Exploring the Role of Nurses as Antimicrobial Stewards

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What is Antimicrobial Stewardship?

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

Association of Professionals for Infection Control and Epidemiology (2016)
“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)
WHO publishes list of bacteria for which new antibiotics are urgently needed

News release

27 FEBRUARY 2017 | GENEVA - WHO today published its first ever list of antibiotic-resistant "priority pathogens" – a catalogue of 12 families of bacteria that pose the greatest threat to human health.

(WORLD HEALTH ORGANIZATION, 2017)

WHO priority pathogens list for R&D of new antibiotics

Priority 1: CRITICAL
1. *Acinetobacter baumannii*, carbapenem-resistant
2. *Pseudomonas aeruginosa*, carbapenem-resistant
3. *Enterobacteriaceae*, carbapenem-resistant, ESBL-producing

Priority 2: HIGH
1. *Enterococcus faecium*, vancomycin-resistant
2. *Staphylococcus aureus*, methicillin-resistant, vancomycin-intermediate and resistant
3. *Helicobacter pylori*, clarithromycin-resistant
4. *Campylobacter* spp., fluoroquinolone-resistant
5. *Salmonellae*, fluoroquinolone-resistant
6. *Neisseria gonorrhoeae*, cephalosporin-resistant, fluoroquinolone-resistant

Priority 3: MEDIUM
1. *Streptococcus pneumoniae*, penicillin-non-susceptible
2. *Haemophilus influenzae*, ampicillin-resistant
3. *Shigella* spp., fluoroquinolone-resistant
WHO global AMR surveillance report (2014) highlighted that AMR is a serious global threat to public health.

WHO calls for a multidisciplinary approach (WHO, 2015).
Objectives and priority areas for action on AMR in NZ

- Awareness and understanding
- Surveillance and research
- Infection prevention and control
- Antimicrobial stewardship
- Governance, collaboration and investment

Launched 06 August 2017 by Health Minister Dr Jonathan Coleman and Food Safety Minister David Bennett (Ministry of Health, 2017)
By 2050, if the pattern will not change, it is estimated to surpass mortality rate caused by vehicular accidents or cancer.

By 2050, it could cripple the global economy comparable to what happened during the 2008 financial crisis.

Deaths attributable to AMR every year by 2050

New Zealand context

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

- ESBL-producing bacteria was higher in three DHBs in Auckland, with Waitemata DHB being the highest, while the Capital and Coast and Hutt Valley DHBs in the lower North Island had the lowest (Public Health Surveillance, 2014).

- Rates exceeded the national rate of 25.3 people with MRSA per 100 000 population in 6 DHBs: Northland (63.0 per 100 000), Counties Manukau (59.2), Tairawhiti (57.0), Hawke’s Bay (33.6), Bay of Plenty (30.2) and Auckland (27.1) (Public Health Surveillance, 2016).
Pharmacy sales in 71 countries revealed an increase in use per person from 26 units in 2000 to 70 units in 2010 in NZ (Van Boeckel et al., 2014).

Dramatic prevalence of resistance of S. aureus to fusidic acid, from 17% in 1999 to 29% in 2013, which is the highest reported in the world (Williamson et al., 2014).

Of the S. aureus cases sampled in 2014, 8.9% were noted to be ST5 MRSA and 57.6% were found to be FA-resistant (BPACnz, 2015).
Mechanisms of antimicrobial resistance and example/s of susceptible drug/s

1. Active efflux (e.g. for tetracyclines, erythromycin and chloramphenicol)
2. Target replication (e.g. for norfloxacin)
3. Drug target modification (e.g. for aminoglycosides)
4. Decreased cell wall permeability (e.g. for penicillins)
5. Enzyme acquisition and production (e.g. for beta-lactam antibiotics)
Risks with antibiotic use

- Antibiotic resistance
- Adverse drug events, allergies, side effects
- Increased morbidity and mortality
- Increased health-care expenditure
- Alteration of the human microbiota, e.g. Clostridium difficile diarrhoea/colitis, vaginosis
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).

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)

2. Initiation or escalating a conversation about the need for early and appropriate blood cultures for patients suspected to have sepsis.
The role of the nurse

3. Ensuring that antimicrobial treatment is in line with microbiology results and reviewing the need for antibiotics (Edwards et al., 2011)

4. Checking that an antibiotic prescription is in agreement with antibiotic guidelines or protocols (Edwards et al., 2011)
The role of the nurse

5. Monitoring ADRs to antibiotics or development of antibiotic resistance (Olans et al., 2016)

6. Checking that antimicrobial therapy is prescribed and in line with its standard recommended duration
7. Initiating discussion of switching IV to oral antimicrobial therapy (Edwards et al., 2011)

8. Checking that surgical antibiotic prophylaxis is prescribed for the appropriate duration as recommended (Edwards et al., 2011)
The role of the nurse

9. Ensuring that antibiotics are initiated and administered at the correct time as prescribed and recommended

10. Decision-making on patient suitability for outpatient IV antibiotic services (Edwards et al., 2011)
11. Education and advocacy for implementation of antimicrobial stewardship practices in the workplace

12. Patient and family education, e.g., safe antibiotic use and immunisation against avoidable infectious illnesses
The role of registered nurses in this regard, other than as infection control practitioners is not well-understood.

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

The WHO calls for multidisciplinary approach (2014).
The Auckland Study

Roles of nurses in antimicrobial stewardship (2016)

Source: Padigos, Junel Amarado (2016). Master of Health Sciences Thesis. The University of Auckland, New Zealand

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Methods/Results

An online descriptive, cross-sectional quantitative survey using Qualtrics (https://www.qualtrics.com; Provo, Utah, USA) for registered nurses in the greater Auckland area of New Zealand

369 attempts

(N=298) respondents from diverse backgrounds completed

The median age group was 40-49 years old.

161/298 (54%) of the respondents had higher level of qualifications in the form of postgraduate degrees.

Data are analyzed using descriptive and inferential statistics using Qualtrics and IBM® SPSS® Statistics version 23. Statistical significance was established at $P \leq 0.05$. 
Have you heard of AMS being implemented in your place of work?

84% had not heard of AMS being implemented in the workplace.

Total Number of Participants = 298

Percentage

Responses
Only a small minority (<5%) felt they had excellent knowledge in any of these areas.

Knowledge was lowest regarding AMS – 146/298 (49%) reported “below average” or “poor” knowledge.
Results

- Lack of knowledge about AMS (211/298, 71%) was viewed as the most challenging factor in integrating AMS in clinical practice.

- About 99% (294/298) wanted education and training of AMS be facilitated in the workplace. All respondents (N=298) wanted further AMS training and education.
Results

- Surprisingly, 14% (43/298) of the respondents expect antibiotics for bad colds or flus, and
- 16% (49/298) regarded antibiotics as safe medicines
Results

- Younger and less experienced nurses (means 2.19/5 and 2.21/5, respectively) had higher expectations for antibiotics to be prescribed by their doctor for the common cold or influenza compared to older (mean 1.75/5) and more experienced nurses (mean 1.64/5), (P<0.05).

- Overseas-trained nurses (mean 2.15/5) tended to expect to be prescribed with antibiotics if they have a bad cold or flu than New Zealand-trained nurses (mean 1.86/5), (P<0.05).
**RECOMMENDATIONS**

- Collaborate with AMS committee, nursing and medical leaders in health care institutions.
- Invite nursing organisations to issue a position statement in line with that of the Ministry of Health.
- Education in all levels: undergraduate, postgraduate and in the workplace.
- Collaborative campaign on safe antibiotic use.
- Further research.
Involvement of nurses and addressing their learning needs on Antimicrobial Stewardship is **paramount**

**IN ORDER TO SERVE A TRUE MULTIDISCIPLINARY APPROACH.**
Conclusion

Nurses play an essential role in the appropriate use of antibiotics. It is therefore paramount that educational needs of nurses are addressed immediately.
Battling antimicrobial resistance is a Herculean task.
References


Images in the slides were taken via [www.google.com](http://www.google.com) and can be accessed using the following links:


