

Smartphone-Based Patient tailored Drug Allergy Preventive System – Pilots Study In 4 Tertiary Hospital



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Introduction

- The treatment of choice in allergic disease
= **Avoidance**

Introduction



- Normal reaction
- Not hypersensitive

Introduction



Patients with cat allergy



다정하다... 이빨과 이빨이 닿지 않게
몰어넣는 배려를 해주고 있어.

Introduction

- Treatment of choice
in cat allergy
= avoidance



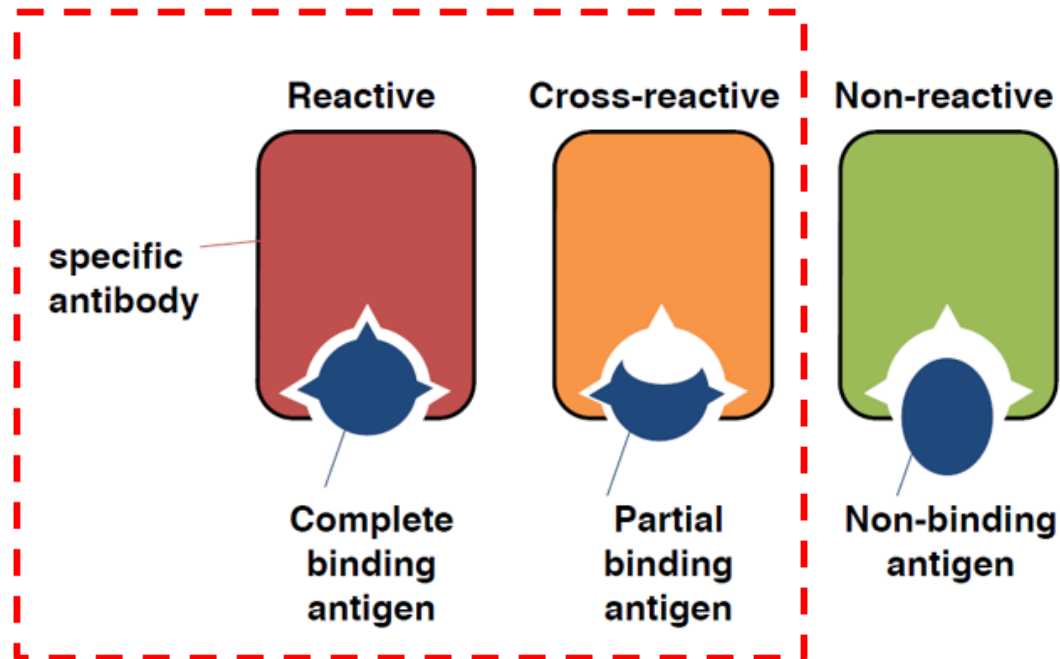
Patients with cat allergy



다정하다... 이빨과 이빨이 닿지 않게
몰어넣는 배려를 해주고 있어.

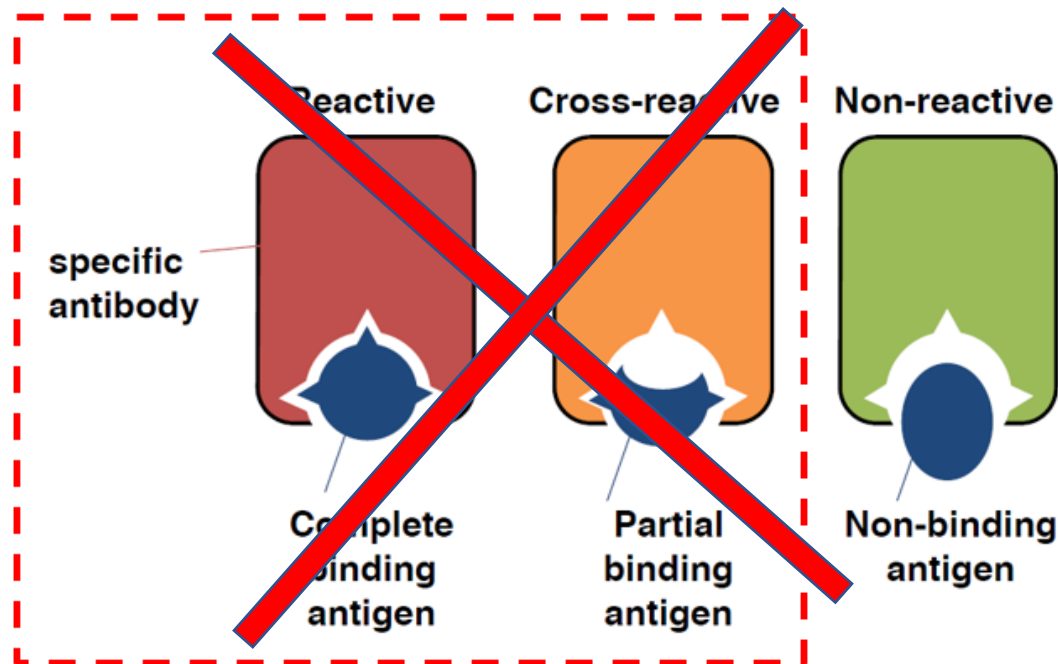
Introduction

- Treatment of choice in drug allergy



Introduction

- Treatment of choice in drug allergy
= do not take the culprit or cross-reactive drugs.



Introduction

- **However, many patients with drug allergy were re-experienced allergic reaction to same or similar drugs.**

Introduction

- **My patient's real story**

Case	31/M with recurrent history of angioedema after taking medication
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▪ 2YA	ibuprofen OTC -> angioedema
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▪ 6MA	Visited outpatient clinic Notified a history a/w ibuprofen induced angioedema Prescribed loxoprofen -> re-experienced angioedema
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▪ 2MA	Visited different outpatient clinic Notified a history a/w ibuprofen and loxoprofen induced angioedema Doctor did not prescribe medications d/t drug allergy history
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▪ 1MA	Visited orthopedic clinic in our hospital Notified drug allergy history prescribed aceclofenac -> visited ED
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Introduction

- Doctor's opinion
 - ✓ He was diagnosed with aspirin/NSAIDs idiosyncrasy/hypersensitivity
 - **Phentype**: generalized urticaria/angioedema (within 30min)
 - The following precautions should be taken when taking medicines
 - **Avoidance**: NSAIDs, aspirin
 - **Potentially risky**: acetaminophen
 - **Safe**: celecoxib (200mg qd)
 - Drugs that are not NSAIDs (ATC code: M01A) can be taken

Introduction

- **My patient's real story**

Case	31/M with recurrent history of angioedema after taking medication
------	---

1WA	Prescribed ophthalmic solution
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Ophthalmic solution - bromfenac

Revisited EM department d/t generalized urticaria and angioedema
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Introduction

- As well as patients with drug allergy,
Many doctors also have troubles in prescribing medication to patients with drug allergy

Introduction

- In some cases, it isn't also easy to an allergy specialists.

TABLE II NSAID classes determined by similar chemical structures

Chemical class	Drugs
Salicylic acid derivatives	Aspirin (ASA), sodium salicylate, choline magnesium trysalicylate, salsalate, diflunisal, sufasalazine, olsalazine
Propionic acid derivatives (profens)	Ibuprofen, dexibuprofen, naproxen, fenoprofen, ketoprofen, dexketoprofen, flurbiprofen, oxaprozin, loxoprofen
Acetic acid derivatives	Indomethacin, tolmetin, sulindac, etodolac, ketorolac, diclofenac, aceclofenac, nabumetone
Pyrazolic derivatives (pyrazolones)	Metamizole, phenylbutazone, phenazone, aminophenazone, ampyrone, suxibuzone, sulfamazone, nifenazone, pyrazolone, propyphenazone
Anthranilic acid derivatives (fenamates)	Mefenamic acid, flufenamic acid, tolfenamic acid
Enolic acid derivatives (oxicams)	Piroxicam, meloxicam, tenoxicam, droxicam, lornoxicam, isoxicam
Para-aminophenol derivatives	Acetaminophen, paracetamol

Objective

- aimed to develop a smartphone based patient-tailored drug allergy preventive system.
- conducted multicenter clinical trial and tested the feasibility of our application.

Methods: overview of the system

Mobile App



Web Browser



Patient



Doctor



Methods : mobile drug safety card

- Provide a personalized information for each patient's drug allergy

Drug safety card		
약물유 해반응	Aspirin/NSAIDs hypersensitivity	
금기 약제	진통소염제 (NSAIDs)	Contra-indicated
주의 약제	acetylsalicylic acid / Acetaminophen	Risky (potentially cross-reactive)
복용 가능 약제	celecoxib	Safe (well-tolerable)
Action Plan	확인하기	

Methods : mobile drug safety card

- Personalized according to patient's drug allergy

Drug safety card		
약물유 해반응	Aspirin/NSAIDs hypersensitivity	
금기 약제	진통소염제 (NSAIDs)	Contra-indicated
주의 약제	acetylsalicylic acid / Acetaminophen	Risky (potentially cross-reactive)
복용 가능 약제	celecoxib	Alternatives (well-tolerable)
Actio n Plan	확인하기	

Methods : mobile drug safety card

- Provide a customized written action plan for drug allergy

Drug safety card

약물유 해반응	Aspirin/NSAIDs hypersensitivity
금기 약제	진통소염제 (NSAIDs)
주의 약제	acetylsalicylic acid / Acetaminophen
복용 가능 약제	celecoxib
Action Plan	<div>확인하기</div>

Action plan

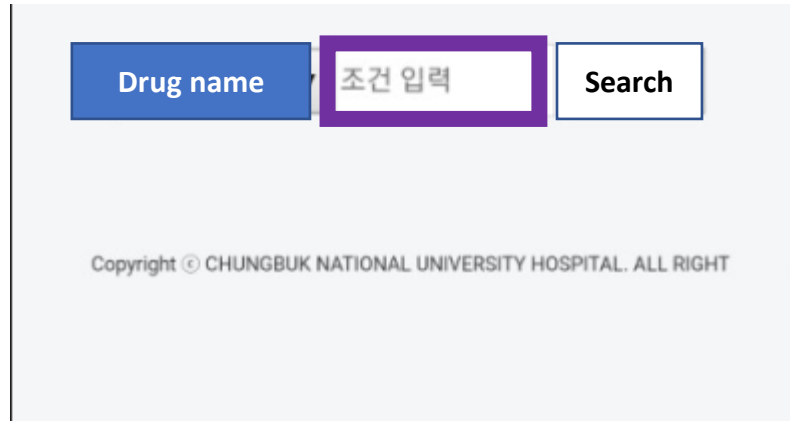
메세지

- 1) Avoid any NSAIDs
(including patch or ophthalmic solution)
- 2) Also avoid aspirin and antipyrenes
- 3) Tolerable to celecoxib, acetaminophen
- 4) Drugs that are not NSAIDs can be taken

확인

Methods : Smart drug utilization review

- Instant feedback for availability of a specific drug




Drug name 조건 입력 Search

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Methods : smart drug utilization review

- Instant feedback for availability of a specific drug



The screenshot displays a web-based search interface for drug availability. It features a light gray background with a white search bar. The search bar is divided into three sections: a blue button on the left labeled "Drug name", a central text input field containing the word "airtal" which is highlighted with a thick purple border, and a white button on the right labeled "검색" (Search). Below the search bar, centered at the bottom, is a small line of text: "Copyright © CHUNGBUK NATIONAL UNIVERSITY HOSPITAL. ALL RIGHT".

Methods : smart drug utilization review

- Instant feedback for availability of a specific drug

The screenshot displays a web-based drug search interface. At the top, there is a search bar with a blue label 'Drug name', a text input field containing 'airtal', and a white button with the Korean text '검색' (Search). Below the search bar, there are two blue headers: '약품 이름' (Drug Name) and '약품 성분' (Drug Ingredient). Under these headers, a table is shown with two columns. The first column contains the text 'airtal' and the second column contains the text 'aceclofenac'. The entire table is highlighted with a thick purple border, indicating the search results.

약품 이름	약품 성분
airtal	aceclofenac

Methods : smart drug utilization review

- Instant feedback for availability of a specific drug

The screenshot shows a web interface for drug utilization review. At the top, there is a search bar with a dropdown menu labeled '약품 이름' (Drug Name) and a search button labeled '검색'. Below this, there is a table with two columns: '약품 이름' (Drug Name) and '약품 성분' (Drug Ingredient). A message box is overlaid on the table, containing the following text: '메세지' (Message), '처방된 약제 중' (Among prescribed drugs), '에어탈정(아세클로페낙)은(는) 금기' (Aetaltong (Aceclofenac) is (is) contraindicated), '약제이므로 처방한 의사선생님께 해당' (It is a drug, so please consult the prescribing doctor about the), '약제 복용 여부를 상의하세요.' (drug use). A blue arrow points from the message box to the English translation box on the right. A red '확인' (Confirm) button is at the bottom right of the message box.

In English

- Your are allergic to NSAIDs.
- Aceclofenac is a NSAIDs and dangerous to you.
- You should not take aceclofenac.

If a patient is cross-reactive to NSAIDs

Methods : smart drug utilization review

- Different answer according to a specific profile of drug allergy

Drug safety card	
약물유 해반응	Isolated acetic acid derivatives hypersensitivity
금기 약제	Acetic acid derivatives NSAIDs
주의 약제	
복용 가능 약제	NSAIDs other than acetic acids derivatives
Action Plan	<div>확인하기</div>

Methods : smart drug utilization review

- Different answer according to a specific profile of drug allergy

Drug safety card

약물유 해반응	Isolated acetic acid derivatives hypersensitivity
금기 약제	Acetic acid derivatives NSAIDs
주의 약제	
복용 가능 약제	NSAIDs other than acetic acids derivatives
Actio n Plan	<div>확인하기</div>

‘Selective’ type
NSAIDs hypersensitivity

약품 이름 ▾ 이부프로펜 검색

약품 이름

약품 성분

- **You are only allergic to acetic acid derivatives NSAIDs.**
- **Ibuprofen** is not an acetic acid derivatives NSAIDs,
- **Ibuprofen** is **safe** for you.

(=only allergic to acetic acid derivatives NSAIDs)

Methods : smart drug utilization review

- Patients who have both aspirin/NSAIDs and cefaclor hypersensitivity

1 2 >

의약품안전카드

약물유 해반응	혈관부종
금기 약제	acetylsalicylic acid / 진통소염제 (NSAIDs)
주의 약제	
복용 가능 약제	meloxicam / Acetaminophen
Actio n Plan	확인하기

aspirin/NSAIDs
hypersensitivity

&

< 1 2

의약품안전카드

약물유 해반응	아나필락시스
금기 약제	1세대 세파 항생제 / 2세대 세파 항생제
주의 약제	OTHER BETA-LACTAM ANTIBACTERIALS
복용 가능 약제	페니실린 계열 항생제 / ceftriaxone
Actio n Plan	확인하기

cefaclor
hypersensitivity

Methods : smart drug utilization review

- Automatically re-check whether dangerous drug were included

The image shows a Korean prescription form titled '처방전' (Prescription). The form contains various fields for patient information, medical history, and medication details. A magnifying glass is positioned over a QR code located in the lower right section of the form, with the text '그 내용동' (Same content) written above it. The QR code is a standard black and white matrix code used for digital verification of the prescription.

QR code in prescription

Smart DUR app – easy to use

- Automatically re-check whether dangerous drug prescribe or not



QR code in prescription



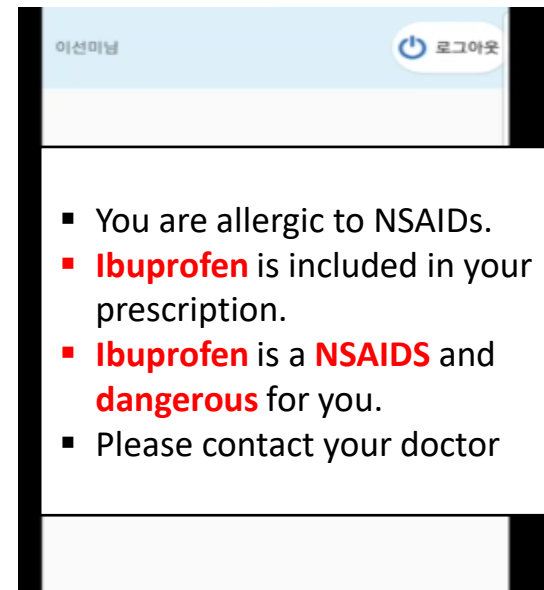
After QR code scanning

Smart DUR app – easy to use

- Automatically re-check whether dangerous drug prescribe or not



QR code in prescription



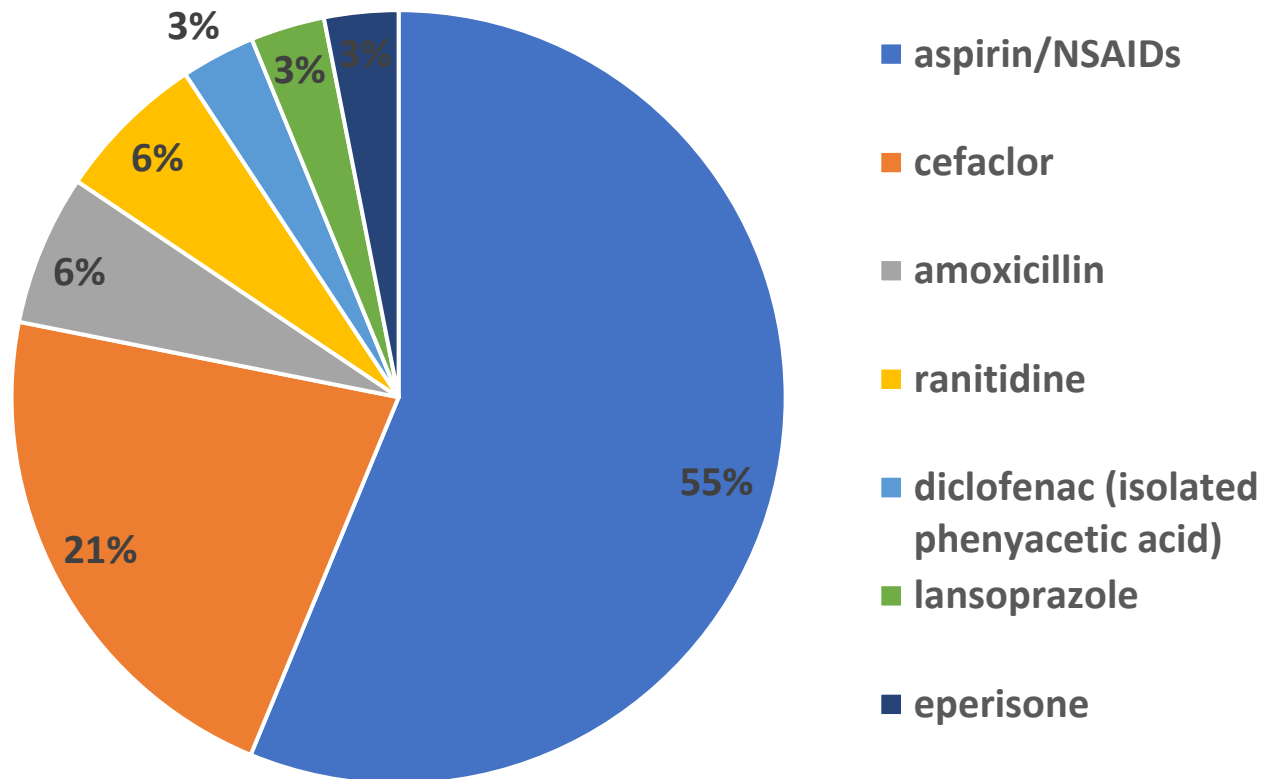
After QR code scanning

Result: pilot study

- Pilot study
 - from January 2018 to December 2018
 - 100 patients with drug allergy were enrolled from 4 tertiary hospital
 - after 3 months of application use
 - evaluate the feasibility and user's satisfaction for our system

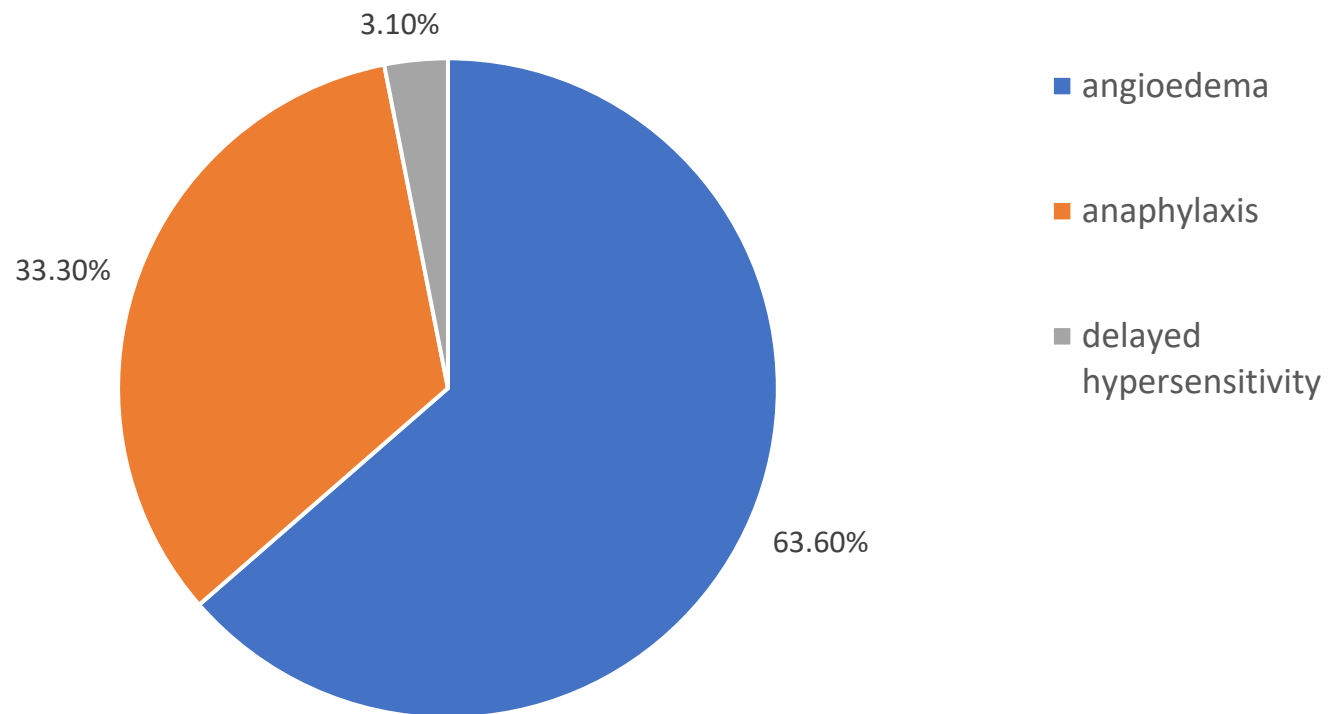
Result: pilot study

■ Culprit drugs



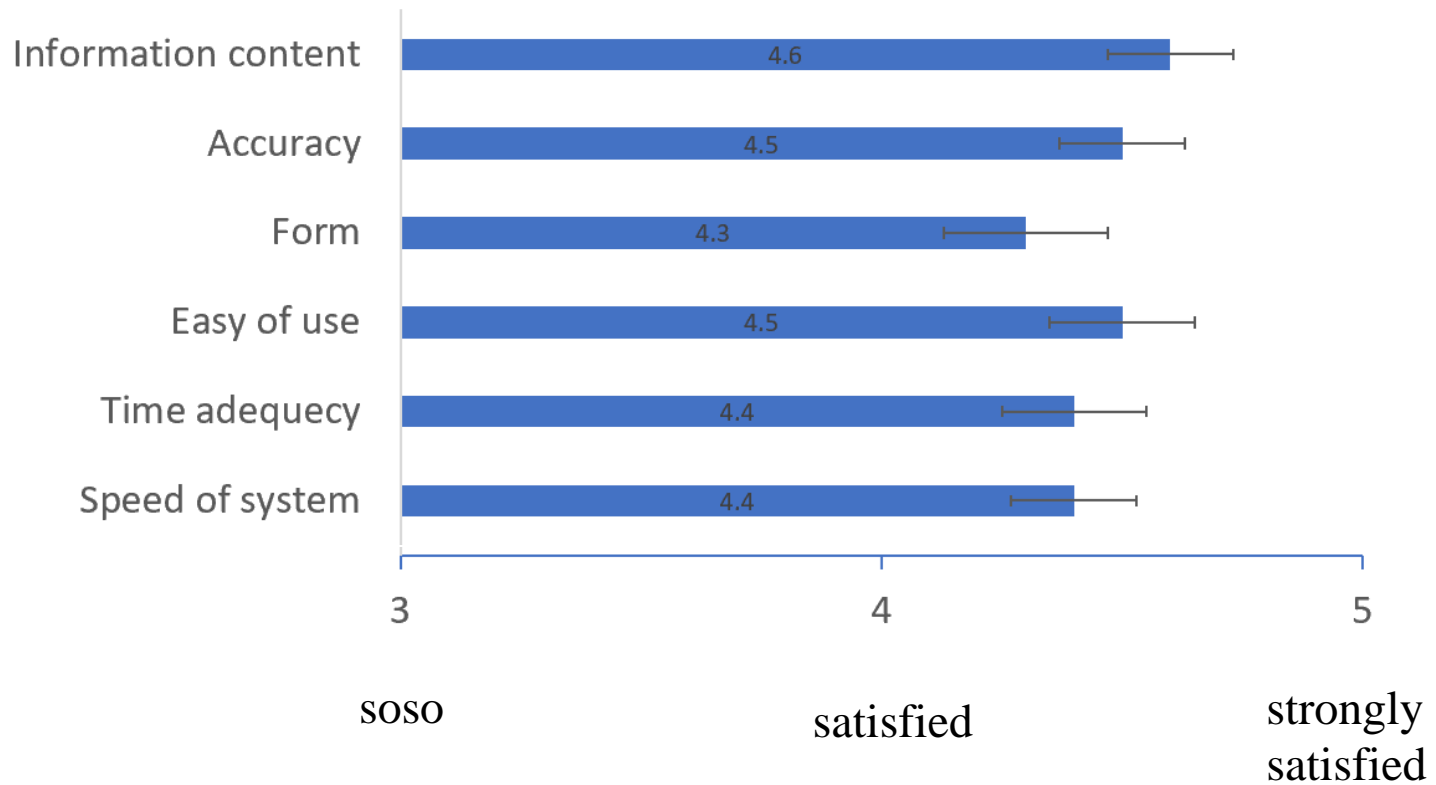
Result: pilot study

- Phenotype of drug allergies



Result: pilot study

- User's satisfactions

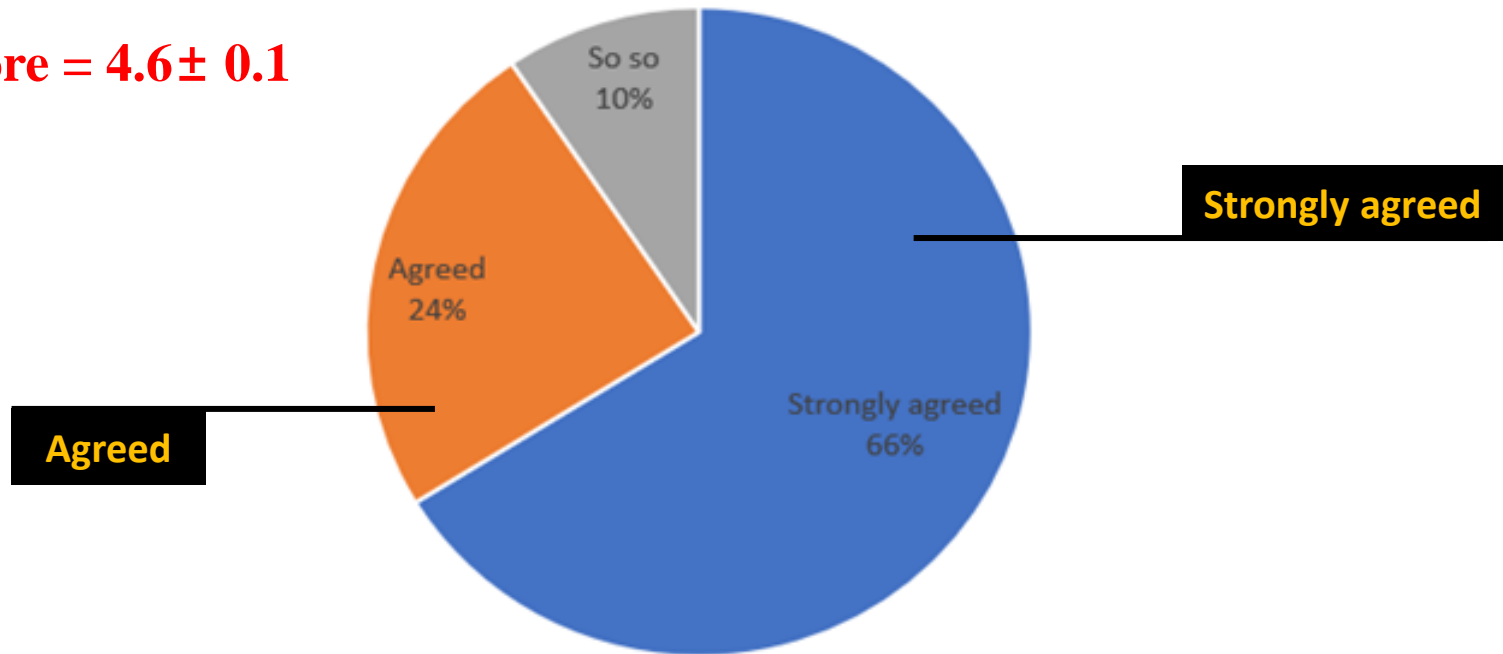


*5 points scales: strongly disagreed (1) ~ strongly agreed (5)

Result: pilot study

Question: Do you think that this application help to prevent accidents associated with drug?

Score = 4.6 ± 0.1



*5 points scales: strongly disagreed (1) ~ strongly agreed (5)

Conclusion

- We developed the smartphone-based drug allergy prevention systems.
- By using Smart DUR app, patients with drug allergy can easily prevent re-exposure to dangerous drugs.