Project Title

Event-Driven Process Increased Productivity of Pharmacists Performing Antimicrobial Audit

Project Lead and Members

Project lead: Mr. Choo Sing Meng, Senior Clinical Pharmacist, Pharmacy Department

Project members: Dr. Lin Li, Senior Consultant, Medicine Department

Organisation(s) Involved

Ng Teng Fong General Hospital

Project Period

Start date: Nov 2017

Completed date: May 2018

Aims

To promote appropriate antimicrobials use, ultimately improving patient safety and reducing healthcare costs

Background

See attachment

Methods

See attachment

Results

See attachment

Lessons Learnt

- The event-driven module has efficiently identified higher proportion of cases with inappropriate antibiotic use. The module also allowed AS pharmacists to review all

antibiotics classes. Given the similar amount of manpower between both periods, a higher number of recommendations was made after implementation of the module thereby signifying increased productivity of AS pharmacists.

- If we were to start this project over again, we would revise the existing clinical rules to account for therapeutic drug monitoring on Vancomycin and Aminoglycosides, drugs that have usually been associated with toxicity.

Conclusion

See attachment

Additional Information

Our main message for others is to be courageous in pioneering new and innovative ways to deliver better care to patients. Leveraging technology for work productivity and patient safety can be rewarding.

 The impact of this innovation on

1.   Patient care

   a) More inappropriate drug use was identified than prior. Prescribing error was corrected to ensure patient received safe and effective medications.

   b) Staff are more confident in handling higher number of interventions and wider scope of drug audits, with limited manpower.

   c) Pharmacist could provide real-time intervention when there are new updates in laboratory results and drug order.

2.   Healthcare system

   a) Time could be efficiently spent in administrative work while the automated module facilitates pharmacist in providing real-time intervention.

   b) Module may reduce patients waiting time when collecting their medications at discharge pharmacy. Alert would be triggered when patient is ready for discharge and pharmacist could start preparing their medications.

Project Category

Automation, IT & Robotics, Care Redesign

Keywords

Automation, IT & Robotics, Care Redesign, Productivity, Safe Care, Antimicrobial Stewardship, Medication Prescription, Pharmacy, Electronic Medical Record, Inpatients, Improvement Tool, Fishbone Diagram, Ng Teng Fong General Hospital, Antimicrobial Use, Prospective Audit and Feedback, Antibiotic-Driven Process, Event-Driven Module, Piperacillin-Tazobactam, Carbapenems

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EVENT-DRIVEN PROCESS INCREASED PRODUCTIVITY OF PHARMACISTS PERFORMING ANTIMICROBIAL AUDIT
MEMBERS: CHOO SING MENG, LIN LI

Define Problem, Set Aim

The Antibiotic Stewardship (AS) team adopted Prospective Audit and Feedback (PAF) as a strategy to steward piperacillin–tazobactam and carbapenems use in our institution. During this Antibiotic-Driven Process (ADP), pharmacists had to manually search and select in order to audit patients who are on both types of antibiotics. Due to limitations of this manual approach, few opportunities are identified for interventions. Our data between March to September 2016 shows 955 cases were audited but only 247 (25.9%) cases required AS team's recommendation. The assessment of the appropriateness of other antimicrobials agents, was almost impossible with existing manpower. Therefore, the impact on improving overall appropriate antimicrobial use, including non-audited antimicrobial agents, can still be improved.

The team redesigned the AS module to an event-driven module to improve our efficiency and productivity. This module also expanded our audit to include all classes of anti-infective agents. We aimed to increase the percentage of cases requiring recommendation to 50% and the acceptance rate of recommendations to 70% from 26% and 64% respectively. We also aimed to evaluate the types of interventions and their acceptance rates to guide future AS practices.

Establish Measures

Baseline data collected from March 2016 – September 2016
Outcome Measures (Baseline)
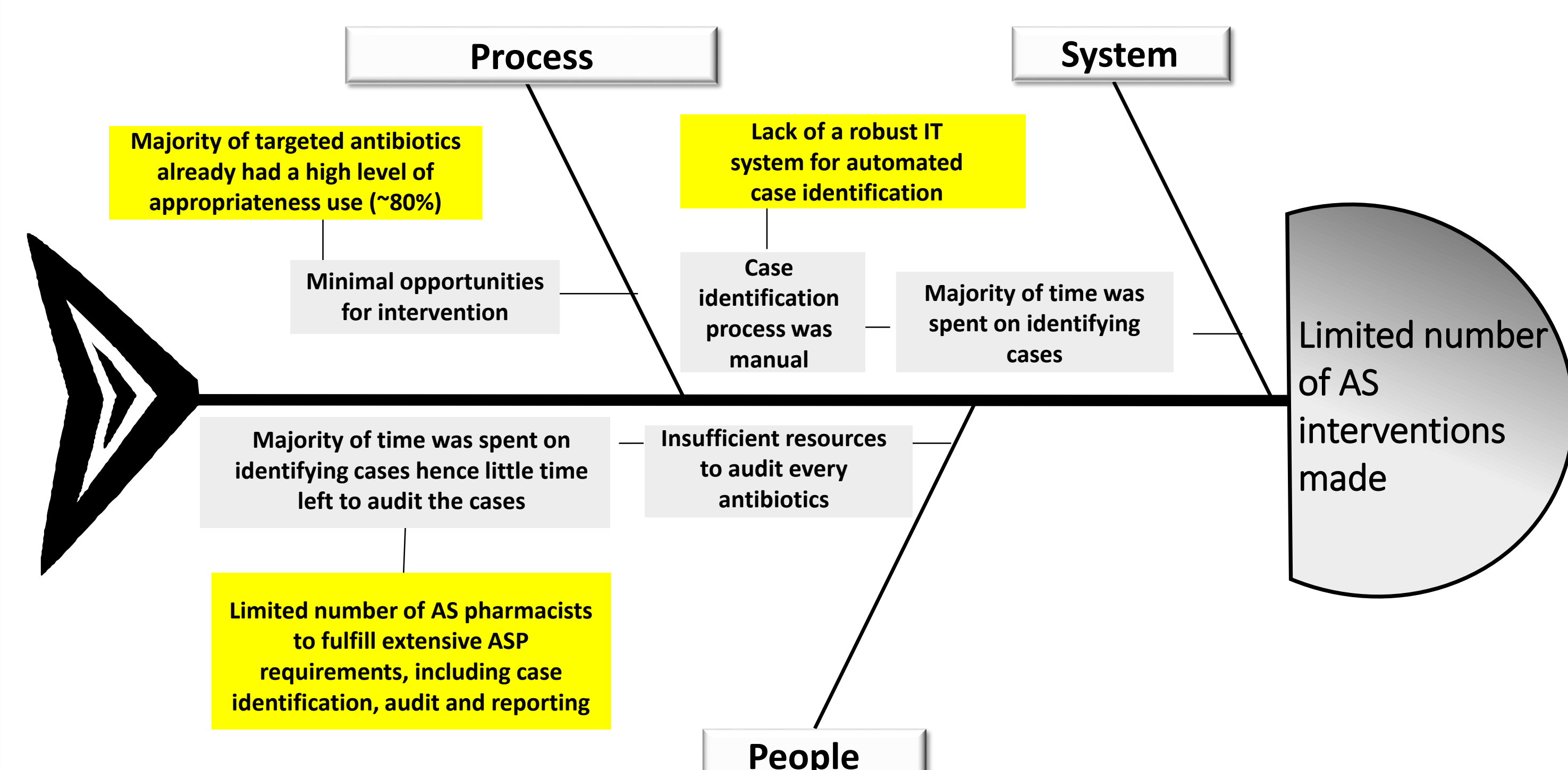**Percentage of cases with AS recommendations and acceptance rates of AS recommendations**
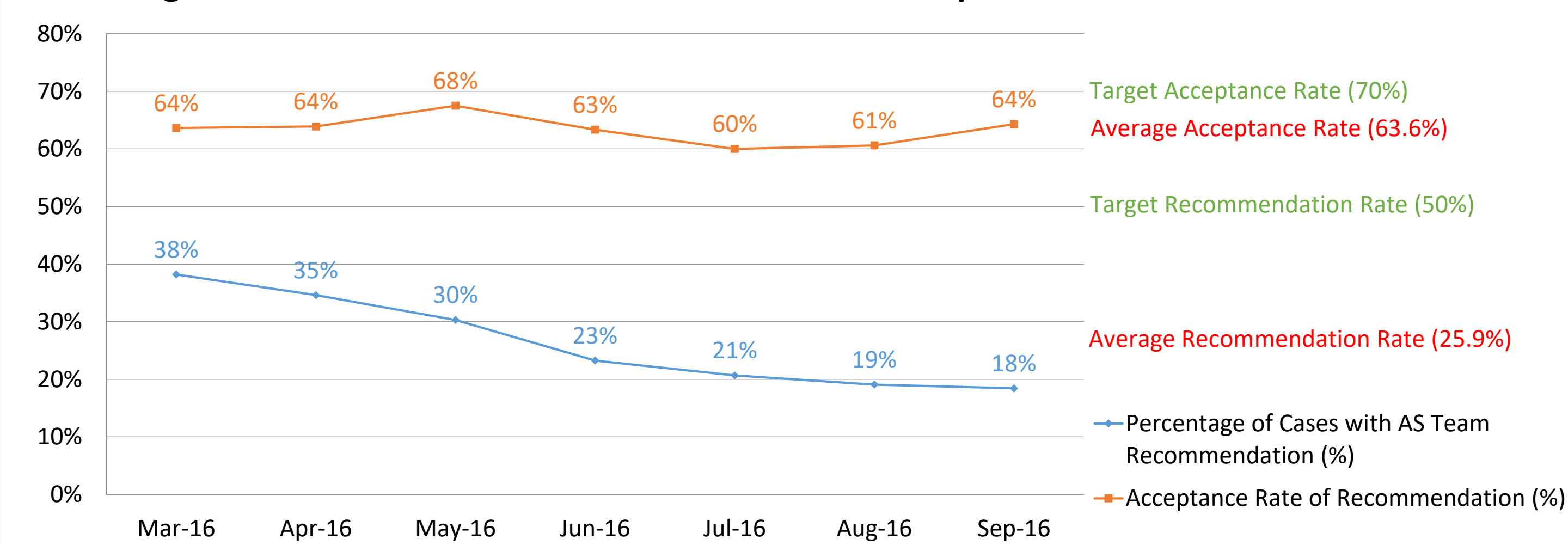
Inappropriateness	Recommendation	n*
Absence of Indication	Discontinue the antibiotic	79
Redundant Coverage	Discontinue other antibiotic(s)	4
Inappropriate Choice	Broadening of empirical coverage	0
	Narrowing of empirical coverage	28
	Escalation based on culture and susceptibility result	5
	De-escalation based on culture and susceptibility result	50
Inappropriate Route	IV to PO switch	4
Inappropriate Dose	Dose/frequency adjustment	11
Inappropriate Duration	Duration suggestion	49
Unable to Determine	Further investigations	9
	ID referral	8
	Total intervention	247

*n = number of recommendations made from each category

Analyse Problem

Figure 1. Fishbone Diagram

Select Changes

Issues Identified	Potential Solutions
Majority of carbapenem and piperacillin-tazobactam use is appropriate	Expand the audit to include other classes of antibiotics
Limited number of AS pharmacists	Utilise EPIC to automatically select for cases with potentially inappropriate use for AS pharmacists' review
Lack of a robust cllinical decision support system (CDSS) initially.	Install clinical rules and exisiting institution's policies (e.g. Broad Spectrum Antibiotics policy) into EPIC to enhance the CDSS to identify inappropriate antibiotic use based on events that flout the rules or policies instead of antibiotic targeted audit.

Test & Implement Changes

The Event-Driven module was implemented in January 2017. Data from March 2017 to Sep 2017 (post-implementation) was collected and compared with baseline data.

Outcome Measures (Baseline versus Post-implementation)
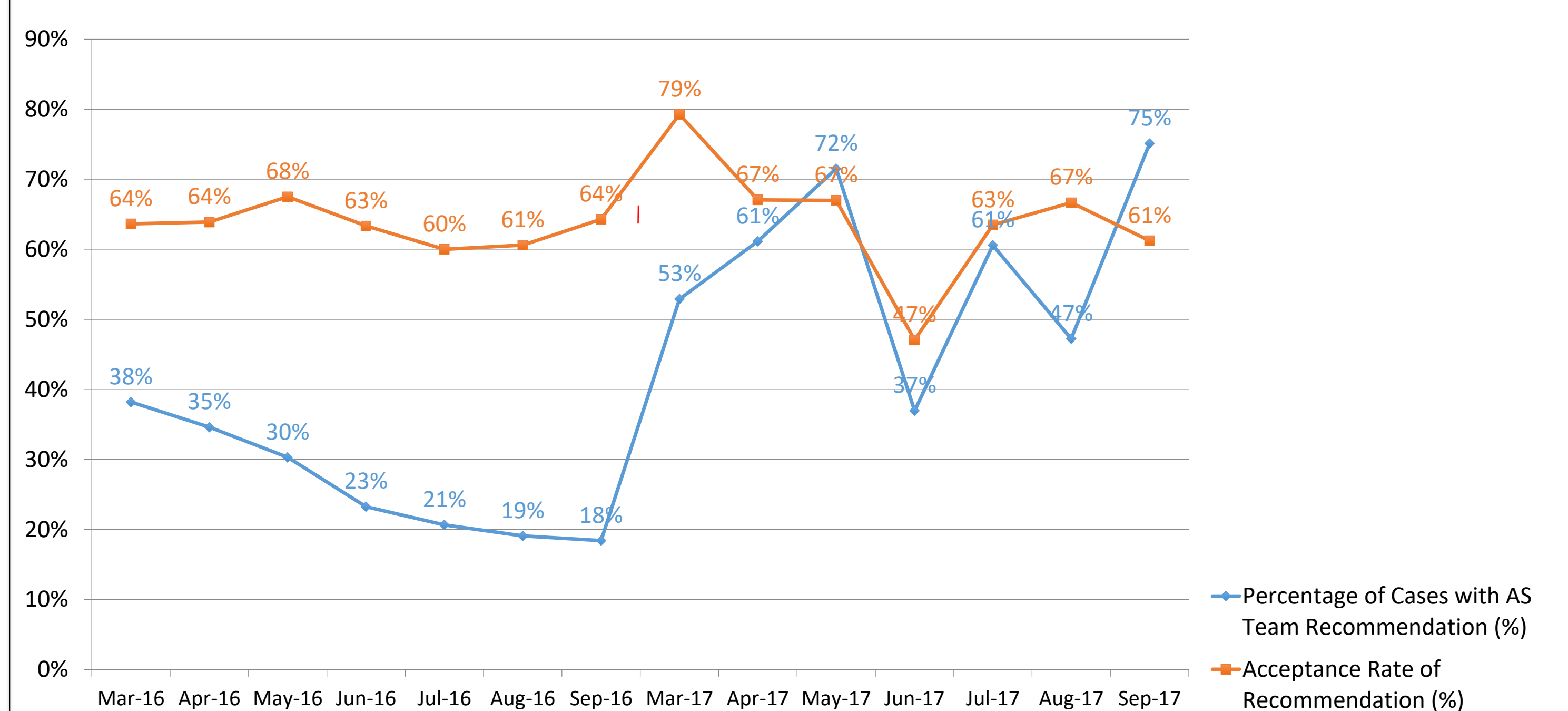**Percentage of cases with AS recommendations and acceptance rates of AS recommendations**

Table 2. Comparison of recommendation types pre- and post- implementation

Inappropriateness	Recommendation	Pre	Post	P-value	Odds Ratio
Absence of Indication	Discontinue the antibiotic	79	147	< 0.001	1.915
Redundant Coverage	Discontinue other antibiotic(s)	4	14	0.023	3.383
Inappropriate Choice	Broadening of empirical coverage	0	0	-	-
	Narrowing of empirical coverage	28	2	< 0.001	0.066
	Escalation based on culture and susceptibility result	5	71	<0.001	14.55
	De-escalation based on culture and susceptibility result	50	228	< 0.001	5.359
Inappropriate Route	IV to PO switch	4	67	<0.001	17.11
Inappropriate Dose	Dose/frequency adjustment	11	18	0.234	1.576
Inappropriate Duration	Duration suggestion	49	38	0.156	0.732
Unable to Determine	Further investigations	9	14	0.346	1.495
	ID referral	8	6	0.536	0.716

Spread Changes, Learning Points

The event-driven module has efficiently identified higher proportion of cases with inappropriate antibiotic use. The module also allowed AS pharmacists to review all antibiotics classes.

Given the similar amount of manpower between both periods, a higher number of recommendations was made after implementation of the module thereby increasing the productivity of AS pharmacists.