Antimicrobial Stewardship in Spinal Cord Injuries: A Multidisciplinary Approach

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Background

- In a global environment of escalating antimicrobial resistance (AMR) and limited new antibiotic development, there is a desire to optimise antimicrobial use across all settings to preserve options for the future (1).
- Despite this, antimicrobials continue to be prescribed unnecessarily and inappropriately in many settings (1).
- Patients with a spinal cord injury (SCI) are particularly vulnerable to receiving multiple courses of antibiotics (2,3).
- Prescription factors include (2,3):
  - Frequent contact with the healthcare system.
  - High rates of bacterial infection with multi-drug resistant organisms.
  - Increased frequency of invasive medical devices such as urinary and intravascular catheters.
- There is limited published data on antimicrobial stewardship programs in this patient population.

Aim

To review the effectiveness of a face to face multidisciplinary team (MDT) inter-speciality ward round approach to Antimicrobial Stewardship (AMS) in the SCI unit and assess changes in antimicrobial appropriateness, guideline compliance and antimicrobial consumption.

Intervention

- We implemented a weekly systematic bedside AMS MDT ward round within the SCI unit at our hospital, where a collaborative inter-speciality and inter-professional approach was undertaken to address antimicrobial prescriptions.
- A retrospective audit of patients receiving antibiotics before (April 2018) and during the intervention (August 2018) was performed in 2019.
- We utilised the National Antimicrobial Prescribing Survey (NAPS) auditing tool to review the appropriateness of antimicrobial prescriptions and level of compliance with evidence-based guidelines. Days on treatment per 100 patient days were also compared.

Phase 1 (Pharmacist Triage)

Clinical pharmacist antibiotic review:
- Indication.
- Drug selection (dosage, form and, frequency.
- Duration.
- Relevant microbiology results.

Phase 2 (Pre Ward Round)

All antibiotic prescriptions identified by the Clinical pharmacist were discussed with the ID consultant. Inappropriate prescriptions were flagged, for discussion on the ward round.

Phase 3 (AMS MDT ward round)

Ward round on the SCI unit (ID consultant, Clinical Pharmacist & Spinal medical team)
1. Opportunities were given for general/patient specific questions.
2. Education (e.g. guidelines).
3. Feedback was provided for specific prescriptions flagged.

Results

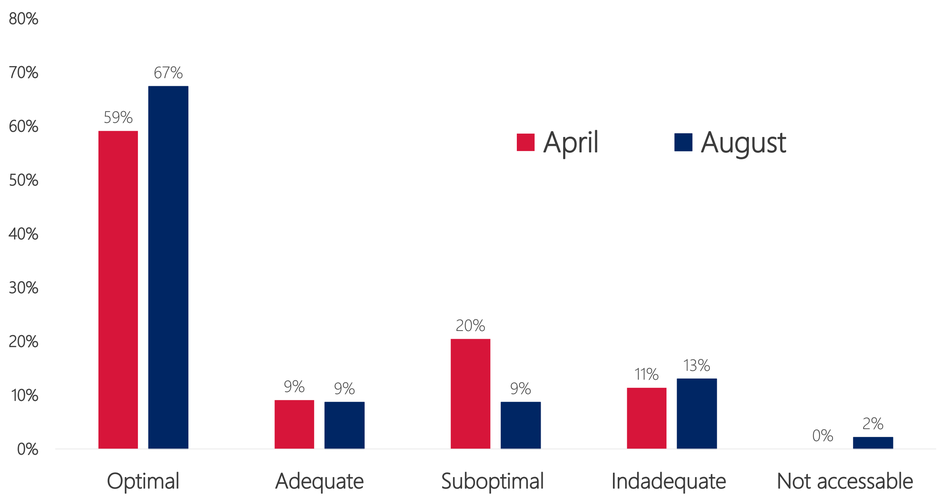

Figure 1. NAPS appropriateness April VS August 2018

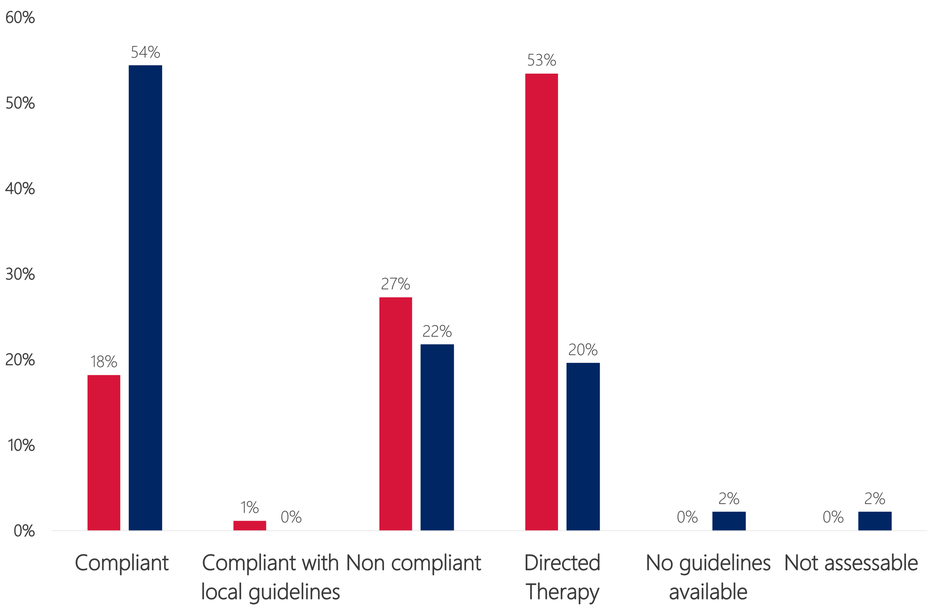

Figure 2. Guideline Compliance April VS August 2018

Table 1. Antibiotic prescriptions (grouped) pre and post intervention 2018

Antibiotic Group	APRIL (Pre)	AUGUST (Post)
Narrow Spectrum Penicillin	4.5%	17.4%
Penicillin/Beta-lactam inhibitor	19.3%	15.2%
1st Gen Cephalosporin	9.1%	8.7%
3rd & 4th Gen Cephalosporin	14.8%	15.2%
Fluoroquinolone & Carbapenem	14.8%	2.2%
Aminoglycoside	5.7%	17.4%
Glycopeptide & Lincosamides	17.0%	8.7%
Other (e.g. Metronidazole, Doxycycline)	14.8%	15.2%
Total	N = 88	N = 46

Table 2. Documented indications for antibiotics pre and post intervention 2018

Indication for Antibiotic	APRIL (Pre)	AUGUST (Post)
Respiratory	12.5%	17.8%
Skin	27.3%	24.4%
Genitourinary	36.4%	33.3%
Epidural	10.2%	0.0%
Gastrointestinal	2.3%	6.7%
Osteomyelitis	5.7%	0.0%
Surgical Prophylaxis	4.5%	0.0%
Other	1.1%	8.9%
Bacteraemia	0.0%	8.9%
Total	N=88	N = 45

Our Findings

- Antibiotic consumption significantly decreased following the AMS intervention, from 69.8 to 24.3 days on treatment per 100 patient days ($p<0.001$).
- A statistically significant decline (p-value 0.034) in the prescribing of broad spectrum antibiotics (carbapenems & fluoroquinolones) was demonstrated (Table 1).
- There was no significant differences in NAPS scores between the groups (optimal = p-value 0.347; suboptimal = p-value 0.081) (Figure 1).
- There was no significant differences between the groups in terms of SIRS criteria (p value 0.058) and Charlson comorbidity index (p-value 0.050).

Limitations

- Our study was a retrospective audit, which may limit the strength of our conclusions in comparison to randomised prospective studies.
- The sample size whilst limited by small numbers in each group was still successful in demonstrating significant reduction in antibiotic use.
- However, we compared the groups based on Age, SIRS criteria and Charlson comorbidity index to match the groups (4).

Implications

- For future research, larger sample sizes and a multicentre approach may increase generalizability of our findings.
- AMS programs targeted to the SCI facilities are required due to self-reported lack of awareness from healthcare providers caring for SCI patients regarding strategies of AMS programs (5).

Conclusion

- Utilising a collaborative inter-speciality and inter-professional AMS approach and providing face to face feedback about the appropriateness of antibiotic prescribing can help optimise antimicrobial usage within a SCI unit, improve adherence to published guidelines and reduce antimicrobial consumption.
- This method can alleviate increasing AMR rates in this patient population, reduce treatment failure and unnecessary adverse events due to inappropriate antibiotic prescribing.
- Our study demonstrated how a simple, time effective, multidisciplinary approach can lead to decreased antibiotic use in patients with SCI.

References

1. ACSQHC; Antimicrobial Stewardship in Australian Health Care. 2018;12
2. Patros C, Sabol M, Paniagua A, Lans D. Implementation and evaluation of an algorithm-based order set for the outpatient treatment of urinary tract infections in the spinal cord injury population in a VA Medical Center. J Spinal Cord Med. 2017 Jun 2;41:1–7.
3. Garcia-Arguello LY, O'Horo JC, Farrell A, Blakney R, Sohail MR, Evans CT, et al. Infections in the spinal cord-injured population: a systematic review. Spinal Cord. 2016;55:526.
4. Stavem K, Hoel H, Skjaker SA, Haagensen R. Charlson comorbidity index derived from chart review or administrative data: agreement and prediction of mortality in intensive care patients. Clin Epidemiol [Internet]. 2017 Jun 2;9:311–20.
5. Evans CT, Rogers TJ, Burns SP, Lopansri B, Weaver FM. Knowledge and use of antimicrobial stewardship resources by spinal cord injury providers. PM R. 2011 Jul;3(7):619–23.

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