A Study on a Method of Planning Countermeasures by Error-Proofing

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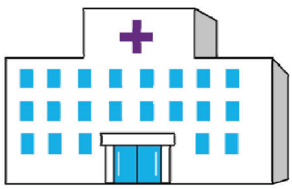
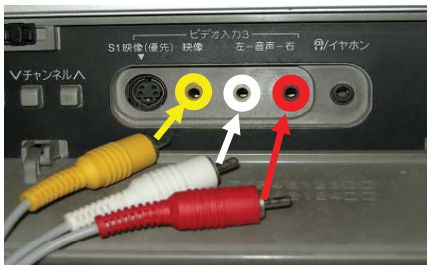
1. Introduction

Background

- Medical incidents often occur in hospitals
- Prevent incidents by improving working methods



※Error proofing (EP)
A device that lowers the probability of human error



In hospitals

- EP is not used well
- Many countermeasures are attention awakening

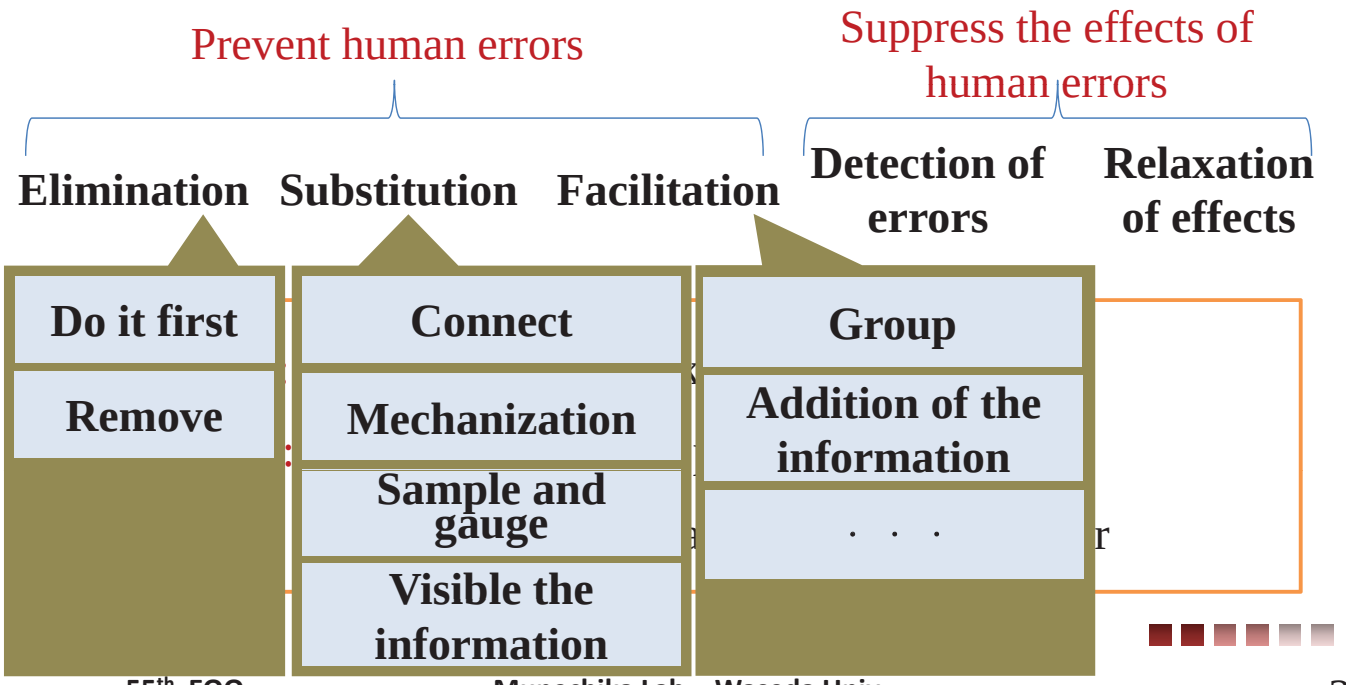
Purpose

- **Systematically and Easily Planning EP countermeasures (administering medicine process)**

2.Conventional Studies and Approach

2.1 The Conventional Study

- **Nakajo et al.**



2.Conventional Studies and Approach

2.1 The Conventional Study

- **Ozaki et al.**

Table 1 the guidelines for planning EP countermeasures (extract)

Error-proofing solutions / Error-factors	Complete Substitution	Part Substitution	Centralization/ Communization	・・・	Accommodation
	people do not need to work	assist a part of the work's function	and the change	・・・	make things which are suitable to people's ability
Scattered information	connect	visualization of information instruct and record	grouping synchronization centralization	・・・	portable immobilization
Dependence on memory			regularize	・・・	portable to reduce the amount and time of memory
Interruption of the work			remove the interruption		
・・・	・・・				
Resemblance of name	machanization	sample and gauge	・・・	・・・	・・・
Indication method of the			・・・		

EP solution

Error factors

2.Conventional Studies and Approach

2.2 The Approach of This Study

➢ **To solve problem of conventional study**

- Identify improvement objects
- Specify necessary EP solutions

Error factors ⇔ Improvement objects ⇔ EP solutions

➢ **Approach**

- Propose some tools

(1)Correlate error factors with improvement objects (Chapter 3)
(2)Correlate improvement objects with EP solutions (Chapter 4)

- Show a procedure (Chapter 5)

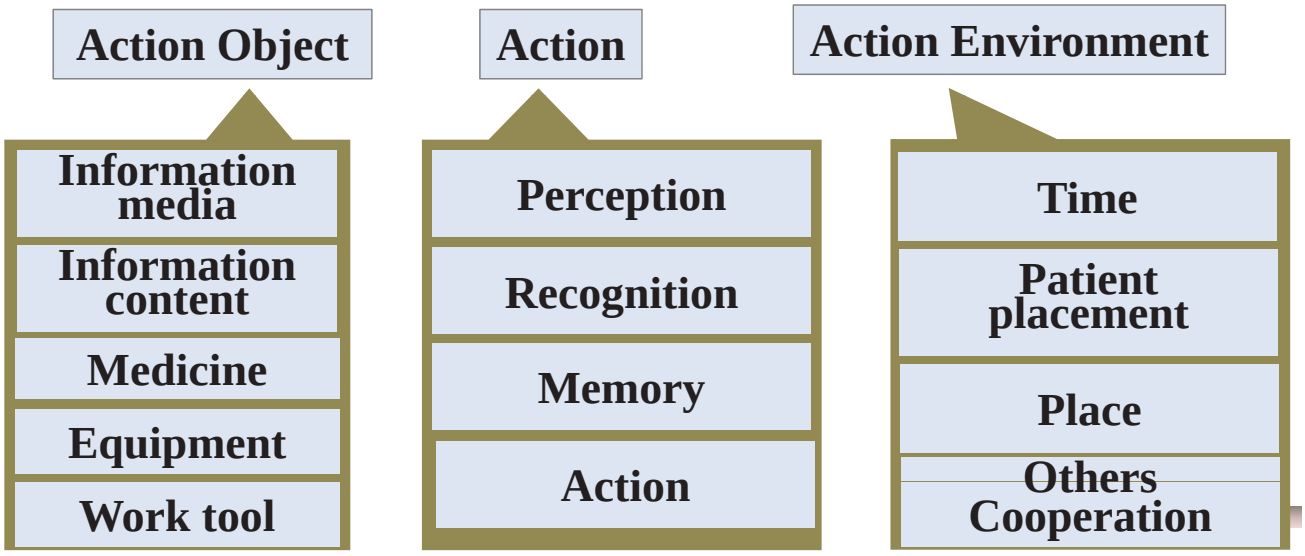
Analyze incidents and plan EP countermeasures

3. Correlate the Error Factors with the Improvement Objects

3.1 The Process of Extracting Improvement Objects

➢ **Improvement Object**

The object of planning EP countermeasures



3. Correlate the Error Factors with the Improvement Objects

3.2 A Map of Error Factors and Improvement Objects

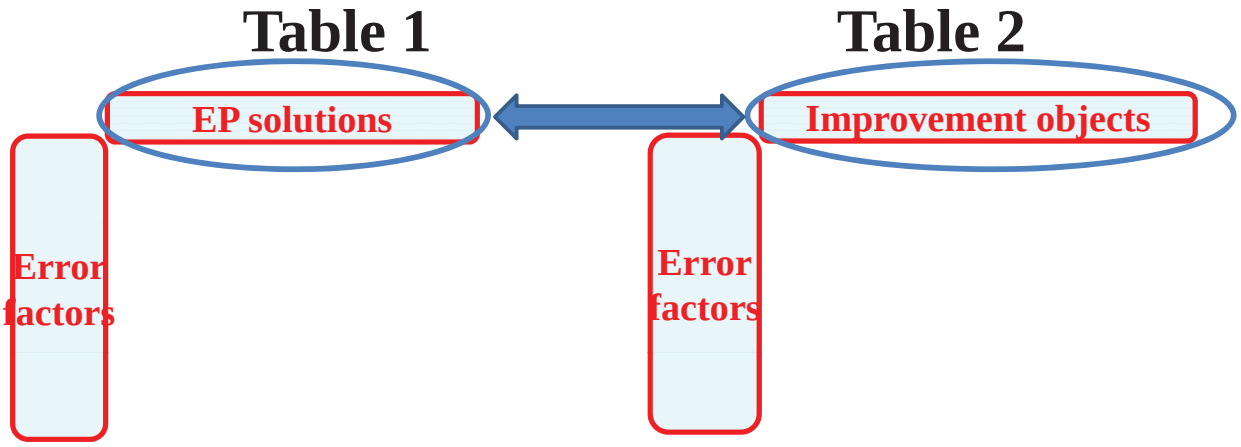
Table 2 Map of error factors and improvement objects(extract)

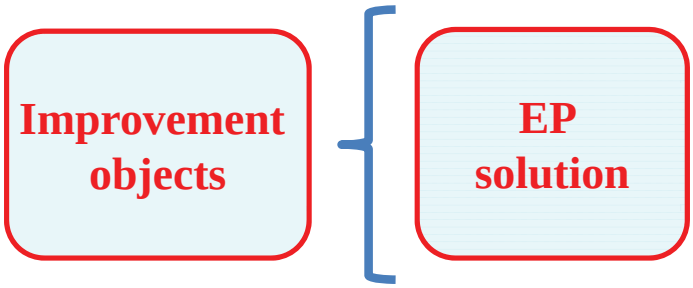
Error-factors \ Improvement objects		Information media	Information content	…	…	…	…	…	Patient characteristics	Time	Place
Skipping Error	Scattered information	●	●			●	●	…			●
	Dependence on memory	●	●						●	●	
	Interruption of the work	●							●	●	
…	…	…									
Mistaking Error	Resemblance of name		●	●	●	●		…	●		●
	Various choices	●	●	●	●	●			●		
	Indication method of the information		●	●	●	●	●				

Improvement objects

Error factors

4.Correlate Improvement Object with EP Solution





4.Correlate Improvement Object with EP Solution

Table 3 Question type regarding EP solutions

Improvement Objects	EP solution	Questions	Countermeasure Sample
1. Information medium	Remove	1.1 Is there any unnecessary information?	The work has been down, install the past prescription to the place of the appointment immediately
	mechanization	1.2 Can we become the medium to mechanize or computerize?	Introduce an effective ordering system.
	Grouping	1.3 Can you put the connection information mediums in one place?	Put the connection prescription in one place.
5. Memory			
	sample and gauge	5.4 In some kinds of situations, why is it that a worker does not memorize information and cannot always confirm it?	I will outline instructions for the day on a white board beforehand and can confirm them anytime
・・・	・・・		

5. Procedure Proposal for Planning Countermeasures

<Step 0> Collecting and classifying medication incidents

[0-1] Collect medication incidents
[0-2] Distinguish medication incidents

<Step 1> Analyzing the incidents to extract error factor

Extract error factor by using Ozaki's method

<Step 2> Selecting improvement objects and EP solutions

[2-1] Select improvement objects
[2-2] Select EP solutions that should be adopted

<Step 3> Planning countermeasures

Plan countermeasures by applying the adopted EP solutions to the improvement objects

6.Application of the Method Proposed

【Case example summary】

- **Operation:** prepared necessary medicines from box
- **Situation :**
  1.One day medicines for patient in box
  2.Among them, two medicines were similar
- **Done :** prepared the incorrect medicine
- **Result:** administered the incorrect medicine to patient

6.Application of the Method Proposed

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<Step 1> Analyzing the incidents to extract error factor

- **Error factor**: “resemblance in the appearance”

6.Application of the Method Proposed

<Step 2.1> Selecting the improvement objects (Map)

Error-factors \ Improvement objects		Information media	Information content	Medicine	Equipment	Work tool	Perception	…	Patient placement	Time	Place
Skipping Error	Scattered information	●	●			●					●
	Dependence on memory	●	●					…	●	●	
	Interruption of the work	●							●	●	
	…					…					
Mistaking Error	…					…					
	resemblance in the appearance			●			●				
	Various choices	●	●	●	●	●		…	●		
	Indication method of the information		●	●	●	●	●				

6.Application of the Method Proposed

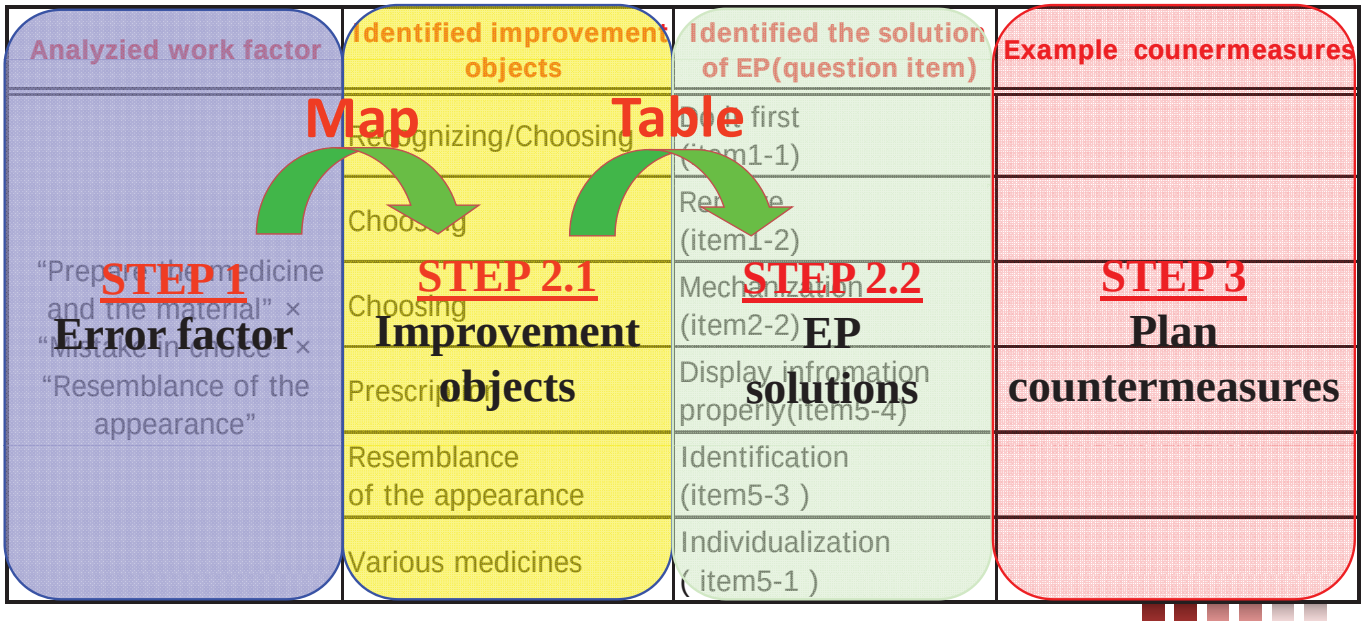
<Step 2.2>Selecting EP solutions that should be adopted (table)

Improvement Objects	EP solution	Questions	Countermeasure Sample
1. Information medium	Remove	1.1 Is there any unnecessary information?	The work has been down, install the past prescription to the place of the appointment immediately
	mechanization	1.2 Can we become the medium to mechanize or computerize?	Introduce an effective ordering system.
	Grouping	1.3 Can you put the connection information mediums in one place?	Put the connection prescription in one place.
• • •		• • •	
5. Memory	visualization of information	5.3 Even if a worker does not memorize it, how is it that the information. can always be visible?	Make a sticker reading “ STOP-please check the name band” and complete it
	sample and gauge	5.4 In some kinds of situations, why is it that a worker does not memorize information and cannot always confirm it?	I will outline instructions for the day on a white board beforehand and can confirm them anytime
• • •		• • •	

6.Application of the Method Proposed

<Step 3> Planning countermeasures

Table A- Table for planning EP countermeasures



6.Application of the Method Proposed

<Step 3> Planning countermeasures

Table 4 - Examples of error-proofing countermeasures

Analyzied work factor	Identified improvement objects	Identified the solution of EP(question item)	Example counermeasures
"Prepare the medicine and the material" × "Mistake in choice" × "Resemblance of the appearance"	Recognizing/Choosing	Do it first (item1-1)	①The doctor who writes the prescription shouldprepare the medicines
	Choosing	Remove (item1-2)	②Supply only medicines that are necessary toeliminate the operation of "choosing"
	Choosing	Mechanization (item2-2)	③Use the bar the bar-code system to choose the right medicine
	Prescription	Display infromation properly(item5-4)	④Write the name of medicines that look similar in a red pen to draw attention in the prescription
	Resemblance of the appearance	Identification (item5-3)	⑤Devise a way to clearly distinguish between similar medicines
	Various medicines	Individualization (item5-1)	⑥After the medicines are supplied, arrange them in amount of times, beforehand

Plan various EP countermeasures easily

6.Application of the Method Proposed

- A countermeasure was planned such as

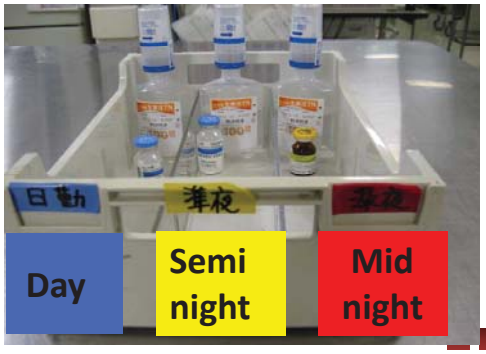
"Arrange medicines in amount of times, beforehand"

【**before**】 When it becomes medicine time, the prescription is comprehended, and the necessary medicines are removed from the box where the medicines of one day in.

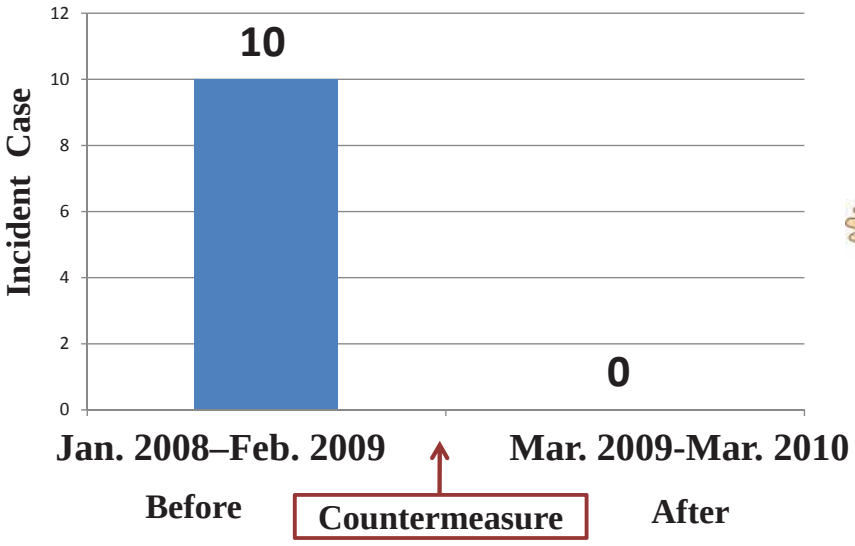
【 **after** 】 After the medicines are supplied by the pharmacy, the nurse arrange them in amount of times, beforehand.

【before】

【after】



6.Application of the Method Proposed



7. Discussion

Table 2

Error factors	Improvement objects

Table 3

Improvement objects	EP solution	Questions	Example countermeasures

8.Conclusion and Future Work

Conclusion

- Error factor  improvement objects  EP solutions

Map Table

- Proposed a procedure

Future work

- Selection method with regard to the planned countermeasures
- Application of proposed method to a greater number of hospitals

Thank you for your attention!

References

[1]Ozaki, I. *et al.* (2005), "A Study of the Reduction of Accidents in Medication by Error Proofs," *Hospital Management*, 42, pp. 361–373

[2]Nakajo, T. *et al.* (1984), "Studies of the Fool Proofs in Work System–Principle for Fool Proofs," *Quality*, 14, pp.20–27

[3]Nakajo, T. *et al.* (1985), "Studies of the Fool Proofs in Work System–Assessment for Fool Proofs in Manufacturing," *Quality*, 15, pp.41–50