How could Consistent Management of Information according to Clinical Care Process on Injection Contribute to Patients' Safety?

Hidehiko Tsukuma[a], Takeshi Tanaka[a], Nakao Konishi[b], Kayo Sakata[c], Akie Kawamura[c], Norikazu Iwata[d], Minoru Ikeuchi[a], Kiyomu Ishikawa[a]

a) Department of Medical Informatics, Hiroshima University Hospital , Hiroshima, Japan
b) Department of Pediatrics, Hiroshima University, Japan
c)Department of Nursing, Hiroshima University Hospital, Hiroshima, Japan
d) Information Media Center, Hiroshima University, Hiroshima, Japan

Introduction

- The necessary condition of patients' safety management in team practice is to be correctly shared the progress of process of order, acceptance of order, preparation, execution and recording on the clinical treatment among all members of a medical team.
- For that purpose, the authors designed and developed the new EHR system which was able to support grasping and sharing the progress of clinical process among medical professions concerned, and check on correctness of combination of medical practice and patient with bar codes, even when the order was frequently changed [1][2].
- The system has been operating at the inpatient ward of Hiroshima University hospital since December of 2004. We qualitatively evaluated the system by the questionnaire survey to the system users (medical professions) from the viewpoint of usefulness in team medical practice, and obtained the results that about 65 % of the respondent (88 % when limiting to the nursing staff) answered the consistent management of information was useful for team practice[2].
- In this paper, in order to evaluate the effect of consistent management of medical information on the clinical process to patients' safety management quantitatively, injection business which is one of the most complex medical practices is studied.

Methods-1

- We evaluated contribution of the injection system to patients' safety by the hand-written type adverse event reports which were submitted to the department of medical safety management of our hospital.

Methods-2

- **The procedure of analysis was as follows.**
  - **First of all, we collected the adverse event reports submitted for half a year before and after the injection system introduction.**
  - **Next, the collected reports were classified into four categories by the cause of the adverse event. Four categories are as follows:**
    - **The first is an event that occurs due to description mistake of injection order by a doctor.**
    - **The second is an event that occurs because those who prepare or execute the injection could not receive doctor's order and/or order change in appropriate timing. For instance, this category includes a case that a nurse did not recognize cancellation of the injection order by the doctor and executed it.**
    - **The third case is that those who prepare the injection make a mistake in the kind and/or the dosage of medicine, etc.**
    - **The fourth case is that the doer makes a mistake in confirmation of the target patient.**
  - **Finally, the numbers of adverse events of each of the four categories are compared before and after the injection system introduction.**

Results-1

- The result is shown in Fig. 1. Fig. 1 shows that the numbers of reports of adverse events decrease for the 1st, 2nd, and 4th categories after introducing the system. On the other hand, it is understood that the third category doesn't decrease from fig. 1. In the first category, the checking system to the injection order is one of the reasons for decrease in the adverse event.

- The effect of this system is especially expected for the event of the second category. Actually, the adverse event concerning the second category did not occur after having been introduced the system.

Results-2

- The system should be able to prevent the adverse event of the 4th category in principle. However, two events happened because of violation of the rule, that is, the doer skipped the procedure of confirming the patient with the barcode reader near the bed side.

- On the other hand, from the result of the category 3, it is clear that the consistent management of the information on the process of injection doesn't contribute to the decrease of human mistakes too much.

Results-3

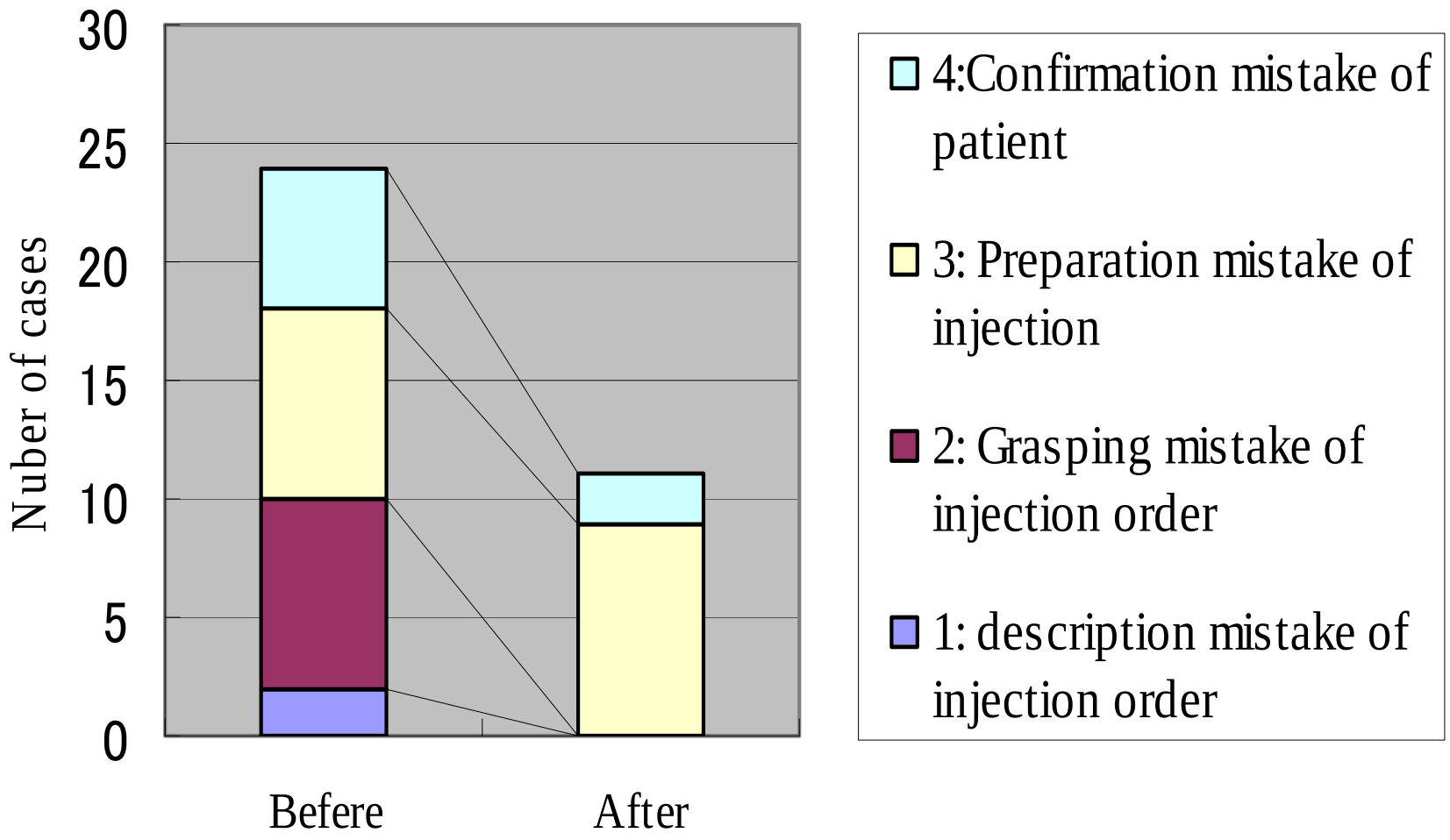

Fig. 1 Comparison of number according to the cause of the adverse event before and after the system introduction

Discussions-1

- (A) There were few adverse events when the process of injection can be consistently managed by the system from an order entry to an execution. So it is possible to judge that the consistent management of information on medical treatment process contributes sufficiently to the patients' safety.

Discussions-2

- (B) The adverse event reports were classified into the following six types:
  - (B-1) The doer obtained correct information, but didn't keep the working procedure,
  - (B-2) The doer obtained correct information, but didn't carefully confirm it, and made a mistake when preparing, for instance, misunderstanding in the schedule time of injection, dosage of medicine,
  - (B-3) The user mistook the usage of the system for understanding shortage,
- For the problem (B-1) and (B-3), it is considered that a complex business procedure disturbs a decrease in risk factors. Therefore, it becomes more and more important to research a simple and intuitive business flow.
- For the problem (B-2), it might be a basic solution that the medical professions act carefully based on correct information that the system offers.

Discussions-3

- It is necessary to examine the improvement of the system. For instance, is it easy to understand the display and the size of the character?
- In this sense, we should pay attention to the fact that a lot of users pointed out that information displayed by computers didn’t understand important points easily. Improvement of this viewpoint is one of the important problems for the safety management with a computer.

Conclusion

- It became clear that the system consistently managed the process information from the order to execution was useful for the patient safety in team practice.
- However, it was suggested to have to improve the expression of the emphasis point etc.
- Moreover, it will be necessary to consider patients' safe in the emergency case that cannot input the order beforehand. These are next subjects.

References and Contact Detail

- **References**
  - **[1] K. Ishikawa et al. “A Clinical Management System for patient participatory Health Care Support”, International Journal of Medical Informatics Vol. 73, pp. 243 -249 (2004).**
  - **[2] H. Tsukuma et. al. "Construction and Evaluation of EHR which Supports Team Practice", Proceedings of Asia Pacific Association for Medical Informatics (APAMI) 2006 - Towards Global Interoperability for Electronic Health Records -, pp.160-164 (2006).**
- **Acknowledgements**
  - **This research was partly supported by Grant-in-Aid for Scientific Research (B) No. 18310107.**
- **Contact Detail**
  - **Hidehiko Tsukuma**
  - **Hiroshima University Hospital, Kasumi 1-2-3, Minami-ku, Hiroshima, 734-8551, Japan**
  - **E-mail: tsukuma@hiroshima-u.ac.jp**
  - **Facsimile: +81-82-257-5084**