

Modular based customization of electronic medical record for private hospitals in Hong Kong

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CMS Extension

CMS Adaptation

For private hospitals

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Modular based customization of electronic medical record (eMR)



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Enable **data sharing and integration capabilities** with
Electronic Health Record Sharing
System (eHRSS)



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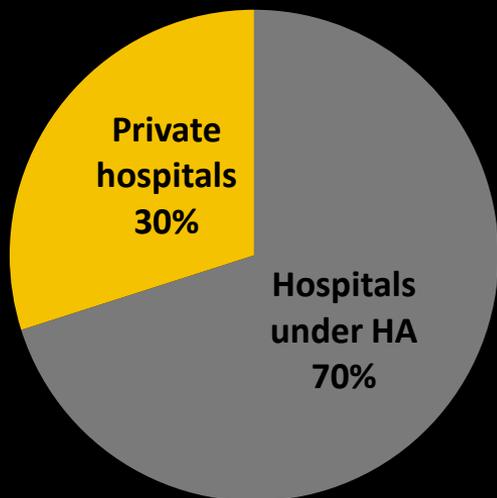
Conclusion

- Over 7 million people in Hong Kong
- 41 public hospitals and 11 private hospitals



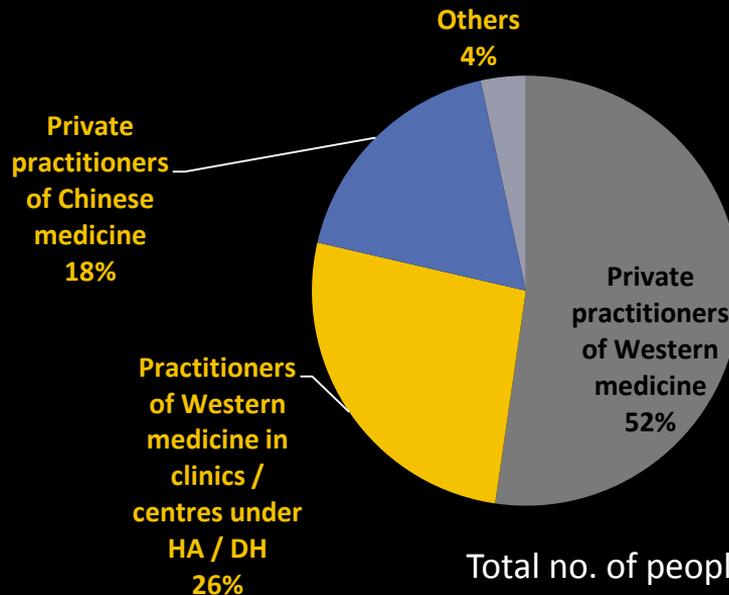
Healthcare Structure in Hong Kong

Hospitalization during the 12 months before enumeration



Total no. of people: 540,100

Doctor consultations made during the 30 days before enumeration



Total no. of people: 1,632,000

Source: "Thematic Household Survey Report No. 58", Census and Statistics Dept., October 2015

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Challenge of eMR adoption in private hospitals

- Various eMR adoption
- Mostly focus on financial and administrative systems
- A few with eMR support clinical data capturing

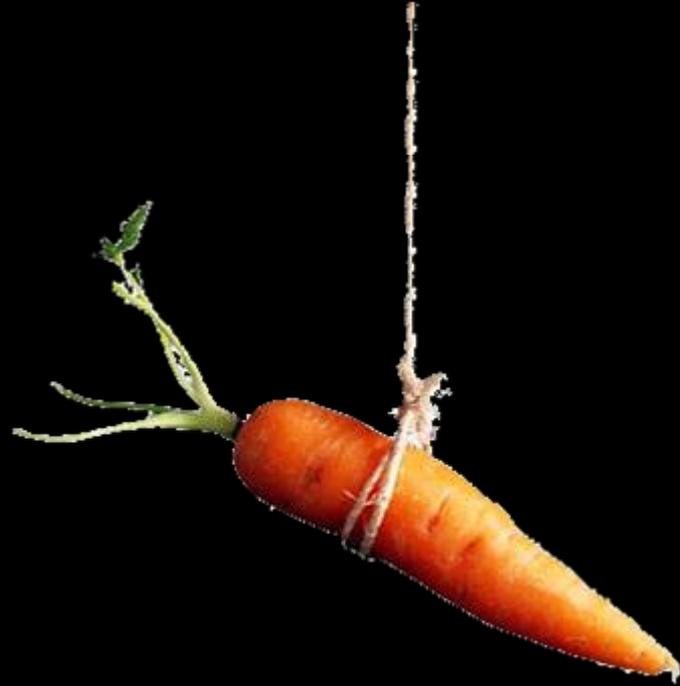
Hong Kong



Multiple barriers:

- Cost (time cost, capital cost, maintenance cost)
- Lack of technical support
- Knowledge gap
- Interference with communication
- Confidentiality breach
- Lack of benefits...

Leung, G. M., Philip, L. H., Wong, I. O., Johnston, J. M., & Tin, K. Y. (2003). Incentives and barriers that influence clinical computerization in Hong Kong: a population-based physician survey. *Journal of the American Medical Informatics Association*, 10(2), 201-212.



Incentives/catalysts:

- Improved efficiency
- Improved quality care
- Patient demand
- Government regulation
- Competitive pressures
- Increased savings
- Financial incentives

Leung, G. M., Philip, L. H., Wong, I. O., Johnston, J. M., & Tin, K. Y. (2003). Incentives and barriers that influence clinical computerization in Hong Kong: a population-based physician survey. *Journal of the American Medical Informatics Association*, 10(2), 201-212.

Announced the development of eHRSS in 2009 policy address

This electronic system will
underpin the **reform** of our
primary healthcare services...



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1. To **design and develop** a customized modular based electronic medical record for private hospitals to use
2. To **facilitate** private hospitals to adopt CMS adaptation modules

WANTED

Customized modular based
eMR!!!

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1. Collect experiences from HA and private
2. Building blocks approach
3. Flexibility in adoption
4. Align sharable scope and standard with eHRSS
5. Ensuring safety and quality
6. Other special features

Leverage Hospital Authority experiences on building CMS



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CMS Adaptation Task Force

To engage private hospitals in the development process and share implementation experiences



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Cater clinical workflow in private hospitals

A blue-tinted photograph of a stethoscope resting on a computer keyboard. The stethoscope is black with a silver chest piece and binaurals. The keyboard is white with black keys. The background is a light blue gradient.

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A photograph of several colorful LEGO bricks (yellow, red, blue) scattered on a white surface. The bricks are in sharp focus in the foreground, with some blurred in the background. The text 'Building Blocks Approach' is overlaid on the left side of the image.

Building Blocks Approach

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Support proper documentation of patient drug allergy, adverse drug reaction & clinical alert

CHAN, APPLE
HKIC: UH000121(0) DOB: 30-Jan-1976 Age: 40 years Ward: 5A-X12 Adm: 30-Jun-2016 Hospital No.: W12356767

Allergy / Adverse Drug Reaction / Alert

Allergy

- allopurinol
- penicillins

Adverse Drug Reaction

- Zocor (simvastatin)

Alert

- G6PD Deficiency

Structured Free Text Deleted

Drug allergy

Adverse drug reaction

Clinical alert

Support discharge / outpatient medication prescription

M CHAN, APPLE
HKIC: UH000121(0) DOB: 30-Jan-1976 Age: 40 years Ward: 5A-X12 Adm: 30-Jun-2016 Hospital No.: W12356767

Medication Order Entry Order Date: 30-Jun-2016

Display **Allergy: (1) allopurinol (2) penicillins ADR: Zocor (simvastatin) Alert: G6PD Deficiency**

Drug Name / Set: Adult

Prescription

- Busco** (hyoscine butylbromide) tablet — 20 mg — three times daily — as required — oral — for 1 week
- Loratadin Stada** (loratadine) tablet — 10 mg — daily — as required — oral — for 1 week
- ibuprofen (Fu Yuan)** tablet — 200 mg — three times daily — oral — for 1 week
- Panadol** (paracetamol) tablet — 500 mg — four times daily — as required — oral — for 1 week

Total Number: 4

Provide medication decision support with drug allergy checking

M PATIENT, APPLE
HKIC: UH123444 DOB: 30-Jan-1988 Age: 20 years Ward: 5A-X12 Adm: 21-Jan-2014 Hospital No.: OP201600629

Medication Order Entry Order Date: 29-Jun-2016

Display Allergy: penicillins Update

Drug Name / Set: Adult

Prescription

Drug Allergy Checking

 This patient has **CERTAIN** drug allergy to **penicillins**. The clinical manifestation was **rash**.

Augmentin (amoxicillin (as trihydrate) + clavulanate (as potassium)) oral tablet 1 g may result in **ALLERGIC REACTION**.

If you wish to prescribe anyway, you must provide the reason(s) for overriding this alert:

- No other alternative available
- Desensitizing the patient with this drug
- Doubts about the reported history of drug allergy
- Patient is administering this drug without allergy reaction
- Patient can tolerate the drug at lower dose
- Others (Please specify reason below)

Remark

Prescribe with reason Do not Prescribe

Total Number: 0 Save Save & Print Delete Order Close

Support diagnosis & procedure reporting comply with eHR standard

CHAN, SIU LING(陳小玲)
HKIC: A12345646(5) DOB: 01-Jan-1986 Age: 30 years Ward: 5A-X12 Adm: 09-Sep-2015 Hospital No.: A321456546

Diagnosis and Procedure

Inpatient: **Diagnosis / Procedure**

Diagnosis History Favourite

Search by Description ICPC2 ICD10

P	?	Description	ICD10	ICPC2
<input checked="" type="radio"/>	<input type="checkbox"/>	Injury of lower limb	T13.9	
<input checked="" type="radio"/>	<input type="checkbox"/>	Accidental cut	W49	
<input type="radio"/>	<input type="checkbox"/>			
<input type="radio"/>	<input type="checkbox"/>			
<input type="radio"/>	<input type="checkbox"/>			

Procedure History Favourite

P	Description	Date	SCT	ICPC2
<input checked="" type="radio"/>	Wound dressing	09-Sep-2015	182531007	S56
<input type="radio"/>				
<input type="radio"/>				
<input type="radio"/>				

Diagnosis component

Procedure component

Save Close

Support customized generic letter / form developed by local hospital

The screenshot displays the Letter Engine (LE) software interface. The main window is titled "Letter" and shows a "Consult Date: 15-Mar-2012". On the left, a "History" panel is expanded, showing a table of previous letters:

Date	Letter Type	Create By
15-Mar-2011	Admission Certificate	Dr. Wong Siu Yan
12-Feb-2011	Sick Leave Certificate	Dr. Wong Siu Yan
15-Mar-2011	Sick-Leave-Certificate	Dr.-Wong-Siu-Yan

A yellow box highlights the "History panel is expanded" text, with an arrow pointing to the history table. The main area displays a "Hospital Authority Referral Letter" form. A yellow box highlights the "Current letter" text, pointing to the form content. The form includes fields for "Private Practitioner Contact Details" (Dr. Wong Siu Yan, Virtual Hospital), "To 致:" (Hospital 醫院, Specialist Clinic 專科門診), "Patient 病者:" (Chan, Siu Ling, I.D. No. 身份証號碼: A1234), and "Sex/Age 性別/年齡:" (F / 57 years). The form also contains a "Dear Professor / Doctor 致教授 / 醫生," and "Thank you for seeing the above-named patient 多謝診治上述病者,". The bottom of the interface shows navigation buttons: "Letter Type", "Print Setup", "Preview", "Save & Print", and "Close".

Facilitate efficient and effective documentation

The screenshot displays the 'Discharge Summary' interface for a patient named SAAM. The template used is 'Gastritis'. The interface is organized into several sections:

- Allergy (n):** A table with columns for Allergy (n), ADR (n), Alert (n), and Update. It shows 'Augmentin' under Allergy (n) and 'Astad (aciclovir)' under ADR (n). A large blue 'SAAM' watermark is overlaid on this section.
- Discharge Diagnosis (new):** A table with columns for P, Description, and ICD10. It lists 'Helicobacter-associated gastritis' with ICD10 code 'K29.7'. A large blue 'Dx' watermark is overlaid on this section.
- Procedure (new):** A table with columns for P, Description, Clini..., Date, and Surg... It lists 'Oesophagogastroduodenoscopy' with a date 'ddmmyyyy'. A large blue 'Px' watermark is overlaid on this section.
- Letter (new):** A section for creating a letter. It includes a 'Print letter:' checkbox, a dropdown for 'Diagnosis to be shown as:' (set to '(1) Helicobacter-associated gastritis'), and a 'Sick leave certificate' section with a 'Start Date' field. A large blue 'Letter' watermark is overlaid on this section.
- Medication Order Entry (new):** A section for entering medication orders. It has a table with columns for Medication and Date, and currently shows 'No record'. A large blue 'MOE' watermark is overlaid on this section.
- Plan of Management with the follow-up plan:** A text area containing the instruction 'Breath test after 8 weeks'.
- Discharge Note with description and details:** A text area containing the following text: 'Complain of epigastric pain and tarry stool for few days', 'Admitted for OGD', 'OGD done and H pylori +ve', and 'For triple therapy and breath test after 8 weeks'.

At the bottom of the interface, there are controls for 'No. of detailed copies: 1' and 'No. of patient copies: 1', along with buttons for 'History by Episode', 'Preview', 'Sign and Print', 'Save Draft', and 'Close'.

Facilitate efficient and effective documentation

History panel

Alert
Allergy: No Known Drug Allergy
ADR:
Alert:

Assessment
Basic Vitals
Body Temp: 36.0 °C Tympanic at 12:00
BP: 122 / 54 mmHg at 12:00
Pulse: 77 / min at 12:00

Consultation Note
C/O skin rash
Rash size: 2x2cm
Itching
Allergy Hx: Nil

Diagnosis

?	Description
<input type="checkbox"/>	Rash
<input checked="" type="checkbox"/>	Eczema
<input type="checkbox"/>	

Medication Order Entry

Date	Medication
1 21-Sep-2015 10:00:55	Eurax (crotamiton) 10 % cream - three times daily - topical (both arms) - for 5 days

- SAAM
- Diagnosis
- Assessment
- Consultation Note
- MOE
- Letter

No. of Consultation Summary: 1

Preview Sign and Print Save Draft Close

Ensure PMI data standard compliance with eHR

Patient Registration

eHR No:

Medical Record Number:

*Surname:

Given Name:

Other Name:

Chinese Name:

*Date of Birth: Age:

HKIC: ()

Document Type:

Document Number:

*Sex: Male Female Unknown

Nationality:

Contact Info.

* At least one phone number is required.

Tel.(Home): Tel.(Mob):

Email Address:

Tel.(Other):

Residential Address

Room: Floor: Block: Building/Street:

District: Area:

Correspondence Address

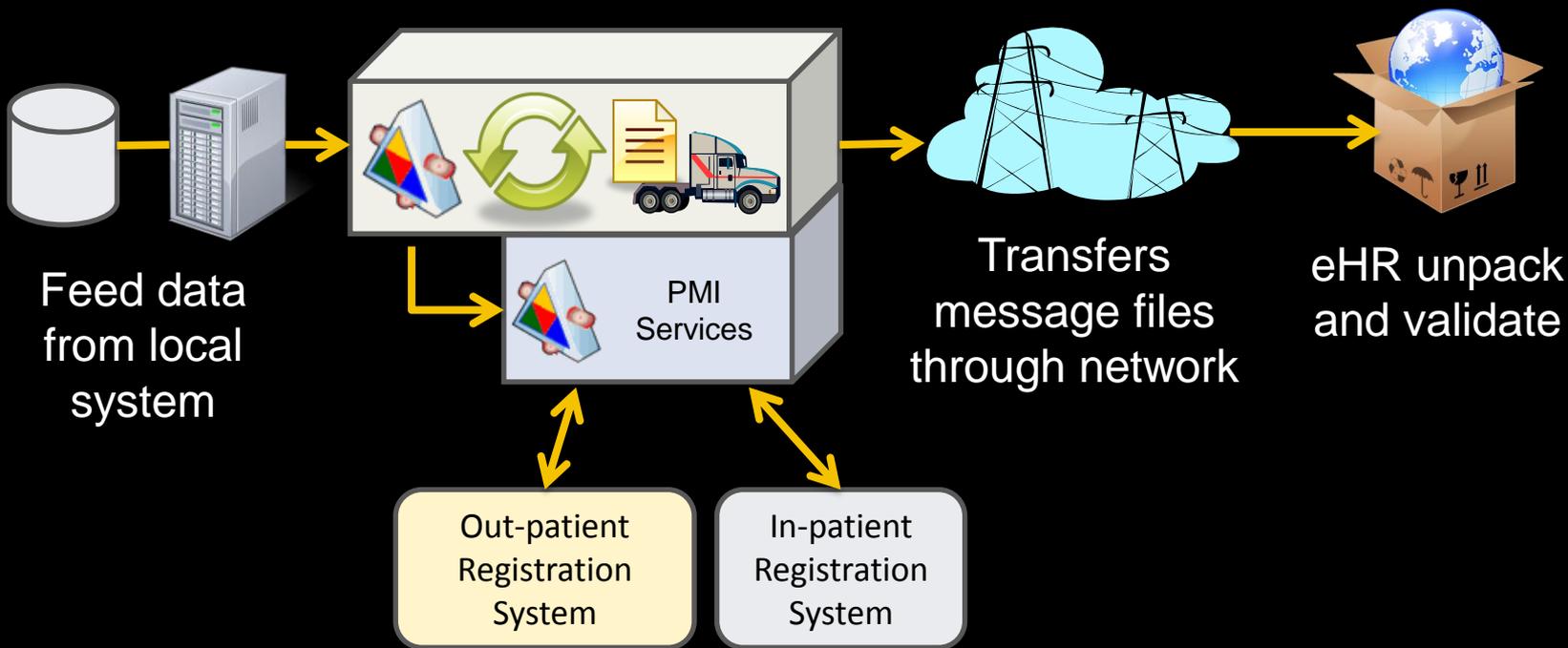
Same as Residential Address

Room: Floor: Block: Building/Street:

District: Area:

Remarks:

Facilitate data upload from local eMR to eHRSS



Created a **synergistic effect** when more than one CMS adaptation modules were adopted



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PATIENT, APPLE

HKIC: UH123444

DOB: 30-Jan-1988

Age: 20 years

Ward: 5A-X12

Adm: 21-Jan-2014

Hospital No.: OP201600629



Medication Order Entry

Order Date: 29-Jun-2016

Display

Allergy: penicillins

Update

Drug Name / Set:

Adult

Prescription

Total Number: 0

Save

Save & Print

Delete Order

Close

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Display

Allergy: penicillins

Update

Drug Name / Set:

augmentin

Adult

Prescription

1,200 mg — Q8H — intravenous

 Augmentin (amoxicillin (as trihydrate) + clavulanate (as potassium)) oral powder for syrup 156.25 mg / 5 mL

2.5 mL — TDS — oral

5 mL — TDS — oral

10 mL — TDS — oral

 Augmentin (amoxicillin (as trihydrate) + clavulanate (as potassium)) oral powder for syrup 457 mg / 5 mL

2.5 mL — BD — oral

5 mL — BD — oral

10 mL — BD — oral

Augmentin (amoxicillin (as trihydrate) + clavulanate (as potassium)) oral tablet 1 g

Augmentin (amoxicillin (as trihydrate) + clavulanate (as potassium)) oral tablet 375 mg

Augmentin (amoxicillin (as trihydrate) + clavulanate (as potassium)) oral tablet 375 mg (United Kingdom)

Augmentin (amoxicillin (as trihydrate) + clavulanate (as potassium)) oral tablet 625 mg

Augmentin Duo Forte (amoxicillin (as trihydrate) + clavulanate (as potassium)) oral tablet 1 g

Augmentin Forte (amoxicillin (as trihydrate) + clavulanate (as potassium)) oral tablet 625 mg

augmentin (Free Text)

Total Number: 0

Save

Save & Print

Delete Order

Close



PATIENT, APPLE

HKIC: UH123444

DOB: 30-Jan-1988

Age: 20 years

Ward: 5A-X12

Adm: 21-Jan-2014

Hospital No.: OP201600629



Medication Order Entry

Order Date: 29-Jun-2016

Display

Allergy: penicillins

Update

Drug Name / Set:

Adult

Prescription

Drug Allergy Checking



This patient has **CERTAIN** drug allergy to **penicillins**. The clinical manifestation was **rash**.

Augmentin (amoxicillin (as trihydrate) + clavulanate (as potassium)) oral tablet 1 g may result in **ALLERGIC REACTION**.

If you wish to prescribe anyway, you must provide the reason(s) for overriding this alert:

- No other alternative available
- Desensitizing the patient with this drug
- Doubts about the reported history of drug allergy
- Patient is administering this drug without allergy reaction
- Patient can tolerate the drug at lower dose
- Others (Please specify reason below)

Remark

Prescribe with reason

Do not Prescribe

Total Number: 0

Save

Save & Print

Delete Order

Close

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1. Collect experiences from HA and private
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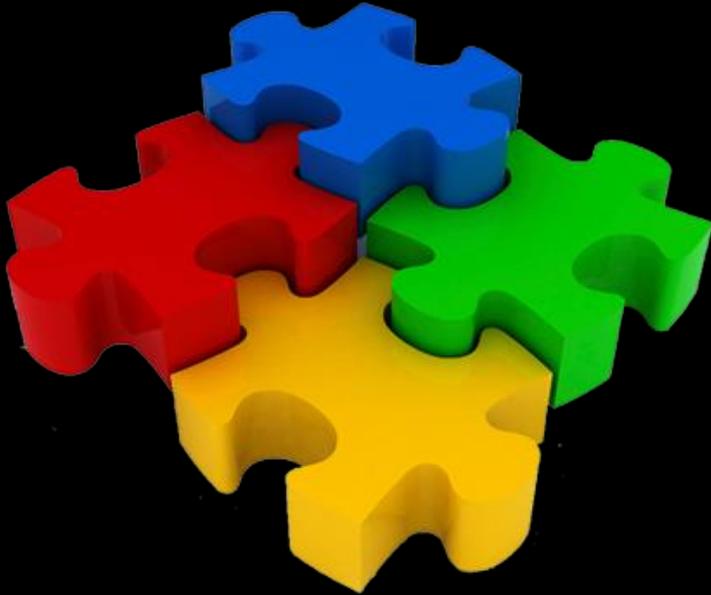
Adopt at your own pace!

SLOW

FAST

Varies from 4 months to years from the first kick off meeting to live run in different private hospitals.

Integrated with hospitals' own eMR



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1. Collect experiences from HA and private
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6. Other special features

STANDARD

Align with eHR
shareable scope and
standard



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Enable quality data capturing
and safe patient care delivery



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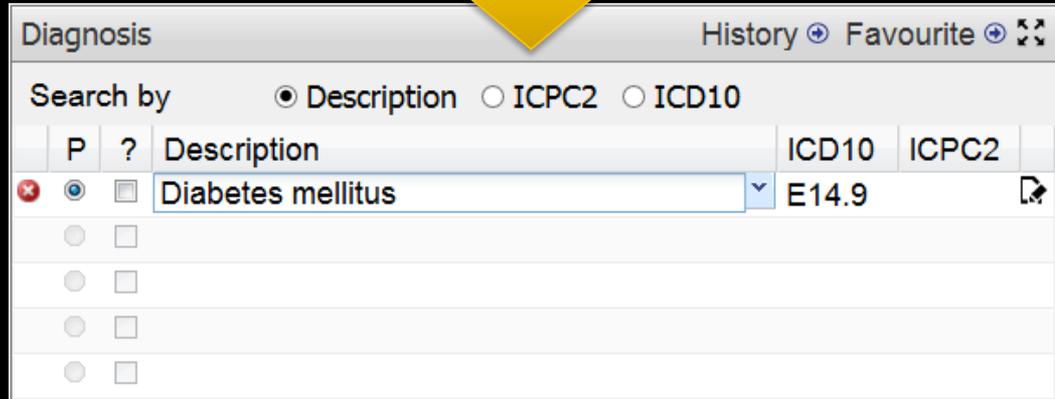
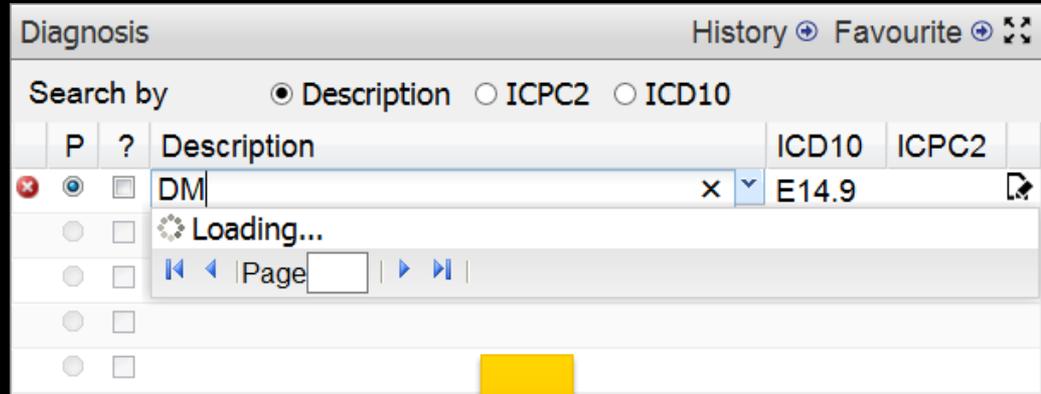
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1. Collect experiences from HA and private
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5. Ensuring safety and quality
6. Other special features

Special features

- Smart search
- Repeat from history
- Customization
- Favourite list & templates



Special features

- Smart search
- Repeat from history
- Customization
- Favourite list & templates

The screenshot displays a web-based Medication Order Entry interface. At the top, patient information is shown: PATIENT, APPLE; HKIC: UH123444; DOB: 30-Jan-1988; Age: 20 years; Ward: 5A-X12; Adm: 21-Jan-2014; Hospital No.: OP201600629. The main header is 'Medication Order Entry' with an 'Order Date: 29-Jun-2016'. Below this, there's a 'Drug History' section with a dropdown menu and an 'Allergy: penicillins' label. The 'Type: All' and 'Period: 6 months' filters are visible. A list of medications is shown, with four items selected (checked): Busco (hyoscine butylbromide) tablet — 20 mg — three times daily — as required — oral — for 1 week; Loratadin Stada (loratadine) tablet — 10 mg — daily — as required — oral — for 1 week; ibuprofen (Fu Yuan) tablet — 200 mg — three times daily — oral — for 1 week; and Panadol (paracetamol) tablet — 500 mg — four times daily — as required — oral — for 1 week. A yellow arrow points from the '4 selected row(s)' tooltip to the selected items. At the bottom, there are buttons for 'Add', 'Total Number: 0', 'Save', 'Save & Print', 'Delete Order', and 'Close'.

Special features

- Smart search
- Repeat from history
- **Customization**
- Favourite list & templates

The screenshot shows a software window titled "Diagnosis and Procedure" with a "Maintenance" tab. The interface is divided into two main sections: a left sidebar and a main content area.

Left Sidebar: A tree view under "Favourite List (My Favourite)" with sub-items: "Diagnosis", "Doctor", and "Procedure".

Main Content Area:

- At the top, there are two tabs: "Favourite List" (active) and "Category".
- Below the tabs is a "Diagnosis" header.
- A "Clinician:" field contains the value "sek001".
- A "Searching By" section has three radio buttons: "Description" (selected), "ICD10", and "ICPC2".
- A "Sorting Order" section has two radio buttons: "Alphabetical" and "Self Customized" (selected).
- A section titled "Favourite List (My Favourite):" contains a list of items with checkboxes and red 'x' icons. The items are: "Description" (unchecked), "Fever" (checked), "Upper respiratory tract infection" (checked), "Pneumonia" (checked), "Diabetes mellitus" (checked), and "Hypertension" (checked).
- At the bottom of the main area, there is a note: "* The sequence of all items can be changed by drag and drop." and two buttons: "Save" and "Close".

Special features

- Smart search
- Repeat from history
- Customization
- **Favourite list & templates**

Discharge Summary Adm Date: 05-Mar-2016 09:30

Template: My Template

Allergy (n)	ADR (n)	Alert (n)	Update
Augmentin	Astad (aciclovir)	No record	

Procedure (new) History Favourite

Discharge Summary Adm Date: 05-Mar-2016 09:30

Template: Gastritis

Allergy (n)	ADR (n)	Alert (n)	Update
Augmentin	Astad (aciclovir)	No record	

Discharge Diagnosis (new) History Favourite

P	Description	ICD10
<input checked="" type="checkbox"/>	Gastritis	

Procedure (new) History Favourite

P	Description	Clini...	Date	Surg...
<input checked="" type="checkbox"/>	Oesophagogastroduodenoscopy	Dr. Sek	ddmmyyyy	

Discharge Note with description and details Revision History Template

Complain of epigastric pain and tarry stool for few days
Admitted for OGD
OGD done and H pylori +ve
For triple therapy and breath test after 8 weeks

Plan of Management with the follow-up plan Revision History Template

Investigation (new) Template

Date	Description	Depart...
------	-------------	-----------

Medication Order Entry (new) Refresh New

Medication	Date
No record	

Discharge Information (new)

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Adoption of CMS Adaptation Modules

	HCP A	HCP B	HCP C	HCP D	HCP E	HCP F	HCP G	HCP H	HCP I	HCP J	HCP K
Structured Alert/Allergy (SAAM)											
Discharge Summary (DS)											
Diagnosis and Procedure (DxPx)											
Consultation Summary (CS)											
Medication Oder Entry (MOE)											
Letter Engine (LE)											
Drug Allergy Check (DAC)											
PMI services											
Local Adaptor/ Message Formatter											

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Adoption of CMS Adaptation Modules

	HCP A	HCP B	HCP C	HCP D	HCP E	HCP F	HCP G	HCP H	HCP I	HCP J	HCP K
Structured Alert/Allergy (SAAM)	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted
Discharge Summary (DS)	Adopted	Not Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted
Diagnosis and Procedure (DxPx)	Adopted	Not Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted
Consultation Summary (CS)	Adopted	Not Adopted	Adopted	Not Adopted	Adopted						
Medication Oder Entry (MOE)	Adopted	Not Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted
Letter Engine (LE)	Adopted	Not Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted
Drug Allergy Check (DAC)	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted
PMI services	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted
Local Adaptor/ Message Formatter	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted

Over 80% adopted CMS adaptation modules

Over 89% used more than two modules

Adoption of CMS Adaptation Modules

	HCP A	HCP B	HCP C	HCP D	HCP E	HCP F	HCP G	HCP H	HCP I	HCP J	HCP K
Structured Alert/Allergy (SAAM)	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted
Discharge Summary (DS)	Adopted	Not Adopted	Not Adopted	Adopted	Adopted	Not Adopted	Not Adopted	Not Adopted	Adopted	Adopted	Adopted
Diagnosis and Procedure (DxPx)	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted
Consultation Summary (CS)	Adopted	Adopted	Adopted	Not Adopted	Not Adopted	Not Adopted	Not Adopted	Adopted	Adopted	Adopted	Adopted
Medication Order Entry (MOE)	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted
Letter Engine (LE)	Adopted	Not Adopted	Adopted	Adopted	Not Adopted	Not Adopted	Adopted	Adopted	Adopted	Adopted	Adopted
Drug Allergy Check (DAC)	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted
PMI services	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted
Local Adaptor/Message Formatter	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted	Adopted



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	HCP A	HCP B	HCP C	HCP D	HCP E	HCP F	HCP G	HCP H	HCP I	HCP J	HCP K
Structured Alert/Allergy (SAAM)	Adopted										
Discharge Summary (DS)	Adopted										
Diagnosis and Procedure (DxPx)	Adopted	Adopted	Adopted								
Consultation Summary (CS)	Adopted	Adopted	Adopted								
Medication Oder Entry (MOE)	Adopted	Adopted	Adopted								
Letter Engine (LE)	Adopted	Adopted	Adopted								
Drug Allergy Check (DAC)	Adopted	Adopted	Adopted								
PMI services	Adopted	Adopted	Adopted								
Local Adaptor/ Message Formatter	Adopted	Adopted	Adopted								

100% SAAM user has successfully been able to upload Allergy/ ADR records.

Adoption of CMS Adaptation Modules

	HCP A	HCP B	HCP C	HCP D	HCP E	HCP F	HCP G	HCP H	HCP I	HCP J	HCP K
Structured Alert/Allergy (SAAM)	Green										
Discharge Summary (DS)	Green	Black	Black	Green	Green	Black	Black	Black	Black	Black	Black
Diagnosis and Procedure (DxPx)	Green	Black	Green	Green	Green	Black	Black	Black	Black	Black	Black
Consultation Summary (CS)	Black	Black	Green	Black							
Medication Oder Entry (MOE)	Green	Black	Green	Green	Green	Green	Black	Black	Black	Black	Black
Letter Engine (LE)	Green	Black	Green	Green	Black						
Drug Allergy Check (DAC)	Red	Red	Red	Red	Black	Red	Black	Black	Black	Black	Black
PMI services	Green										
Local Adaptor/ Message Formatter	Green										



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Modular based customization of electronic medical record (eMR)



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Facilitates the interconnection between private hospitals eMR systems to eHRSS





Thank
you

Q & A