

# A Proposal of Collection and Analysis System of Near Miss Incident in Nursing Duties

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**Abstract.** In this study, we proposed collection and analysis system of near miss incident (CASN) as a support tool of safe activity at the medical institutions. CASN is consists of supporting software and reference list which helps risk managers who don't have special knowledge and skill do factor analysis easily and nurses write good reports for analysis. CASN accumulates the data of PSF of near miss incidents and gives the tendency of PSF at each post and analyzer. As a result, diverse factors are found by the analysis of the risk managers and we expect the diversity promotes the growth of the risk managers.

**Keywords:** Human error, Accident prevention, Knowledge management.

## 1 Introduction

Human errors including accidents, incidents and near miss incident occur for many factors. We call these factors PSF (Performance Shaping Factors). It is important to understand what kind of PSF there is and deal with PSF properly to prevent accidents. In addition, in order to prevent tragic accidents which may happen in the future, it is important to analyze not only the accident that happened for a past in detail but also near miss incident which is the case that doesn't cause serious accident but has potential danger.

In the nursing duties, the importance of collecting and analyzing near miss incident is attracting attention because medical accidents are liable to result in miserable. However, many medical institutions can't collect and analyze sufficiently near miss incident in the fact because of the difficulty of the analysis. Therefore, the purpose in this paper is to propose collection and analysis system of near miss incident (CASN) as a supporting tool which enables staffs to analyze near miss incident easily at the medical institutions.

## 2 Analysis of Near Miss Incident in a Nursing Duties

At first, we surveyed how near miss incident was collected and analyzed in medical institutions. In collecting process, the nurse must record the contents of near miss

incident; date, place, and situation as a report, and consider and write factors and improvement plans for themselves when he or she experiences near miss incident. However, it is natural that people don't want to confess their failure. Some nurses are reluctant to write a report or write a report like the apology, for example "I was careless, I will be careful from now on". Therefore, it became clear that the data which was able to analyze didn't collect sufficiently.

In analyzing process, a few nurses discuss the near miss incident and consider the factors and measures. However, there are many near miss incident cases in comparison with the accident cases. The amount of collecting data is enormous. And risk managers who analyze near miss incident mainly are busy with nursing duties and don't have special knowledge and skill of the factor analysis. So, it is difficult for risk managers to analyze all the near miss incident data.

We performed a questionnaire to about 50 risk managers at two hospitals. As a result, 65% risk managers answered they could not analyze data to prevent accidents. (Fig.1)

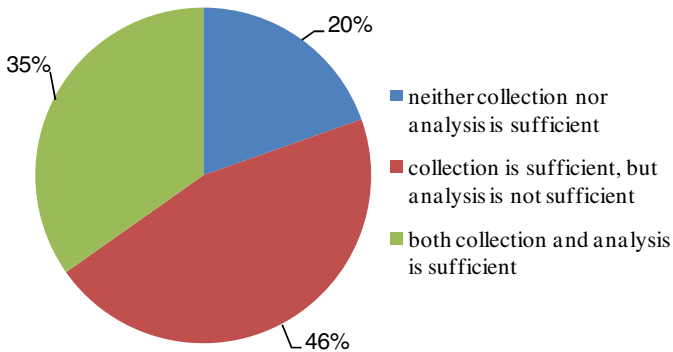


Fig. 1. Survey about near miss incident in hospital

### 3 Collection and Analysis System of Near Miss Incident (CASN)

Therefore, we proposed CASN which consists of supporting software and reference list which helps risk managers who don't have special knowledge and skill do factor analysis easily and nurses write good reports for analysis.

#### 3.1 PSF Reference List

PSF reference list is made up of 17 PSF which was thought about as factors of the errors in the nursing duties and incident cases which are expected to be caused by these PSF. We chose these PSF in reference to 98 PSF which were compiled by past examples and made the example sentence of the expected incident cases. These PSF are classified into four categories, Gestalt, Affordance, Preview, Workload. This concept called GAP-W is suggested by Yukimachi, Nagata.

This list is added to the incident report and used for supporting when doing factor analysis. Nurses can write good reports by this list because they can imagine their

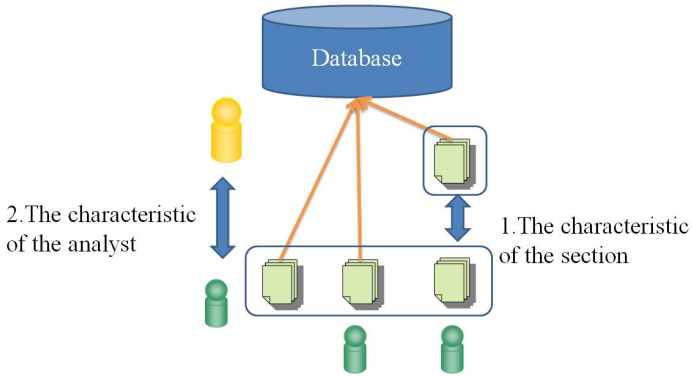
<b>Gestalt</b>	
Lack of skill	A skill about the work is short.
Uncertain work	The work is depending on personal judgment. There is not a manual, manual is vague.
Lack of knowledge	A knowledge about the work is short. A basic medical knowledge is short.
<b>Affordance</b>	
Difficulty of confirmation	The work is hard to confirm, impossible to confirm. A confirmation item is uncertain.
Difficulty of distinction	Indication of the apparatus is bad. There are plural similar objects.
Imperfection of apparatus	It is hard to use an apparatus. How to use operation appliance is incomprehensible.
Lack of criterion for judgment	There is not a criterion or creterion is lacking in concreteness.
<b>Preview</b>	
Difficulty of prediction	It is hard to get information to predict it. It is hard to predict latent danger.
Inappropriate of communication	Instructions, communication and guidance from the boss is not appropriate . Cooperation with the other post is not good.
Lack of preparation	Begin work with incomplete preparation. Daily lack of preparation.
Unplanned work	The work has interruption or changes.
<b>Workload</b>	
Excess of information and direction	A lot of information is given from plural people or places
Complicated work	There is much incidental work such as preparations, a record, and the transaction. The work needs processing at the same time.
Psychological burden	Independent work. Fear of the failure is severe.
Bad work environment	There is not enough area about the work. The duty of the long time. Illumination is dark.
Physical burden	The work needs hard posture or movement. Long time work.
Distract attention	Cannot distribute mind to surroundings in a focalization.

Fig. 2. The list item

near miss incident’s factors for looking categorized PSF. Risk managers can analyze cases easily through the check list made by this reference list.

### 3.2 Knowledge Discovery in Databases

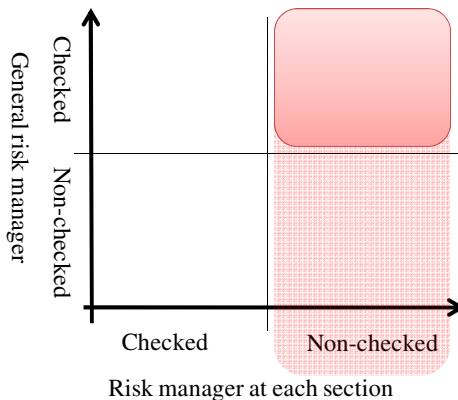
Risk managers at each section analyzed the report in their own section by using the reference list. And an administrator who is the general risk manager in the medical institution and has higher skill and knowledge than other risk managers analyzed the case again after risk manager’s analysis. By this analysis of the check list method, the reports can be arranged to the database. CASN discovers knowledge from accumulated data in two ways, the characteristic of the section and risk manager.



**Fig. 3.** The concept of knowledge discovery

CASN compares the analysis of each section’s data with the analysis of whole hospital’s data and extracts PSF checked a lot statistically at that section. For this function, risk managers can know a tendency of PSF hiding in their sections and take more proper action to prevent accidents.

In the comparison of an administrator and risk managers of each section, CASN extracts PSF checked a lot by an administrator while risk managers of each section didn’t check. These PSF are thought that it is difficult for the risk manager of each section to notice them. It promotes the growth of the risk managers to inform them of these hiding PSF and it is expected that they become to be able to do factor analysis from various viewpoints.



**Fig. 4.** The extraction of the characteristic of the analyst

## 4 Results of Examination

We tested effectiveness of the reference list. In reports, the factors mentioned by nurses were mainly self-factor like “not notice, not confirm, forget, make mistake”

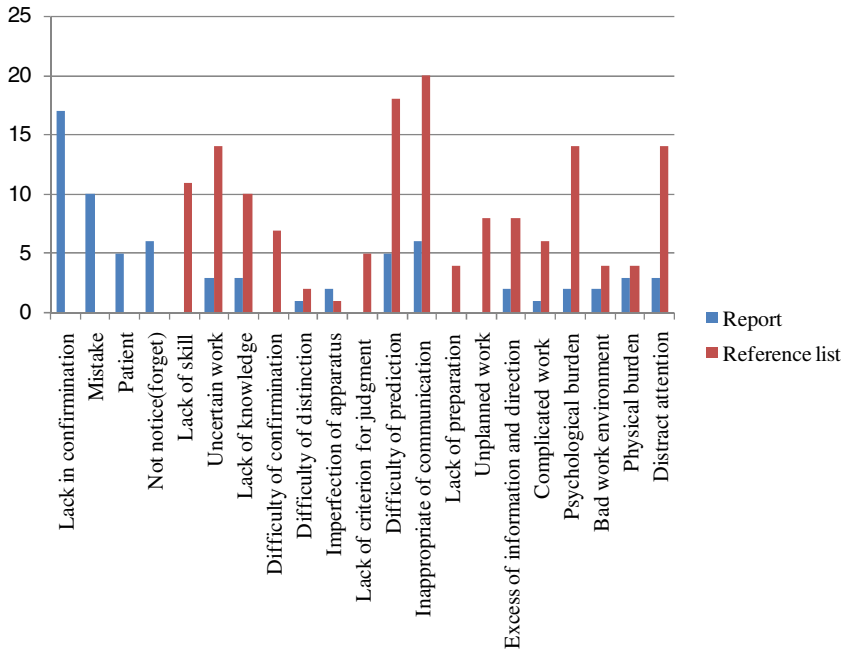


Fig. 5. Factors mentioned in reports and extracted by using reference list

Table 1. One-sided p-value (significance probability)

	A3	A4	A5	B3	B4	B5	C4	C5	ICU	OPE
Lack of skill	0.1096			0.2909	0.4287	0.4150			0.3540	
Uncertain work		0.4869		0.2909	0.4287	0.4150	0.3987		0.3540	
Lack of knowledge	0.0501	0.4383						0.1638	0.4706	0.1026
Difficulty of confirmation			0.1056	0.1982			0.407	0.3721		0.0583
Difficulty of distinction		0.3767	0.3853		0.2252	0.4335	0.1919	0.4511		0.3767
Imperfection of apparatus	0.0628			0.4549		0.2979			0.2461	
Lack of criterion for judgment									0.1230	0.0191
Difficulty of prediction		0.1252		0.3671		0.3157	0.1273		0.0312	
Inappropriate of communication		0.1827				0.1087		0.3065		0.4913
Lack of preparation		0.1104	0.4334		0.1051	0.0663	0.3069			
Unplanned work		0.0207			0.4072	0.0650				0.0207
Excess of information and direction		0.0135		0.4549		0.2979				0.4671
Complicated work			0.0844	0.1488	0.1726					0.1123
Psychological burden	0.0568			0.2242				0.426	0.3982	0.0079
Bad work environment		0.0854	0.1784				0.215			0.0071
Physical burden	0.0002									0.0812
Distract attention					0.1274	0.2891				0.0011

and patient-factor, for example, the patient who is liable to fall down, and these factors were 54% in all factors mentioned in reports. Risk managers at each section analyzed the report in their own section by using the check list. In comparison with the factor mentioned in reports, the number of extracted factors became 2.1 times and various factors were able to be extracted by using the reference list. (Fig.5)

In this test, a writer of the report and the checker are not the same person. So these increases of factors don't necessarily mean that the CASN helps users analyze the case easily. However, considering the present condition of analysis near miss incident is that even analyzing all the data is impossible, these results can put value from the points which all the data can be analyzed and various factors except self-factors are found.

We show a result example of a characteristic of each section in Table1. The figures in Table1 is one-sided p-value (significance probability). The blank shows that PSF was selected fewer than whole hospital in that section.

PSF whose significance probability was less than 5% were observed nine in total at four sections. Less than 10%, eighteen PSF were observed at six sections. In addition, it was cleared that some sections has many these characteristic PSF.

## 5 Conclusion

In this study, we proposed collection and analysis system of near miss incident to help risk managers to do factor analysis easily and inform them of tendency of PSF each section and themselves have. Analysis of near miss incident from wider viewpoint was enabled for this system. On the other hand, there were opinions from staffs that it took time to analyze all reports even though they used the check list. Therefore, we will improve CASN through changing the information which is presented against users and expect the growth of the risk managers.

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