IS E-HEALTHCARE CHART CONTRIBUTORY TO PATIENT SAFETY?

Kiyomu Ishikawa, Takeshi Tanaka, Minoru Ikeuchi and Hidehiko Tsukuma

Department of Healthcare Informatics and Hospital Systems Management,
Hiroshima University Hospital, Hiroshima, Japan

Abstract: Toward 503 hospitals evaluated by Japan Council Health Care (JCHC), the questionnaire survey was conducted and analysed according to 2 groups of pre-2005 and post-2006 system introduction. As the result, it was found that despite with the annual improvement in the e-healthcare chart system function, both information system and users' operation were insufficient with concern of medical accidents: About sixty per cent of the hospitals have experienced information-system-related harmful incidents. Among the hospitals that implemented information security education of health information system, 60% had triggered harmful incidents, and preavoid experience. In contrast, 40% of hospitals without information security education had triggering experience. We found preavoid experiences in 70% of those reported no preavoid experiences. There is a possibility that the organizational development for information literacy raises the consciousness of users towards harmful incidents through the accumulation of information on such incidents.

1 AIM

E-healthcare Chart or EHR has been developed as the key medium to support individual lives by means of multi-occupational networking. Today, it could be the core tool in team healthcare process.

While, according to the survey of 273 public and national hospitals (together 144,019 beds) from January to June, 2009, 172 facilities reported fatal medical accidents (JCQHC). Here, based on "The survey of the development and issues on the computerization of medical process" of the hospitals included in the study, the experience rates of harmful incidents are compared with the provision of training opportunities.

2 METHOD

The internet-based questionnaire survey was conducted from July to August, 2009, and 1488 target hospitals which had been authorized to meet the functional criteria by Japan Council for Quality Health Care (JCQHC) were asked to fill in the forms with both multiple choice and open questions.

The focus was "the relation between the occurrence of harmful incidents or prevention experience, management organization and training system."

The following topics were analyzed.

a.   The introduction status of a health care information system
b.   The status of the education of the hospital personnel for the use of the healthcare information system
c.   Is healthcare chart monitored to check the risk of harmful incidents?

In Japan, the Ministry of Health, Labor and Welfare enacted "the guidelines for safety management of health information systems" (Japan Ministry of Health, Labour and Welfare in 2005. In order to find the effects of the guideline enforcement, the target hospitals were classified into 2 groups, one that included hospitals with systems introduced before 2005, and the other with hospitals that introduced the system later.

3 RESULT

3.1 The Introduction Status of Heath Information System

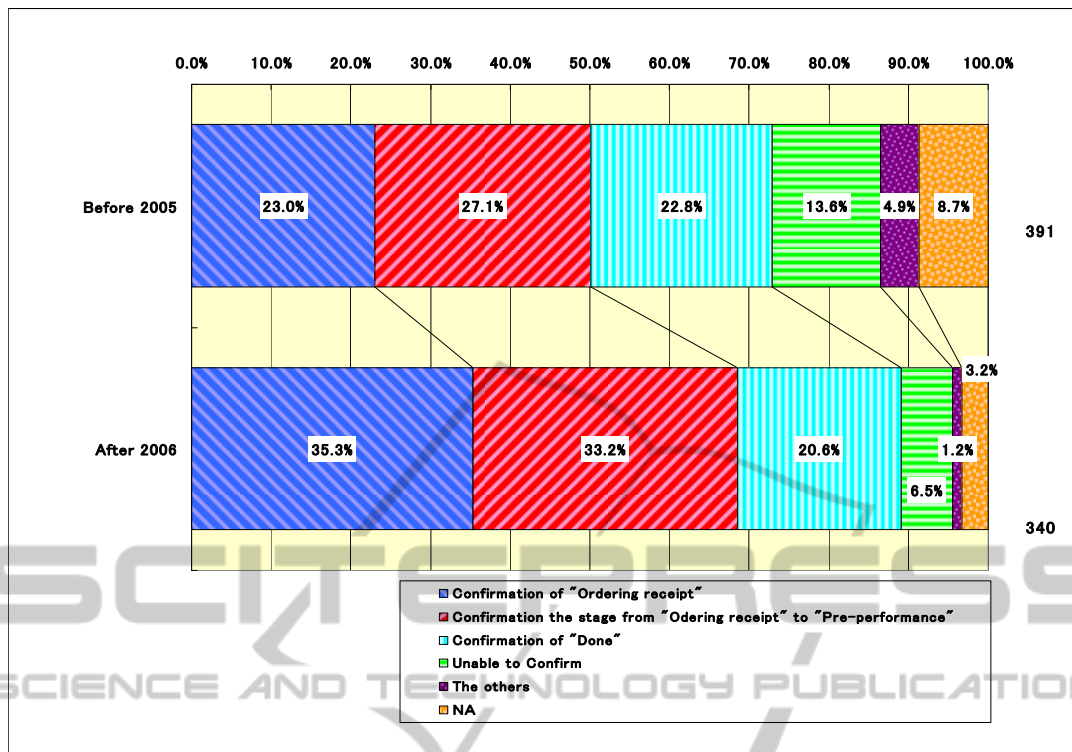Answers were received from 503 hospitals (33.8%).

Figure 1: The confirmation function ordering receipt.

The larger scale hospitals showed the highest answering rate. Focusing on the occupation of answerers, clerks are listed at the top, followed by nurses, system engineers of information management department of hospitals.

This survey shows that above 90% hospitals introduced health information systems. Among them 187 hospitals (41%) which introduced health information system after 2006. Looking at the introduction rates in relation to the size of the hospitals we found that hospitals with over 201 beds actively progress the computerization of an ordering system.

Furthermore, focusing on the medical care process from physicians' ordering to the confirmation of nurses' practice after order receiving, the systems of the post-2006 hospitals have more advanced checking function than pre-2005 hospitals (Fig 1).

3.2 The Relation to Harmful Incident

Among the hospitals that implemented information security education of health information system, 59.6% (242/406) had triggered harmful incidents and 38.4% (153/406) had not, and 61.3% (249/406) had preavoid experiences and 38.7% (157/406) had

not.

In contrast, 38.1% (37/97) of hospitals without information security education had triggering experience, and 54.6% (53/71) had not. We found preavoid experiences in 33.0% (32/97) of the hospitals, and 67.0% of those hospitals reported no preavoid experiences (65/97). (Fig. 2)

3.3 The Cause of Harmful Incident

The system-based harmful incidents were caused by users operation or program imperfection rather than system troubles such as "Input of wrong information" (71.7%; 200/279), "No input of necessary information" (29.4% (82/279) in the system without warning function and 25.8% (72/279) in disregard of warning function), and "Impossible input due to master registration or master maintenance imperfection" (22.9%; 64/279). (Fig 3)

On the other hand, the cases of preavoid harmful incidents by system operation are listed as "Patient misconception" (68.3%; 192/281), "Dosing wrong medicine" (56.6%; 159/281) or "Ordering of wrong procedure or test" (31.3%; 88/281). "The prevented Cases of Patient Misconception" are somewhat higher in the post-2006 group.
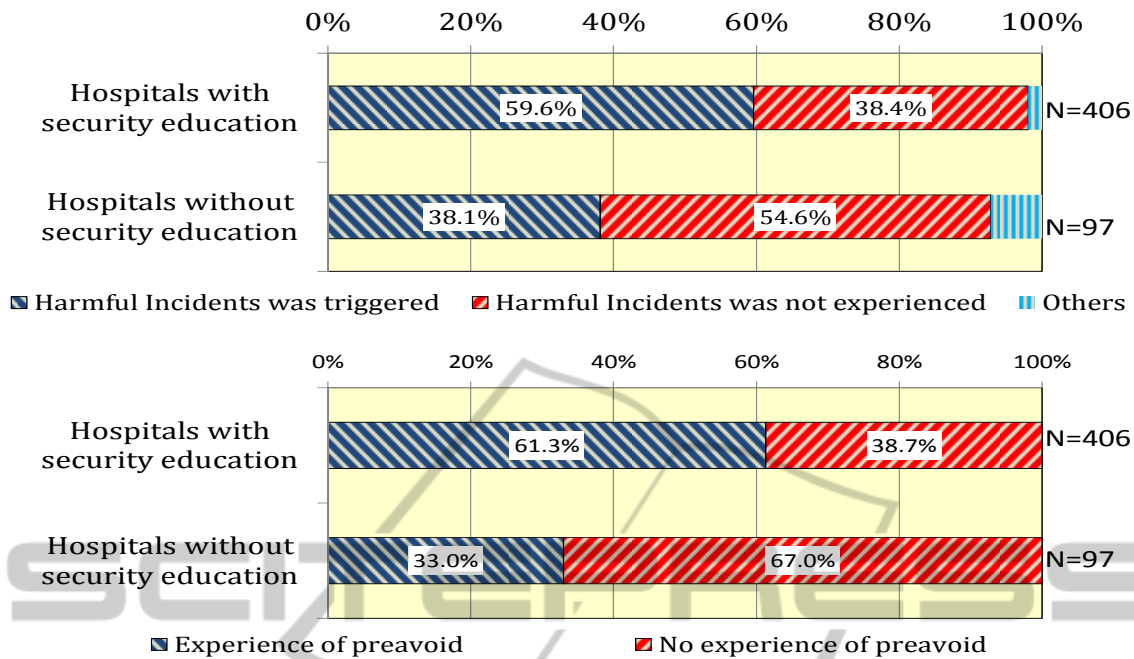
431

Figure 2: Relations between education and experiences of harmful incidents.

4 DISCUSSION

4.1 The Occurrence / Prevention of Harmful Incident and Staff Education

When the survey results mentioned from 3.1 to 3.3 are compared with the past case (Ishikawa et al., 2007), (though the answering hospitals and answerers were different), it is supposed that e-Healthcare chart has become well-established as the standard tool in the Japanese hospitals. Especially, due to the progress of "checking function of medical process", it will shortly meet the functional requirements as information infrastructure for use inside the hospital. It is also supposed that the system with the Bar-code-used matching function between patients and medical practice became more popular. Nevertheless, the present survey did not provide the definite evidence that the functional improvement has contributed to prevention of harmful incidents.

As shown in Sec. 3.2 (Fig 2), there is a possibility that the organizational development for information literacy raises the consciousness of users towards harmful incidents through the accumulation of information on such incidents.

4.2 The Occurrence / Prevention of Harmful Incident and Staff Education

According to 3.3 (Fig 3), the causes of human issues are mainly input error related causes and master troubles. In order to settle these issues, from the view point of another questionnaire survey by JCQHC (JCQHC, 2009), it is crucial to classify cases into "(1) Careless mistakes" and "(2) Common and organizational issues". Furthermore, the cases of "Careless mistakes" need to be examined whether there are possibilities of improvement by means of warning in case of wrong input of names, quantity, and item selection or pick up of mandatory input items and warning to check mandatory input.

Under the on-going rapid computerization, the partnership building between vendors and users will be the key for designing the practical measures based on the integrated examination outcomes of multiple hospitals and rapidly implementing the measures identified in the software.

Through this study, it was found that harmful incidents do not always result from information system-based hardware or software troubles. They are related with the human factors included in the medical process.
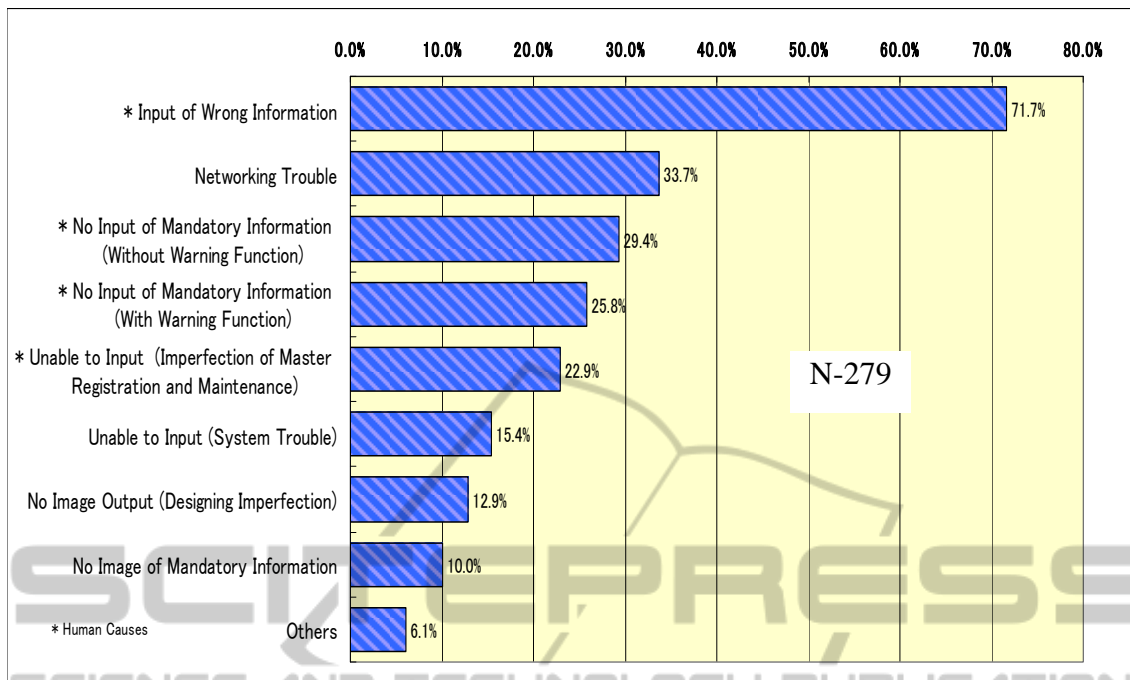
Figure 3: The Causes of Information System-Related Harmful Incidents.

5 CONCLUSIONS

The aim of the e-Healthcare Chart system introduction has changed for this decade, and at present the aim is not achieved completely. Three principles of preservation by e-media including e-healthcare chart were "Accountability", "Availability", and "Storage ability" based on eight principles of the OECD Board of Directors. It means that in order to assure "patient safety", the medical quality should be improved by interactive confirmation of medical process from ordering to practice among multi-occupational sites. However, despite the diverse requirements of system functions, they are hardly achieved at present. For this aim, the specialized usage of patient data and system designing along with medical performance should be prioritized.

ACKNOWLEDGEMENTS

REFERENCES

JCQHC, *The 18th Report on the Medical Accident Collection Project of JCQHC*: http://www.med-safe. jp/pdf/report_18.pdf

Japan Ministry of Health, Labour and Welfare, *The guideline on a safety management of medical information system (the 1st edition)*: http://www.mhlw.go.jp/ shingi/2005/03/s0331-8.html

K. Ishikawa et al. "*The Guideline of the Personal Health Data Structure to Secure Safety Healthcare –The balance between use and protection to satisfy the patients' needs-*: Int. J. of Med. Info. Vol. 76 No. 5-6, pp. 412-418 (2007).

JCQHC, *For Making the case collection book: The meeting material for the 3rd review meeting on computerized information devices in 2009* (2009).