



EMR Antimicrobial Stewardship Initiative

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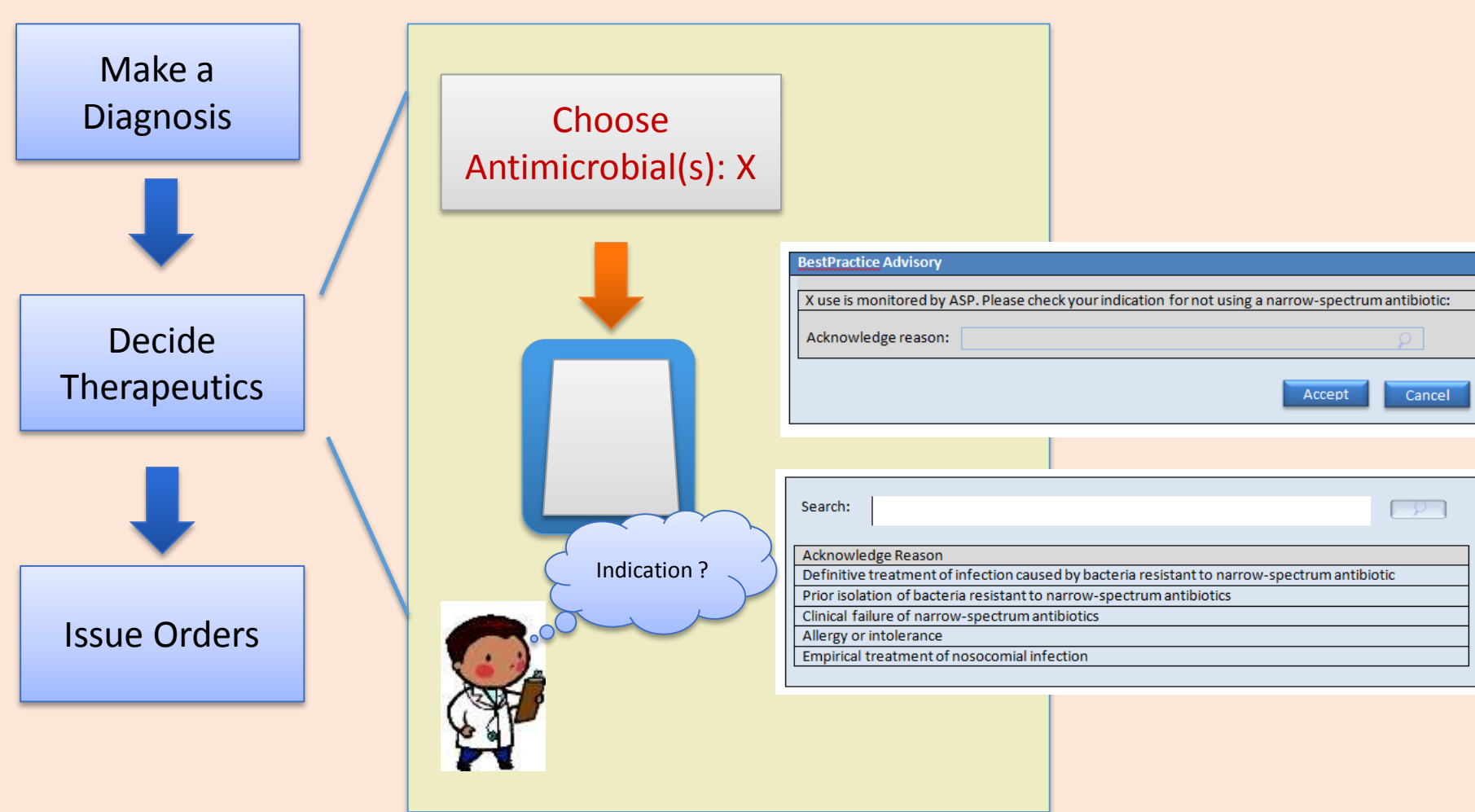
Background

- JurongHealth Electronic Medical Record (EMR) system, customized from the EMR technology by Epic Systems Corporation (Verona, Wisconsin, USA) went live with the opening of Ng Teng Fong General Hospital.
- Antibiotics Stewardship Program (ASP), an initiative aimed at improving patient outcomes while reducing the emergence of bacterial resistance that had been in JHS hospital previously. The working team is composed of an infectious disease physician and ASP-trained pharmacists. The main ASP activity comprises of daily auditing on targeted broad-spectrum use and providing feedback to the prescriber if an use is deemed inappropriate.
- The potential of utilizing the EMR, with its clinical decision support system (CDSS) to support the ASP was recognized; CDSS for antimicrobial prescribing have demonstrated improved clinical and financial outcomes in institutions with successful implementation strategy.

System Design and the End Product

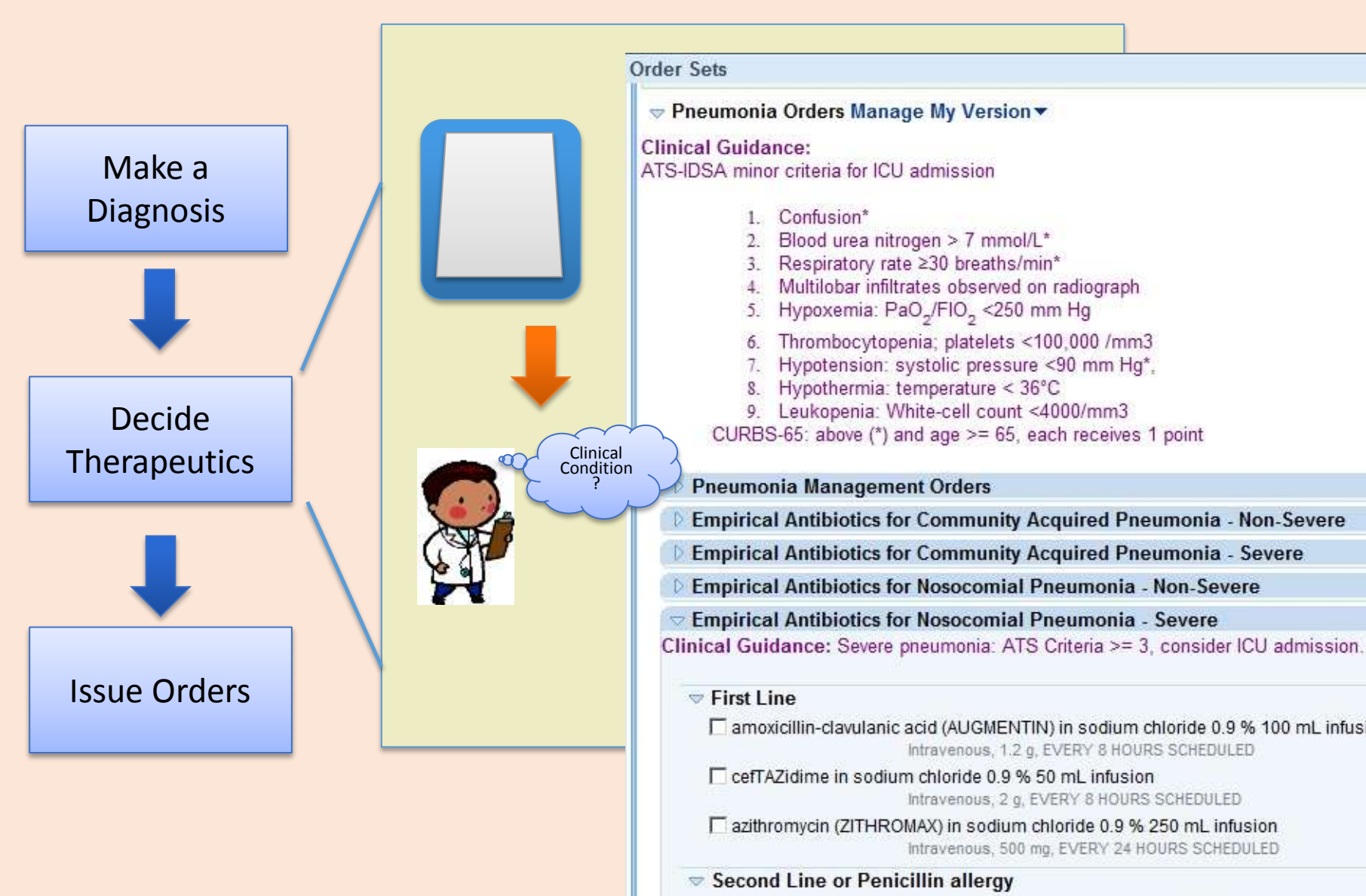
The EMR Antimicrobial Stewardship Initiative (EASI) is a set of module additions to the JHS EMR system, configured specifically for supporting the ASP in JurongHealth Systems.

CDSS on prescribing antimicrobials: When the prescriber's decision on an antibiotic has been made



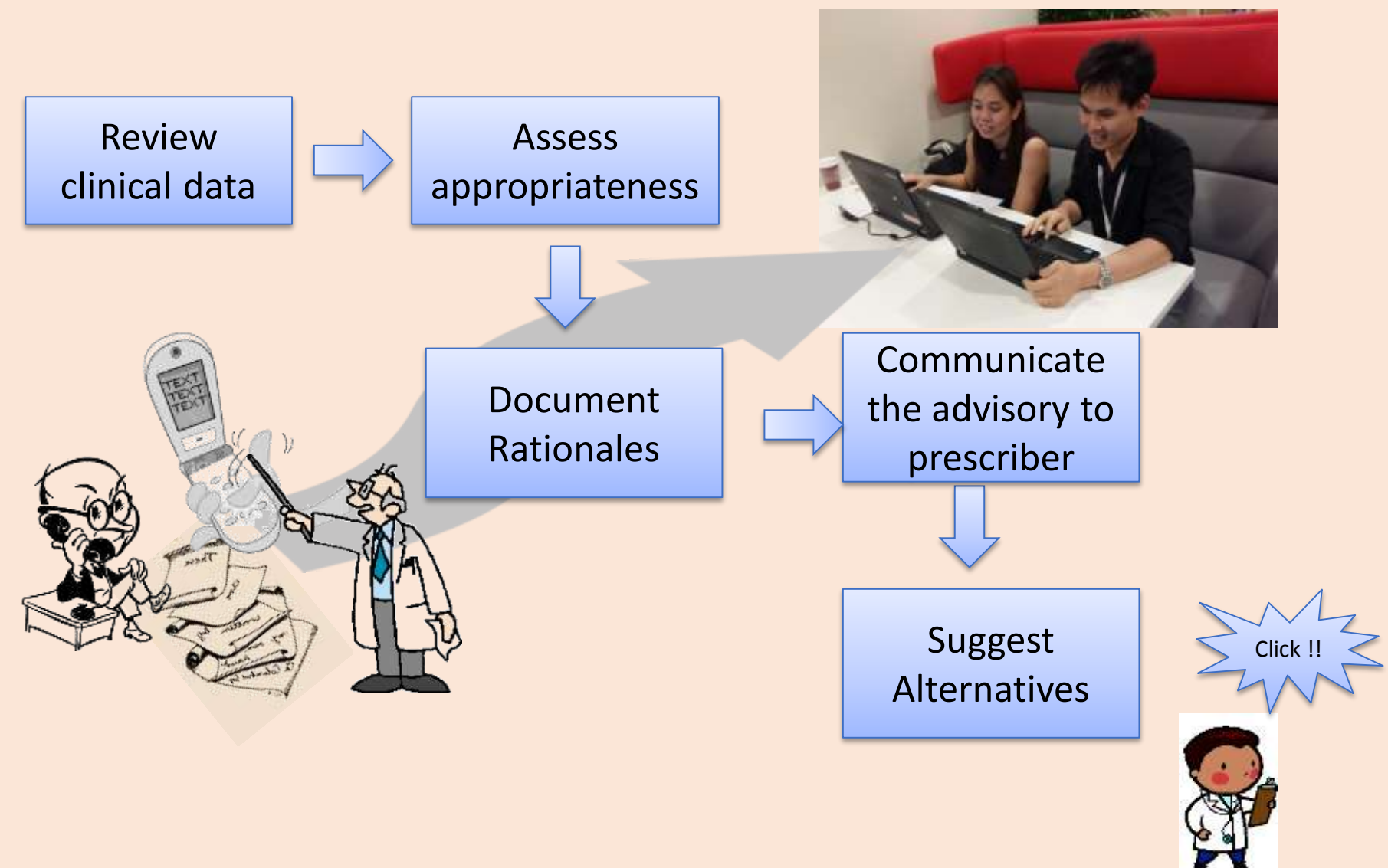
- Best Practice Alert, a pop-up window that display a list of appropriate indications that is in accordance with the hospital guideline
- User chooses an indication.

CDSS on prescribing antimicrobials: When the prescriber is entering order for managing an infection



- A Guideline compliant order set for managing the infection is suggested to the prescriber.
- The prescriber is directed to focus on factors the helps determining antibiotic choices.
- The user chooses diagnostic and therapeutic options from the list.

Audit and Feed back module and the ASP – an ordered task in the form of workflow

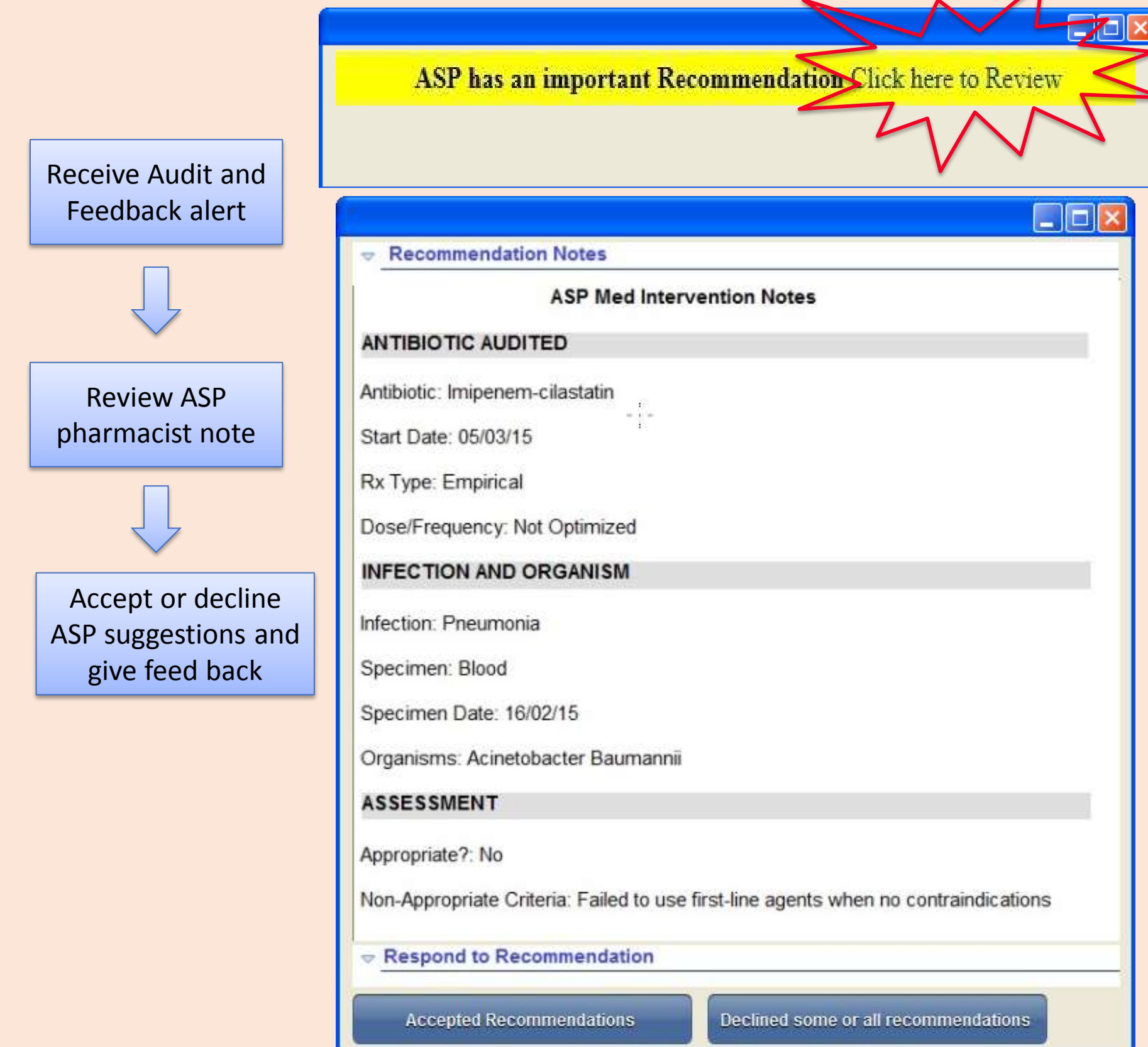


- Focused display of patients' laboratory, radiology and microbiology data related to infection
- Structured documentation of infection and appropriateness of antibiotics use
- Auto populated template for documentation and writing of feedback notes

The screenshot shows the 'Assessment and Recommendation - ASP Assessment and Recommendation' interface. It includes fields for 'Service', 'Antibiotic', 'Start Date', 'Rx Type', 'Orderset', 'Dose/Frequency', 'Appropriate?', 'Non-Appropriate Criteria', 'Intervention', 'Recommendation', 'Feedback to Clinician', and 'Acceptance'. The 'Recommendation' dropdown is set to 'Change Antibiotics', and the 'Acceptance' dropdown is set to 'Accepted with modification'.

The screenshot shows the 'ASP Med Intervention Notes' interface. It includes sections for 'ANTIBIOTIC AUDITED' (Antibiotic: Imipenem-cilastatin), 'INFECTION AND ORGANISM' (Infection: Pneumonia, Organisms: Acinetobacter Baumannii), and 'ASSESSMENT' (Appropriate?: No, Non-Appropriate Criteria: Failed to use first-line agents when no contraindications).

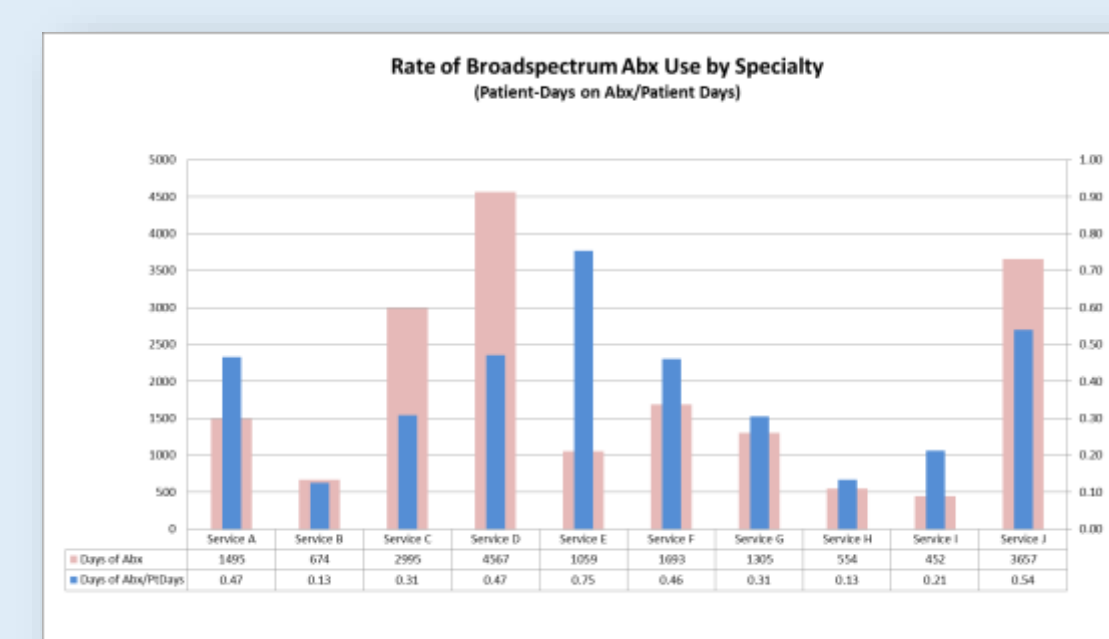
Clinician's Response Module – an workflow for acting on the recommendations



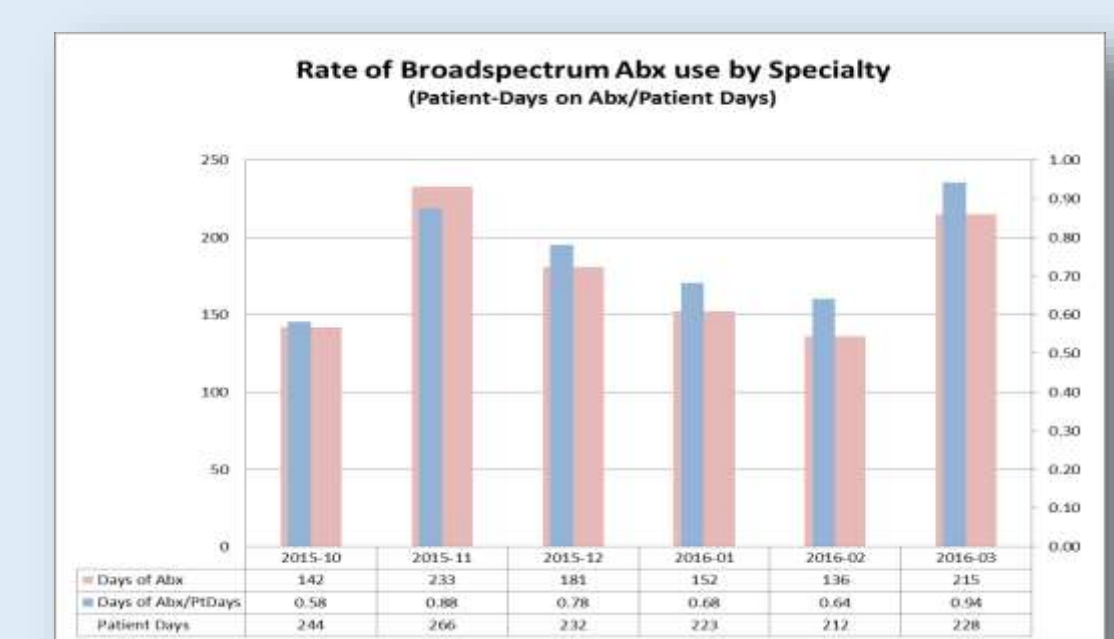
- A feedback banner is displayed at the clinician's screen that links to Clinician's Response Navigator
- The clinician is directed to act on the recommendations
- User can give feedback on the recommendation.

Results

- EASI guides the clinicians on appropriate antibiotic use, facilitates ASP pharmacists' daily work, and enforces accountability by tracking and reporting antibiotic usage data.
- From 7/2015 to 12/2015
 - Number of antibiotics placed via an order set from : 130
 - Number of prescribers who failed to give an indication for their antibiotic order identified : 312 (further actions carried out on the low performers)
 - Number and proportion of antibiotics audited : 782 and 76.2%
 - Number of interventions by ASP pharmacists and acceptance rate: 112 and 58.9%
- Identification of the services with the most broad-spectrum antibiotic use and the services with most of their patient on a broad-spectrum antibiotics; for services identified, monthly trend reports



This diagram illustrates Service D uses most Broad-spectrum Antibiotics and Service E has the highest rate of use.



This diagram illustrates Service E had a drastic increase of their antibiotic use on patients.

Discussion

- Providing CDSS and antibiotic guidance promotes guideline-compliant management of clinical conditions. The guidance embedded in the order sets also dissuades indiscriminate and inappropriate orders thus reducing both healthcare costs and the likelihood of adverse events. The clinicians are further empowered, and their autonomy preserved, as the order set is organized in a way that streamlines the clinician's decision-making process.
- The ASP navigator improves the quality and efficiency of case review. The communication mechanism eliminates manual processes, such as making phone calls to identify the prescriber, deliver an intervention, or enquire about an action.
- Antibiotics use accountability advocacy becomes possible as all actions are tracked. The hospital can use the data to institute educational activities, or other effective measures which target particular services and individuals.

Reference

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Acknowledgement

- EASI development was funded by MOH-IT Solutions for Antimicrobial Stewardship Program
- Project was proposed by JHS ASP and JHS IT, and developed by JHS IT
- Order sets were designed and configured in consultation with the physicians in infectious diseases, respiratory medicine and microbiology.