

Patient Safety Incidents Caused by Hospital Information System

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There are no conflicts of interest associated with this presentation.

Hospital Information System

- The Hospital Information System (HIS) includes the ordering system, reporting system, electronic medical records (EMR), and subsystems used in the departments in a hospital.
- HIS promotes patient safety by increasing the transparency of medical processes, and enables simultaneous handling of patient data among the medical team.
- However, HIS may cause incidents in medical processes and patient safety due to bugs in HIS, misuse of HIS, incorrect management of HIS, and so on.

Japan Council for Quality Health Care (JQ)

- Established in 1995 as an independent, non-profit organization which aims to improve Japan's health care and welfare.
- JQ's Hospital Accreditation has been officially approved by the International Accreditation Program of the International Society for Quality in Health Care, thus confirming that it meets international standards.

Council for Patient Safety Promotion (PSP)

- Volunteers from accredited hospitals form the backbone of our patient safety drive. The Council gathers information on challenges faced by hospital workers, discusses these matters at meetings and seminars, and provides feedback to health care institutions nationwide.

IT and Equipment Section of the Council for PSP

- Established in 2003 to study HIS-related incidents until 2015.
- The Section collected incidents assumed to be caused by HIS from the member hospitals of PSP every year, and analyzed them with HIS vendors.
- Incidents related to ordering system/EMR were classified into 11 main categories, and causes were classified into 3 categories.
- The summary of representative cases (about 200 cases) was published in the PSP Journal, to share information about these incidents. Member hospitals used it for case analysis.
- Cases of improvement and incidents related to other than the ordering system/EMR were also reported, and the analysis results were published in the Journal.

Major Categories of Incidents related to Ordering System/EMR

1. Design of system
2. Connection of systems
3. Switching of system
4. Trouble in master table
5. Trouble of systems
6. Data capture
7. Direction related
8. Input/display related
9. Implementation related
10. Duplication of patient registration
11. Others

Causes:

- A. due to human factors
- B. due to information system
- C. due to combination of the above factors

Details of Categories of Incidents related to Ordering System/EMR

Major	Middle	Minor	
1. Design of System	Mismatch with work flow		
	Defect in function design		
2. Connection of Systems	Link with connected equipment		
	Connection of department systems	Same vendor Different vendor	
3. Switching of System	Transition of data		
	Transition of master table		
Total:	11	34	54

Trouble in Master Table

Incident: The name of the drug printed out by the system of the Pharmacy Department differed from that prescribed by the doctor.

Cause: Code in the main master table was changed after fixing the main master table and department master table.

Solution: The connection between the code in the main master table and that in the department master table was checked on all the master tables.

Point: The provision and procedure when master tables are changed should be clarified.

It is recommended to make and use a checklist for changing the master tables.

The best solution is to unify all the master tables.

Quality Indexes (QI)

- It has been found that some incidents related to master tables and ordering system/EMR occurred frequently in many hospitals.
- “Quality Indexes of patient safety related to HIS” were developed as a good practice for HIS related to patient safety.
- QI is selected because it is easy to calculate from data in HIS, and is clearly defined so that its interpretation will not differ among hospitals.
- Eight QIs were selected.

Quality Indexes

- 1. Ratio of performing certification by barcode, etc. for injections/blood transfusions**
- 2. Ratio of receiving permission from supervisors for injections/blood transfusions ordered by trainee doctors**
- 3. Number of occupations accessing the EMR records of one in-patient during one hospitalization**
- 4. Ratio of patients receiving chemotherapy by regimen to all patients treated with chemotherapy**
- 5. Ratio of patients treated with clinical pass to all hospitalized patients**
- 6. Ratio of new staff receiving lectures on HIS operation to all new staff**
- 7. Number of days to complete discharge summary**
- 8. Number of critical problems of HIS such as switching to paper chart, and the maximum duration of such critical HIS problem**

Checklist

- **A checklist was developed to avoid incidents related to the ordering system/EMR which occurred frequently in many hospitals.**
- **The checklist aims to help determine the specifications of the HIS when it is newly introduced or renewed.**
- **The checklist contains 65 check points in 5 categories.**
- **The checklist can be used to assess the current status of HIS, not only for introduction or renewal, and is expected to help draw up improvement policies.**

Checklist

1. Maintenance of systems and terminals

(a) maintenance of hardware

2. Administration of systems, maintenance of masters, training

(b) administration of systems, maintenance of training system

(c) system of organizing the maintenance system of masters

3. System for certification, double checking, and approval

(d) introduction of system for certifying each patient using name band/bar code

(e) introduction of system for supervisors to approve orders issued by trainee doctors

Checklist

4. Medicines, prescriptions, coordination of allergy information

(f) system related to drugs and prescriptions

(g) coordination of allergy information between main system and department subsystems

5. Addition of other safety systems/functions

(h) addition of other systems/equipment/functions

Checklist

1. Maintenance of systems and terminals
 - (a) maintenance of hardware

1) Dualizing data saving

- a) dualize hard disks including mirroring**
- b) save on external medias other than hard disks such as tapes**
- c) save at remote place such as data center**

2) Maintenance of network (from server to floor switches)

- a) redundancy of main network**
- b) countermeasure against looping**
- c) check of introduction or update of security software by server**

3) Dualizing the power supply

- a) maintenance of household power generation**
- b) supply by uninterruptible power source**

4) Terminals in HIS

- a) enough terminals to meet requests?**
- b) maintenance of the process for battery replacement of laptop PCs**
- c) maintenance of the ledger of terminals**

Summary

- **Hospital Information Systems (HIS) and Electrical Medical Records (EMR) are useful for improving patient safety. However, HIS also causes incidents in medical processes and patient safety.**
- **The IT and Equipment Section in the Council for Patient Safety Promotion under the Japan Council for Quality Health Care collected incidents related to HIS from accredited hospitals, from 2003 to 2015. Incidents related to the ordering system/EMR were classified into 11 categories, and the causes into 3 types.**
- **A summary of representative cases was published in the PSP Journal.**
- **Some incidents related to the ordering system/EMR occurred frequently in many hospitals.**
- **Quality Indexes were developed as a good practice for HIS related to patient safety. 8 QIs were selected.**
- **A Checklist was developed to avoid incidents related to the ordering system/EMR which occurred frequently in many hospitals. It aims to help determine the specifications of HIS when it is newly introduced or renewed.**

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