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Delivery of value-based care by the Antimicrobial Stewardship Programme in an acute, tertiary hospital

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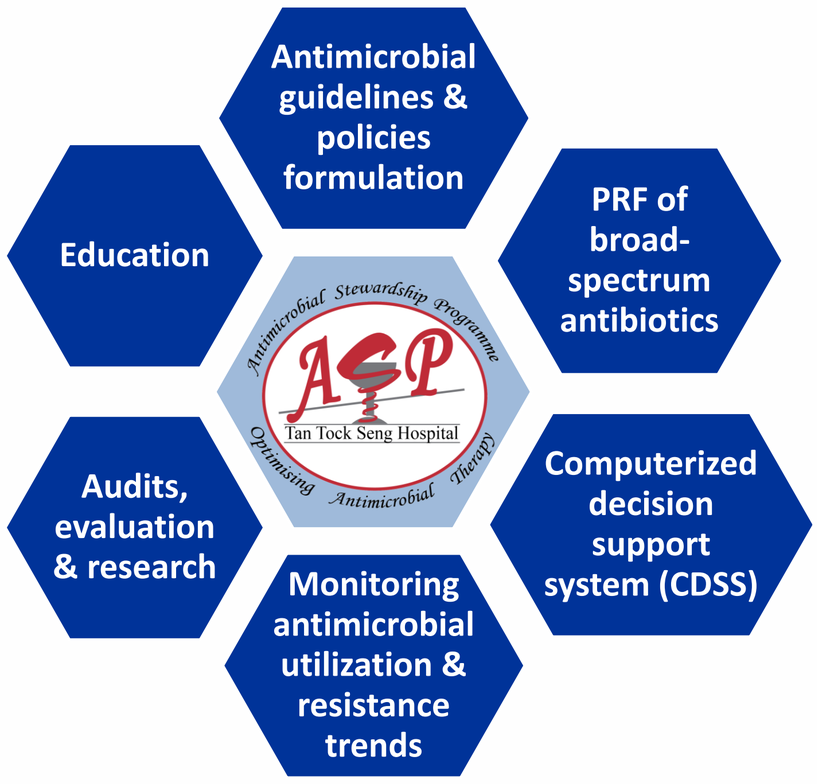
Background and Aim

- The aims of the Antimicrobial Stewardship Programme (ASP) are to reduce the misuse and overuse of antimicrobials and to optimize antimicrobial therapies for patients
- Benefits of ASP reported in studies include reduction in antimicrobial utilization, improvement in antimicrobial resistance, reduction in adverse events e.g. *Clostridioides difficile* infection and reduction in length of stay (LOS)[1-3]
- ASP in Tan Tock Seng Hospital (TTSH) started since 2009 and is mandated by Ministry of Health (MOH) since 2011
- We aim to evaluate value-based outcomes of ASP in TTSH

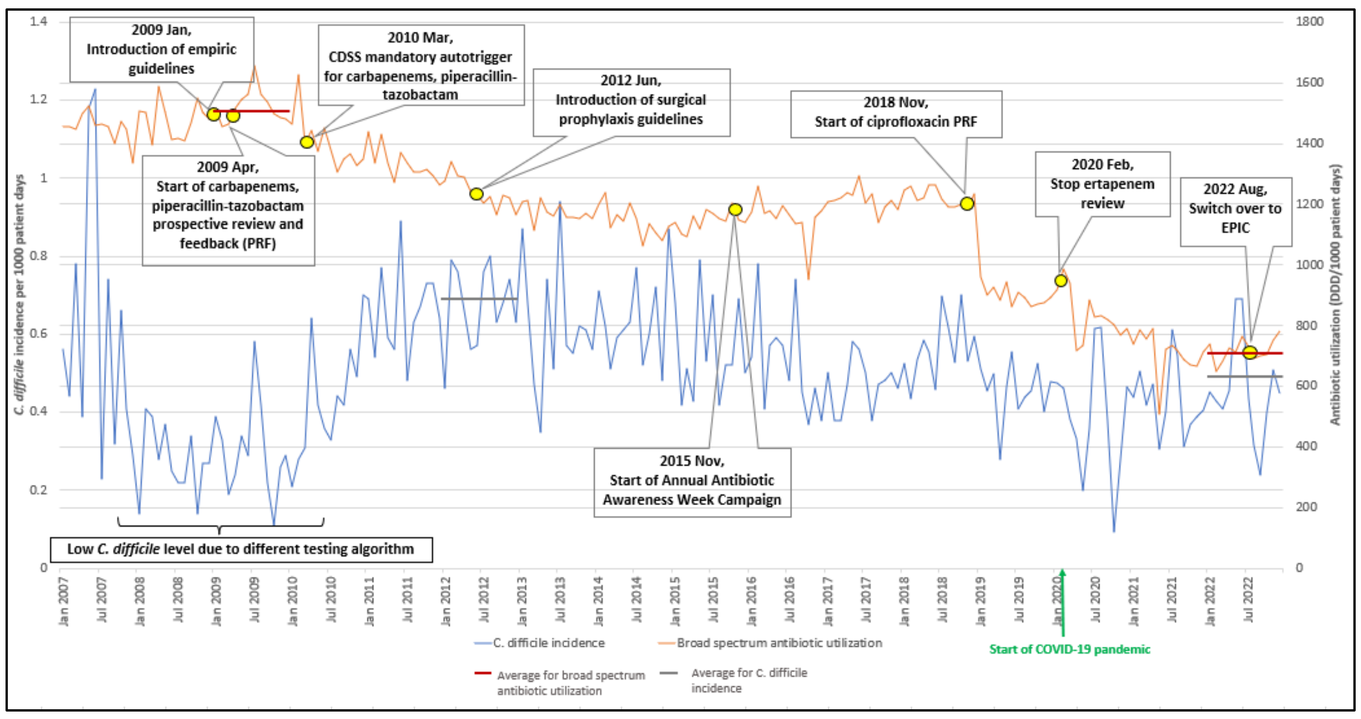
Methods

- TTSH ASP team consists of:
  - 5 full-time equivalent (FTE) trained pharmacists
  - 0.5 FTE of Infectious Diseases consultants for ASP rounds
  - 0.5 FTE of executive for data generation and administration work
- Main ASP strategy used is prospective review and feedback (PRF) for broad spectrum antibiotics, i.e. piperacillin-tazobactam, carbapenems and ciprofloxacin, which is the most resource intensive
- Fig. 1 TTSH ASP main activities and interventions in 2009 to 2022



Results

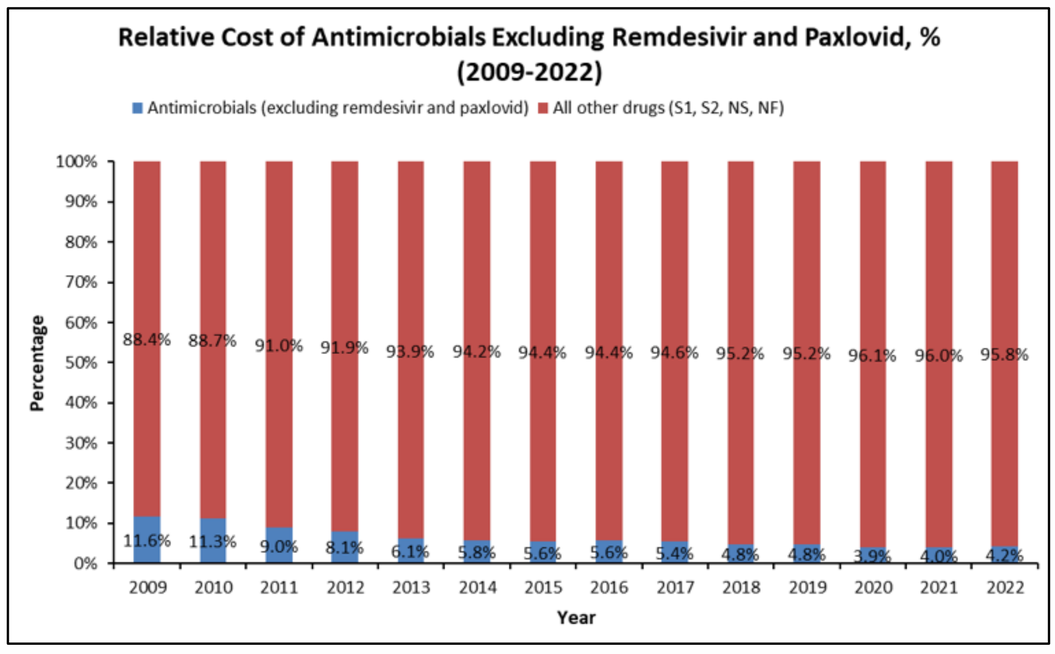
- Overall broad-spectrum antibiotic utilization dropped by 53% from 1523 to 720 defined daily doses (DDD)/1000 patient days from 2009 to 2022
- *C. difficile* incidence also dropped from 0.67 to 0.46/1000 patient days from 2012 to 2022



Results

- Relative cost of antimicrobials compared to overall drug expenditure reduced from 11.6% in 2009 to 4.2% in 2022 (Fig. 2)

Fig. 2 Relative cost of antimicrobials to overall drug expenditure 2009 - 2022



- Based on analysis of PRF data from April and May 2022:
  - ASP recommendations were adopted by primary teams for 225 patients and rejected for 77 patients

Table 1. Clinical outcomes of ASP recommendations on piperacillin-tazobactam and carbapenem therapy in April and May 2022

Overall (n=302)	Adopted group (n=225)	Rejected group (n=77)
30-day mortality	22 (9.8%)	8 (10.4%)
30-day multi-drug resistant organism (MDRO) acquisition	11 (4.9%)	6 (7.8%)
LOS (median, interquartile range), days	12 (5-30)	19 (8-39)

  - 30-day mortality remained similar in both groups
  - 30-day MDRO acquisition was 2.9% lower in patients with adopted ASP recommendations
    - ➢ About 30% of the patients colonized with MDRO developed infections caused by MDROs[4]
    - ➢ A local study reported that excess hospitalization costs attributed to MDRO infection was $8638.58[5]
    - ➢ Estimated median cost avoidance from reduction in MDRO acquisition = (2.9/100 x 302 patients x 0.3 x $8638.58) x 6 ≈ $136,182/year
  - Median LOS was 7 days shorter in patients with adopted ASP recommendations
    - ➢ Estimated median cost savings from reduction in LOS = ($1114/day[6] x 7 days x 225 patients) x 6 ≈ $10,527,300/year
- Estimated benefit-cost ratio = $\frac{\text{cost savings + cost avoidance}}{\text{manpower cost}}$

$$= \frac{\$10{,}663{,}482}{\$1{,}120{,}503} \approx 9.5$$

Conclusion

TTSH ASP has achieved more than a decade of sustained value-based care at both system and patient-care level.

References

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