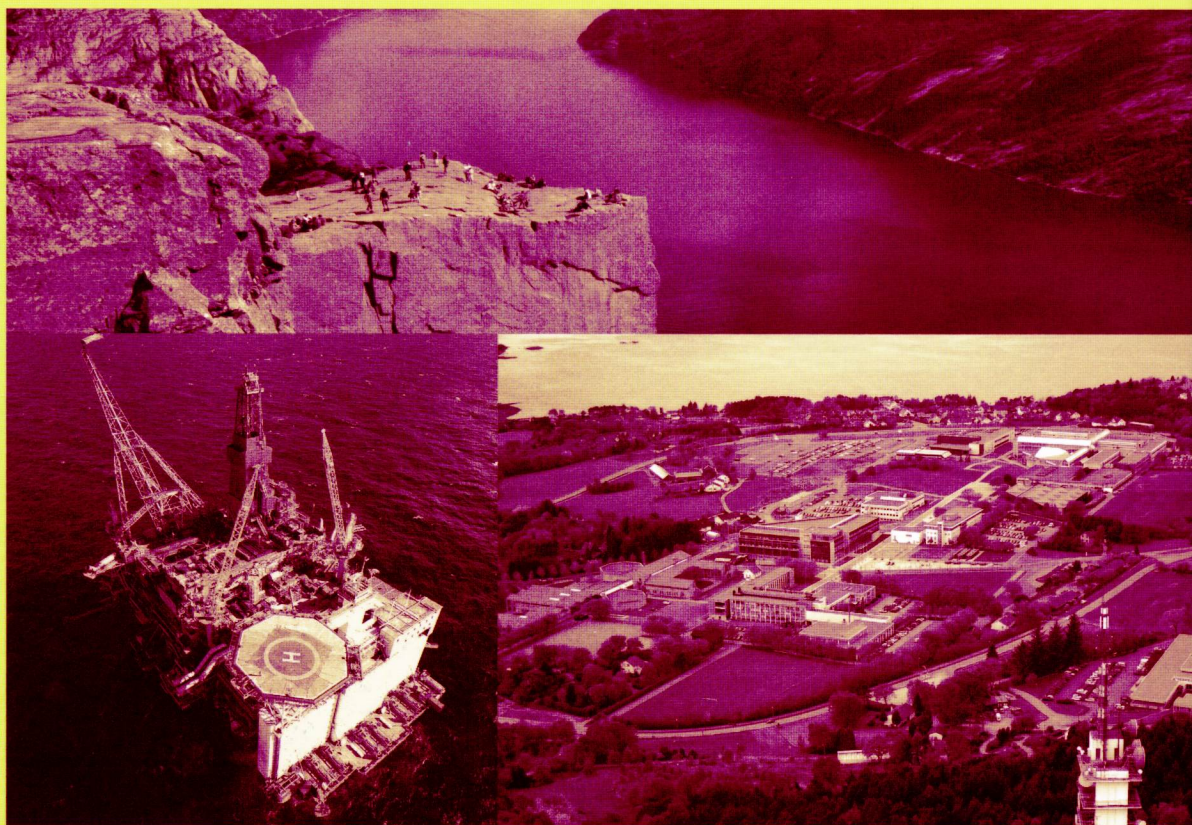


# Risk, Reliability and Societal Safety

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## Causes of medical errors as perceived by patients and healthcare staff

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**ABSTRACT:** The present paper reports results of questionnaire-based surveys about the perception of causes of medical errors, comparing the views of patients and healthcare professionals. Respondents were asked to indicate their agreement or disagreement on a five-point Likert scale with each of nine potential error causes. A consistent three-factor construct was elicited by applying principal component analysis in separate, independent analyses to three samples of patients, doctors and nurses, accounting for 63–68% of the cumulative variance: staff workload, staff ability and lack of management effort. The staff workload was commonly perceived as the most critical factor of errors in Japanese healthcare not only by doctors and nurses but also by patients. There is a large divergence in views about lack of management effort between healthcare staff and patients. Based on the results we discuss several safety-related issues from patients' point of views.

### 1. INTRODUCTION

Recently, a number of studies have been carried out to investigate patients' points of view with an aim at introducing a patient-centred approach into health-care management (e.g., Gallagher et al., 2003; Hobgood et al., 2002; Manser & Staender, 2005) comparable to user-oriented approaches being pursued in other domains such as user-centred system design (e.g., Norman & Draper, 1986). Similarly, in the business world, for instance, quality management has long been established as a key strategy for achieving competitive advantage from customers' points of view. The traditional quality initiatives, including Statistical Quality Control (SQC), Zero Defects and Total Quality Management (TQM), and more recently, Six Sigma all apply various forms of structured approaches to reducing error and enhancing quality. Six Sigma in particular includes a customer-centred approach (Kuei & Madu, 2003).

In healthcare, there has been a long tradition of studying patient satisfaction with quality of hospital care (e.g., Cleary & McNeil, 1988; Tokunaga et al., 2000) similar to customer satisfaction surveys in the business world. In recent years, going beyond general patient satisfaction issue, a number of studies have aimed at uncovering patients' opinions about patient safety and risk management issues (e.g., Gallagher et al., 2003; Hingorani et al., 1999; Hobgood et al., 2002; Witman et al., 1996). For instance, Hobgood

et al., (2002) elicited patients' wishes about disclosure of medical accidents by questionnaire-based surveys. Gallagher et al. (2003), using focus group interviews, found that patients wished disclosure of all error information, e.g., what happened, why error happened, its consequence, and how recurrences will be prevented.

Acknowledgement of error and an explanation of the event with greater candour and openness convey positive effects to both patients and healthcare professionals and organisations, and will reduce the risk of legal actions by patients and relatives (Vincent & Magi, 1994; Witman et al., 1996; Madsen, 2006).

Closely connected with the issues above, Itoh et al., (2006) investigated patients' beliefs about healthcare staff's willingness to disclose adverse events by questionnaire-based surveys in Denmark and Japan. Their survey results suggested that Japanese patients had a low degree of trust in staff willingness to be open – much lower than that of Danish patients.

There may be several reasons behind the larger degree of mistrust by Japanese patients (as discussed in Itoh et al., 2006). One possibility is that Japanese patients have a greater level of mistrust in safety critical service providers; or perhaps they have some-what different views, compared to Danish patients, about the causes of medical mishaps. As we shall see, the results to be reported in this paper go some way towards answering at least the latter possibility.

The study from which we are going to present results was a questionnaire-based survey about patients'



views concerning safety-related issues in healthcare, in particular, perceived causes of medical errors. To highlight patients' views about these issues, we compared the questionnaire results obtained from patient respondents with those of healthcare professionals.

## 2 SURVEY OUTLINE

### 2.1 Questionnaire

The surveys reported here had a common core in a patient questionnaire originally developed for a Danish survey and subsequently translated into Japanese. The Japanese questionnaire comprises eight sections asking patients about each of the following aspects: (1) expectations and (2) wishes about doctor's actions after an adverse event, (3) disclosure of adverse events, (4) opinions about reasons for not disclosing, (5) opinions about causes of errors, (6) wishes when suffering an unavoidable adverse event not due to any staff error, (7) what they would regard as most important in relation to dealing with errors, and (8) various issues relating to medical practices. An additional demographic section asked respondents to supply information about department, gender, age group, and experience of hospitalisation and whether they had suffered medical errors during hospitalisation. The present study specifically focuses on the responses to Sections V and VIII of the questionnaire.

In Section V, question items regarding causes of errors were included. In this section, respondents were asked to rate potential causes. The lead-in question was: "When adverse events that probably could have been prevented do happen in hospitals, they happen because ...", which then was followed by eight potential causes to which respondents could indicate their degree of agreement or disagreement on a five-point Likert scale:

- Because the staff is working under a great work load;
- Because there are fewer nurses than really required at work in a hospital;
- Because there are fewer doctors than really required at work in a hospital;
- Because the individual staff member does not feel sufficiently responsible for his/her tasks;
- Because the staff is not sufficiently competent;
- Because the inexperienced staff is often left with insufficient back-up;
- Because bad doctors are allowed to continue;
- Because hospital managements do too little to prevent errors; and
- Because too few resources are allocated to a hospital.

In Section VIII respondents were asked to indicate their levels of agreement or disagreement with eight

Table 1. Collected responses of patient and staff questionnaires.

	Distributed	Collected	Response rate
Patients	1439	920	64%
Doctors	300	164	55%
Nurses	930	795	85%

Note: The numbers of collected responses include those which were not used for analysis due to missing values.

statements about patient safety related issues. The items were given as follows:

- The skills and competence of hospital staff should be tested regularly;
- Patients have a right to be informed when an event/error has occurred;
- Anyone can make a mistake;
- The press generally deals with medical errors in a sensationalist way;
- Doctors cover up for each other;
- A ward/department that reports few errors can be expected as well to have few errors;
- The individual doctor or nurse who commits an error feels miserable about it; and
- Patients who become victims of errors that lead to injury should automatically receive compensation.

Using a questionnaire which shared some sections with the patient questionnaire, another survey, now directed at healthcare staff, was conducted. In the staff questionnaire, the section of error causes was included with the same lead-in question and Likert-scale response options.

### 2.2 Respondents

The patient survey was made in December 2003. We collected responses from both inpatients and outpatients in a university hospital in Tokyo. The questionnaire was distributed in every ward to inpatients who could administer responding themselves and to outpatients who were waiting in the reception hall to be called to their consultation. Therefore, some of the questionnaires collected from outpatients were not completed before the patients were called for their consultation. When items had missing responses they were treated as missing data. The staff survey was conducted in November 2004 in the same hospital as the patient survey, collecting data from doctors and nurses.

The number of responses distributed and collected (including not completed responses) and the response rates for each sample of the patient and the staff survey are shown in Table 1.

Items	Pt.	Dr.	Ns.	Pt.	Dr.	Ns.	Pt.	Dr.	Ns.
Working under great workload	<b>0.60</b>	<b>0.76</b>	<b>0.57</b>	-0.13	-0.04	-0.05	-0.05	0.05	0.04
Fewer nurses than really required	<b>0.86</b>	<b>0.62</b>	<b>0.79</b>	0.09	0.18	-0.04	0.13	0.10	0.15
Fewer doctors than really required	<b>0.71</b>	<b>0.66</b>	<b>0.66</b>	-0.04	0.11	0.04	0.14	0.10	0.14
Not sufficiently responsible for tasks	-0.21	-0.03	-0.12	<b>0.64</b>	<b>0.74</b>	<b>0.71</b>	0.29	0.03	0.18
Not sufficiently competent	-0.07	0.08	-0.03	<b>0.82</b>	<b>0.79</b>	<b>0.74</b>	0.23	0.22	0.13
Inexperienced staff is often left	0.23	0.23	0.30	<b>0.45</b>	<b>0.40</b>	<b>0.34</b>	0.34	0.11	0.16
Bad doctors are allowed to continue	0.01	0.14	0.06	0.47	0.44	0.37	<b>0.59</b>	<b>0.38</b>	<b>0.41</b>
Managements do too little for safety	-0.03	0.02	0.08	0.29	0.06	0.21	<b>0.74</b>	<b>0.81</b>	<b>0.84</b>
Few resources allocated to hospitals	0.16	0.18	0.29	0.13	0.23	0.12	<b>0.45</b>	<b>0.62</b>	<b>0.53</b>
Variance accounted for	34%	19%	30%	24%	33%	22%	10%	14%	11%
Cronbach's $\alpha$	0.75	0.72	0.71	0.72	0.67	0.62	0.71	0.66	0.68

Table 3. Mean scores of responses to the three underlying factors of medical errors.

	Pt. (N = 665)	Dr. (N = 158)	Ns. (N = 781)	<i>p</i> (Mann-Whitney test)		
				Pt. vs. Dr.	Pt. vs. Ns.	Dr. vs. Ns.
Staff workload	3.67	3.95	3.91	0.000	0.000	0.305
Staff ability	3.38	2.75	3.03	0.000	0.000	0.000
Lack of management effort	3.06	2.47	2.53	0.000	0.000	0.376

N: The number of responses available for the analysis.

### 3 PERCEIVED CAUSAL FACTORS ON MEDICAL ERRORS

#### 3.1 Underlying error factors

Regarding the causes of medical errors, a principal component analysis was applied separately to each of three samples, i.e., responses from patients, doctors and nurses, to elicit underlying error factors in healthcare. The results of the analysis of the three respondent group samples are shown in Table 2 in terms of factor loadings, Cronbach's alpha and variance accounted for each principal component. It is noteworthy, as clearly indicated in the table, that a consistent set of factors was obtained independently from the three samples, accounting for 63–68% of the cumulative variance. The nine individual causes of errors in healthcare offered in the questionnaire were exclusively divided into three principal components on basis of their factor loadings. Each factor was comprised by exactly the same set of individual items across the three samples, regardless of different perceptions of medical accidents by healthcare providers and patients (Itoh et al., 2006), and differences in professional cultures,

i.e., doctors and nurses (Itoh et al., 2005). In addition, Cronbach's alpha of each factor was reasonably high in every sample, ranging from 0.62 to 0.75, and median 0.71. This implies that potential causes of healthcare errors perceived not only by healthcare professionals but also by patients can be reliably measured by a single tri-dimensional latent construct.

For the first principal component (see bold emphasis in Table 2) the factor loadings of the following items were particularly high: "staff is working under a great workload", "fewer nurses than really required work in a hospital" and "fewer doctors than really required work in a hospital". These statements describe the balance between workforce and work demands, and therefore, we have labelled this factor "staff workload". The second principal component had high factor loading on the following three statements: "staff does not feel sufficiently responsible for their tasks", "staff is not sufficiently competent" and "inexperienced staff is often left with in-sufficient back-up". All these items, in a broad sense, are related to abilities required for healthcare staff such as competence, experience, skills and responsibility; so we call this factor "staff ability".

Table 4. Item-based responses to individual causes of medical errors.

		Patients (N = 665)	Doctors (N = 158)	Nurses (N = 781)	<i>p</i> (Mann-Whitney test)		
					Pt. vs. Dr.	Pt. vs. Ns.	Dr. vs. Ns.
Working under great workload	% agree.	71%	86%	83%	0.000	0.000	0.937
	% disagree.	14%	8%	6%			
Fewer nurses than really required		65%	61%	70%	0.053	0.242	0.008
		13%	21%	11%			
Fewer doctors than really required		47%	81%	61%	0.000	0.000	0.000
		19%	11%	16%			
Not sufficiently responsible for tasks		43%	21%	18%	0.000	0.000	0.812
		28%	57%	60%			
Not sufficiently competent		30%	17%	24%	0.000	0.010	0.001
		33%	51%	39%			
Inexperienced staff is often left		66%	46%	70%	0.000	0.084	0.000
		10%	26%	10%			
Bad doctors are allowed to continue		41%	21%	26%	0.000	0.000	0.003
		24%	55%	43%			
Managements do too little for safety		44%	21%	12%	0.000	0.000	0.172
		22%	58%	62%			
Few resources allocated to hospitals		16%	18%	19%	0.124	0.540	0.227
		48%	59%	55%			

N: The number of responses available for the analysis.

Finally, the third principal component was composed of the rest of the nine individual causes: "bad doctors are allowed to continue", "hospital managements do too little for safety" and "too few resources are allocated to a hospital". These statements can be said to describe undesirable conduct or consequence for which hospital management is primarily responsible. Accordingly, the principal component comprising these items has been labelled "lack of management effort".

### 3.2 Similarities and differences between patient and staff views

Summarising similarities and differences in perceptions of causes of errors between patients, doctors and nurses, Table 3 indicates mean scores of responses to the above-mentioned three underlying factors of healthcare errors for each sample as well as significance levels derived by the Mann-Whitney test between any pair of the three sample groups. The ranks (relative strengths) of the three underlying factors are alike across the patient, doctor and nurse group. The staff workload was perceived the most critical causal factor of errors in Japanese healthcare not only by healthcare professionals, i.e., doctors and nurses, but also by patients.

Similar views about causal factors of medical errors were observed between doctors and nurses except for the factor on the staff ability. By contrast, there were significant differences in responses to any of the three underlying factors between the patient group and each of the doctor and nurse group. In particular, a large gap

was seen in views of the lack of management effort as a causal factor between healthcare staff and patient responses. For instance, 44% of the patient respondents agreed (strongly or slightly) with the statement that "hospital managements do too little to prevent errors", while only 21% of doctors and 12% of nurses indicated agreements with this item, respectively. This gap between patients and staff in their perception of hospital management may be due in part to the mostly "invisible" nature of activities to bolster patient safety.

## 4 ITEM-BASED ANALYSIS OF PERCEIVED CAUSES OF MEDICAL ERRORS

### 4.1 Patient-staff comparisons

Patient and staff responses to suggested individual causes of medical errors are shown in Table 4 in terms of percentage agreements and disagreements (including slightly and strongly). This table also includes the statistical significance levels obtained by applying the Mann-Whitney test to any pair of patient, doctor and nurse groups. There were significant differences in responses to most individual error causes between patient group and each of the doctor and the nurse group. As mentioned in the last section, percentage agreements with any individual error cause that was fallen into the factor on the "staff workload" was higher than those with the other items. In particular, the statement of "working under great workload" was perceived as a dominant cause of medical errors not only by the healthcare professionals but also by the patients.

Table 5. Rank-based correlations of perceptions of individual error causes between patients, doctors and nurses (Spearman's rho).

	Nurses	Patients
Doctors	0.85**	0.75*
Nurses	—	0.70*

\*:  $p < 0.05$ , \*\*:  $p < 0.01$ .

Regarding the respondent group differences, the two professional groups, i.e., both doctors and nurses, agreed (strongly or slightly) with the workload-related items as error causes in a higher rate than patients.

For most of the other suggested error causes, which were fallen into the factor on "staff ability" or "lack of management effort", patients' agreements were higher than those of each professional group. In particular, there were large differences between patients and doctors/nurses in agreements as error causes with two items connecting to the lack of management effort, i.e., "bad doctors are allowed to continue to work" and "managements do little for safety", and with the ability related item, "the staff does not feel responsible for their tasks". As mentioned in the last section concerning the factor-based analysis, the great divergence in the perceived error causes between patients and the healthcare professionals may be due to the invisible nature of healthcare and risk management activities for laypersons. Regarding divergence in perception of error causes within the healthcare professional groups, significant differences were observed between doctors and nurses for two workload related items.

It is noteworthy that each of the two professional groups tends to think that errors are caused because they themselves are understaffed. Thus, doctors agree more strongly than nurses that errors occur because there are fewer doctors than really required do the work; and similarly nurses agree more strongly than doctors that errors occur because there are fewer nurses than really required. There were also significant differences between the two professional groups for two items that fell into the factor on "staff ability" and for an item included in the "lack of management effort". For these items, the nurses agreed more strongly than the doctors that the proposed items were indeed causes of errors but less strongly than the patients. As mentioned previously, there was a large and significant difference between patients and health-care professionals in the absolute level of agreement (including strongly and slightly) with each of the suggested error courses. However, relative strengths of these items as proposed error causes were reasonably alike across the three respondent groups. To examine this trend, a rank-based correlation analysis was applied to datasets of the mean scores of responses to the nine suggested

error causes for three respondent groups, and Spearman's rho's between any pair of the groups are shown in Table 5. As can be seen in this table, a significant correlation was identified in the relative perceived strength of the error causes between patients and the doctors and between patients and nurses.

#### 4.2 Other error causes

From patients' responses to open-ended questions, a small number of "additional" causes of medical errors were found, i.e., additional to the proposed nine potential statements. Only 2% of patient respondents offered comments on additional causes of medical errors. Their additional comments on error causes were classified into the following three categories: (1) other ability related issues (including lack of training, problems of licensing systems and issues on staff moral and ethics), (2) safety structure issues (including inappropriate rules and work and safety systems), and (3) safety climate issues (including lack of patient-oriented management, and strong production-oriented management).

We also obtained a few additional comments on error causes from healthcare staff, i.e., collecting from 18 doctors (11% of respondents) and 51 nurses (6%). Their comments were classified into the following five categories: (a) other workload related issues (including frequent occurrence of work interruption; from 6 doctors and 9 nurses); (b) other ability related issues (1, 9); (c) issues relating to staff compliance (including lack of awareness and attention to patient states; 4, 4); (d) safety climate issues (5, 14); and (e) safety structure issues (9, 7). The safety structure issues which the staff respondents offered their comments on included problems of intern and residency systems, lack of supporting aids to staff, manuals and checklists, bad administration of training, and inappropriate work schedules and employment conditions. Among the safety climate issues suggested by healthcare professionals, a large majority pointed out problems of bad or infrequent communication in the workplace. Several staff members, in particular, nurse respondents also suggested that a large power distance prevails, that there is a learning culture is lacking, and that bad human relations exist within a department/ward.

### 5 PATIENT PERCEPTIONS OF SAFETY-RELATED ISSUES

The patient responses to safety-related questions provided in Section VIII of the patient questionnaire are shown in Figure 1. As an overall trend, almost all respondents wanted that patients should have a right to be informed when an error or adverse event has

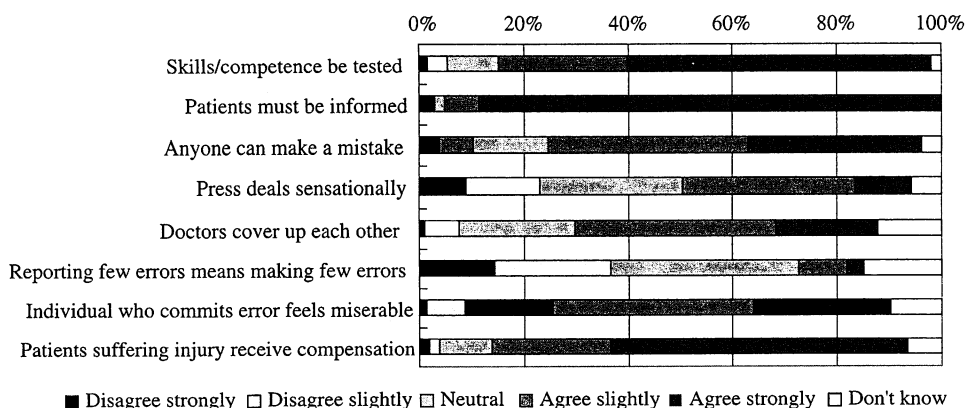


Figure 1. Patient responses to individual items of safety-related issues for healthcare.

occurred. Also, most of the subjects desired hospital staff skills and competence to be tested regularly. In addition, a majority of respondents agreed with the statement that patients who become victims of errors that lead to injury should automatically receive compensation.

Among the particularly salient patient responses to the safety-related issues is patients' high agreement with the statement "anyone can make a mistake" and their low agreement with the item that "a ward/department that reports few errors can be expected as well to have few errors". Referring to these responses, we suggest that patients have realistic views of recognition of human errors and incidents which occur in the healthcare setting. Besides these items, there were a larger number of respondents who agreed than disagreed with the statement that the press generally deals with medical errors "in a sensationalist way". In addition, approximately two thirds of respondents exhibited their sympathy with healthcare staff involving in the event, agreeing with the statement "the individual doctor or nurse who commits an error feels miserable about it". From these questionnaire results, it can be seen that patients in general have a reasonable understanding of safety related issues on healthcare, although they may sometimes act as a reflection of their "stereo-typical" response coloured by the press reports and public debate (Itoh et al., 2006).

## 6 CONCLUSION

In the present paper, we compared results of questionnaire-based surveys collected from both healthcare professionals and patients. In particular, we investigated underlying causes of medical errors perceived by patients, doctors and nurses based on the questionnaire responses. In addition, patient responses

to safety-related issues were analysed and compared with their views of causal factors of medical errors, leading to a discussion of the general characteristics of patients' views about patient safety issues.

A major outcome of this study was the identification of a consistent three-factor construct of perceived causes of medical errors that was elicited independently from the patient, the doctor and the nurse sample. The three factors were interpreted as staff workload, staff ability, and lack of management effort. A similarity in their views about these causal factors of medical errors was seen between patients and healthcare professionals although there were significant differences in the absolute strength of perception for each factor. The staff workload was identified as the most critical factor of medical errors by patients, doctors and nurses. The similarities in perceptions of error causes between healthcare staff and patients may be taken to suggest that patients have "realistic" views and recognition of patient safety issues. Such views were also seen in their responses to several issues relating to patient safety. For instance, most of the patients agreed with the statement that anyone can make a mistake, and many disagreed that a ward or department that reports few errors can also be expected to have few errors. The largely common understanding between patients and staff of error mechanisms yield a basis for open communication about safety both during daily care and in the after-math of an adverse event and during daily care.

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