Roles of registered nurses in antimicrobial stewardship

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“In such cases, the thoughtless person playing with penicillin is morally responsible for the death of the man who finally succumbs to infection with the penicillin-resistant organism.”

Sir Alexander Fleming (26 June 1945)
Acknowledgment

“No one can whistle a symphony. It takes a whole orchestra to play it.”

_Halford Luccock_

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New Zealand Nurses Organisation
All participants (Registered nurses in the greater Auckland region)
What is antimicrobial stewardship?

Antimicrobial stewardship is a coordinated program that promotes
1. appropriate use of antimicrobials (including antibiotics),
2. improves patient outcomes,
3. reduces microbial resistance, and
4. decreases the spread of infections caused by multidrug-resistant organisms.

Association for Professionals in Infection Control and Epidemiology, 2016
World Health Organization recommendation

a. WHO global AMR surveillance report (2014) highlighted that **AMR is a serious global threat** to public health.

b. WHO calls for a **multidisciplinary approach** of AMS programme in all health care institutions across the globe to facilitate appropriate antibiotic use (WHO, 2015).
Rationale of antibiotic use

- Treating infections

Centres for Disease Control and Prevention (2011) stated that “Half of US hospital patients were taking antibiotics; 25 percent on two or more”.

- In the agriculture, antibiotics are used to promote growth of livestock.
What has gone wrong?

In New Zealand, evidence suggested irrational antibiotic use nationally and a rising rate of AMR particularly in Auckland.

NZ has smaller incidence rates of AMR compared to other countries; however, there is a rising rate (Thompson, 2013; Thomas et al., 2014; MOH, 2016).

Pharmacy sales in 71 countries revealed very high antibiotic use in New Zealand, as evidenced by an increase in use per person from 26 units in 2000 to 70 units in 2010 (Van Boeckel et al., 2014).
What has gone wrong?

Rural Context

In Tairāwhiti, 51% of the population were prescribed one or more antibiotics in the year during which the study was undertaken, suggesting high antibiotic use (Norris et al., 2011).

As implied by Norris et al. (2011), underprescription of antibiotics in high-risk Māori and Pacific Island populations and overprescription of antibiotics in the general population highlights a disparity in prescribing whereby antibiotics are being injudiciously prescribed for a low-risk population.
Mechanisms of antimicrobial resistance

1. Active efflux
2. Target replication
3. Drug target modification
4. Decreased cell wall permeability
5. Enzyme acquisition and production
Risks with antibiotic use

a. Antibiotic resistance
b. Adverse drug events and allergies
c. Drug side effects
d. *Clostridium difficile* infection
e. Antibiotic associated diarrhoea/colitis
f. Increased morbidity and mortality
g. Increased health-care expenditure
h. Alteration of the human microbiota
The human microbiota

a. The human microbiota refers to the vast collection of microorganisms that naturally colonise the human body, including the skin, nose, and gastrointestinal and genitourinary tracts (Madigan et al., 2015).

b. There are an estimated $10^{14}$ (100 trillion) microorganisms in the human microbiome, which is approximately 10 times more than the total number of cells in the human body (Madigan et al., 2015).
1. Risk reduction e.g., by checking allergy status and reducing IV line days (Gillespie et al., 2013; Fehily et al., 2015)
What registered nurses can do?

2. Initiation or escalating a conversation about the need for early and appropriate blood cultures for patients suspected to have sepsis.
3. Ensuring that antimicrobial treatment is in line with microbiology results and reviewing the need for antibiotics (Edwards et al., 2011)
What registered nurses can do?

4. Checking that an antibiotic prescription is in agreement with antibiotic guidelines or protocols (Edwards et al., 2011)
5. Monitoring ADRs to antibiotics or development of antibiotic resistance (Olans et al., 2016)
What registered nurses can do?

6. Checking that antimicrobial therapy is prescribed and in line with its standard recommended duration.
What registered nurses can do?

7. Initiating discussion of switching IV to oral antimicrobial therapy (Edwards et al., 2011)
What registered nurses can do?

8. Checking that surgical antibiotic prophylaxis is prescribed for the appropriate duration as recommended (Edwards et al., 2011)
9. Ensuring that antibiotics are initiated and administered at the correct time as prescribed and recommended.
What registered nurses can do?

10. Decision-making on patient suitability for outpatient IV antibiotic services (Edwards et al., 2011)
What registered nurses can do?

11. Education and advocacy for implementation of antimicrobial stewardship practices in the workplace
What registered nurses can do?

12. Patient and family education, e.g., safe antibiotic use and immunisation against avoidable infectious illnesses
A multidisciplinary approach, involving all HCPs is needed to combat AMR (Charani *et al.*, 2014). The roles of doctors and pharmacists are very well contextualised in AMS.

**a.** The role of registered nurses (RNs) in this regard, other than as infection control practitioners is not well-understood.

**b.** Little is known about the knowledge of practising RNs concerning use of antibiotics, AMR and especially in the New Zealand context.
RESEARCH FINDINGS
Aim

This study assessed knowledge of nurses concerning antibiotics, AMR and AMS; and to assess their perceptions on the potential roles as antimicrobial stewards.
Methods

An online survey was used (Qualtrics survey software) (purely quantitative).

Ethical approval procured from The University of Auckland, ADHB and CMH Research Offices.

369 attempts; \((N=298)\) participants completed the survey.

Descriptive and inferential statistics were used.
Knowledge on antibiotics, AMR and AMS

Antibiotics (Median=3; IQR=1)
- Excellent: 10
- Above Average: 11
- Average: 101
- Below Average: 19
- Very Poor: 3

Antimicrobial Resistance (Median=3; IQR=1)
- Excellent: 6
- Above Average: 34
- Average: 75
- Below Average: 40
- Very Poor: 8

Antimicrobial Stewardship (Median=3; IQR=1)
- Excellent: 11
- Above Average: 55
- Average: 91
- Below Average: 34
- Very Poor: 112

Total Number of Participants = 298
Have you heard of AMS being implemented in your place of work?

Total Number of Participants = 298

<table>
<thead>
<tr>
<th></th>
<th>Percentage</th>
<th>Responses</th>
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<tbody>
<tr>
<td>Yes</td>
<td>16%</td>
<td>47</td>
</tr>
<tr>
<td>No</td>
<td>84%</td>
<td>251</td>
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Percentage and Responses in the graph.
Causes of AMR

- Unnecessary use of antibiotics (Median=5; IQR=1)
- Prescription of unnecessary broad-spectrum antibiotics (Median=4; IQR=2)
- Prescription of the wrong doses of antibiotics (Median=4; IQR=2)
- Prolonged/frequent hospital care (Median=4; IQR=2)
- Excessive use of antibiotics in livestock industry (Median=4; IQR=2)
- Poor infection control practices e.g. hand hygiene (Median=4; IQR=2)
- Prescription of unnecessary broad-spectrum antibiotics (Median=4; IQR=2)
- Prolonged/frequent hospital care (Median=4; IQR=2)
- Excessive use of antibiotics in livestock industry (Median=4; IQR=2)
- Poor infection control practices e.g. hand hygiene (Median=4; IQR=2)
- Poor patient adherence to treatment regimen (Median=4; IQR=1)
- Failure to complete course of treatment of prescribed antibiotics (Median=5; IQR=1)

Total Number of Participants = 298

- Extremely Significant
- Very Significant
- Moderately Significant
- Slightly Significant
- Not Significant
Challenges in integrating AMR in clinical practice

- Patient load
- Time constraints
- Workplace culture
- Managerial support
- Support from physicians
- Facilitating staff education
- Background knowledge
- Support from nursing colleagues
- Limited computers to access guidelines
- Leadership in the workplace

Total Number of Participants = 298
Do you want further training and education on the following?

- **Antibiotics**: 277 respondents want further training, 21 do not.
- **Antimicrobial Resistance**: 286 respondents want further training, 12 do not.
- **Antimicrobial Stewardship**: 298 respondents want further training, 0 do not.

Total Number of Respondents = 298
Where should further training and education on AMS be facilitated?

- **Undergraduate Nursing School (Median=4; IQR=1)**
  - Strongly Agree: 132
  - Agree: 130
  - Undecided: 25
  - Disagree: 6
  - Strongly Disagree: 5

- **Postgraduate Nursing School (Median=4; IQR=1)**
  - Strongly Agree: 114
  - Agree: 139
  - Undecided: 34
  - Disagree: 6
  - Strongly Disagree: 5

- **Workplace (Median=4; IQR=1)**
  - Strongly Agree: 85
  - Agree: 0
  - Undecided: 1
  - Disagree: 3
  - Strongly Disagree: 0

Total Number of Participants = 298
Conclusion

Nurses play vital roles in addressing AMR and in contributing to AMS efforts.

Therefore, further training and education to address health literacy needs of RNs and their roles in AMS is paramount.
The WHO recommended a multidisciplinary approach to proper use of antibiotics.

Not including nurses and not responding to the learning needs of nurses for further training and education on Antimicrobial Stewardship DOES NOT SERVE A TRUE MULTIDISCIPLINARY APPROACH.
Where do we go from here?

1. Collaborate with AMS committee, nursing and medical leaders in health care institutions.
2. Invite the Nursing Council of New Zealand, NZNO, College of Nurses Aotearoa to issue a position statement in line with that of the Ministry of Health.
3. Education in all levels: undergraduate, postgraduate and in the workplace.
4. Widespread campaign on safe antibiotic use.
5. Further research on nursing involvement in antimicrobial stewardship programme.
BATTLING ANTIMICROBIAL RESISTANCE IS A HERCULEAN TASK.
References

Association of Professionals for Infection Control and Epidemiology (2016). *Antimicrobial stewardship*. Accessed from [http://www.apic.org/Professional-Practice/Practice-Resources/Antimicrobial-Stewardship](http://www.apic.org/Professional-Practice/Practice-Resources/Antimicrobial-Stewardship)


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