



The Increasing Interest in Antibiotic Stewardship Programs

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Authors' contributions

This work was carried out in collaboration between both authors. Author NJA designed the study, performed the statistical analysis, wrote the protocol, managed the literature searches and wrote the first draft of the manuscript. Author MFK participated in the statistical analysis and managed the analyses of the study. Both authors read and approved the final manuscript.

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ABSTRACT

Background: The inappropriate use of antibiotics leads to many adverse effects and also leads to bacterial resistance. A hospital-based program, commonly referred to as antibiotic stewardship programs, is used to improve the usage of antibiotics. This study aims to explore the increasing interest of the public in antibiotic stewardship programs by using data from Google Trends and Twitter.

Methodology: A search trends feature that shows how frequently a given search term is entered into Google's search engine (Google Trends) and a social network site (Twitter) were used.

Results: The public and the health care professionals are now more interested in antibiotic use and antibiotic resistance due to the development of more severe infections that were caused by bacteria resisted to many antibiotics which lead to high morbidity and mortality rates.

Conclusion: There is a high prevalence of infections caused by multi-drug resistant organism that could lead to more mortality and morbidity rates, as a result the interest in antimicrobial

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stewardship programs in internet is increased. So it is important to increase the knowledge of health care professionals regarding the appropriate antibiotic use and to encourage them to change their unsuitable prescribing patterns.

Keywords: Bacterial resistance; antibiotic stewardship programs; antibiotics; multi-drug resistant organism.

1. BACKGROUND

Antibiotics have changed the medications practices, helping in treating severe and lethal infections and making many other advances in the medical field such as organ transplants and cancer chemotherapy possible. The rapid starting of antibiotics to treat infections has been proven to lessen the morbidity of different infections and save lives, such as in the cases of sepsis [1]. However, between 20-50% of all antibiotics prescribed in the United States acute care hospitals are either excessive or unsuitable [2-7].

The Centers for Disease Control and Prevention estimates that more than two million people are infected with antibiotic-resistant organisms, resulting in high rate of mortality, approximately 23,000 deaths annually [8].

The appropriate use of antibiotics was defined by the World Health Organization as the cost-effective usage of antibacterial agents which maximizes the therapeutic effect while diminishing both the development of antimicrobial resistance and drug-related toxicity [9].

A growing body of evidence proves that there are hospital-based programs, commonly referred to as antibiotic stewardship programs, used to improve the usage of antibiotic, can both optimize the management of infections and lessen the adverse events associated with the use of antibiotic [10,11]. These programs help clinicians improve the patient care quality [12] and improve patient safety by increasing the infection cure rates, decreased management failures, and raised the frequency of correct prescribing for both prophylaxis and therapy [13,14]. They also considerably reduce the rates of clostridium difficile [15-17] and the resistance to different antibiotics [18-20].

In order to diminish the undesirable consequences of antimicrobial usage, carrying out of the antimicrobial stewardship programs should be mandatory [21-22]. The committee of these programs should include physicians

specialized in infectious diseases, with clinical pharmacists. Both of them are considered the chief leaders of antimicrobial stewardship programs. Additionally, clinical microbiologists can play an important role in these programs [23].

Internet search data could provide valuable insight into population behaviors. Google trends site is one of the tools that allows users to interact with internet search data. It is a widely available online resource, provided by Google. It provides insights into the timing, frequency and geographic source of matching google searches [24]. Twitter is an interactive social media platform established in 2006 that allows users to send 140-character messages to one another. It is another tool that can effectively disseminate non-medical information. Moreover, healthcare professionals have used twitter to share medical information [25-29].

This study aims to explore the interest of public in antibiotic stewardship programs by using internet search trends data such as Google Trends and Twitter.

2. METHODOLOGY

A search trends feature that shows how frequently a given search term is entered into Google's search engine (Google Trends) and a social network site (Twitter) were used to explore a public interest in antibiotic stewardship programs by using terms related to in antibiotic stewardship programs for the last 5 years. The data included the number of tweets in different years, the year of highest tweets and the years of highest search in google for antimicrobial stewardship, the highest countries that searched for the terms.

2.1 Statistical Analysis

Data were analyzed using Statistical Package for Social Sciences version 25 (SPSS 25). Data variables were presented as frequencies and percentages. Independent sample t test was conducted to detect difference in means of enquiry asked (Tweeted) between different year.

Pearson correlation was used to explore correlation between questions asked in different years. P value < 0.05 indicated significance.

3. RESULTS AND DISCUSSION

The first part included the number of tweets that were related to the term (antimicrobial stewardship programs) on Twitter. The number of tweets in the years between 2014 till 2018 was 479 tweets.

There was a significant difference has been found in the tweets in a different year, the p-value of .020 has been noted and the correlation was significant at the 0.05 level (2-tailed).

The result shows a continuous increase in the number of tweets, the number of tweets in 2017 and 2018 is more than 100 tweets. The years of highest tweets were 2018 followed by 2017, 2016, 2015 and 2014. Table 1 shows the number of tweets using the keyword antimicrobial stewardship from 2014-2018 tweets.

Table 1. Number of tweets from 2014-2018 tweets

| Year | Frequency | Percentage |
|------|-----------|------------|
| 2018 | 128 | 26.72% |
| 2017 | 113 | 23.59% |
| 2016 | 96 | 20.04% |
| 2015 | 95 | 19.83% |
| 2014 | 47 | 9.81% |

The second part included searching google trends for the keyword “antimicrobial stewardship”, In the last 5 years increasingly trend appears for searching the keyword and 2017 is the year of the highest number of searching trials.

The countries that frequently searched for the terms were Australia followed by Canada, Philippine, Malaysia, and Saudi Arabia. The highest city that searched for the terms was Toronto city.

The public and the health care professionals are now more interested in antibiotic use and antibiotic resistance due to the development of more severe infections that were caused by bacteria resisted to many antibiotics that lead to high morbidity and mortality rates. Additionally, the interest is now increased for the interventions that lead to appropriate antibiotic use such as antimicrobial stewardship programs. The results

of these study showed more interest in antimicrobial stewardship programs especially for the health care providers because the public generally have a poor knowledge regarding the antimicrobial stewardship programs and commonly they may search for the terms antibiotic, infection but not for medical keywords such as antimicrobial stewardship.

4. CONCLUSION

There is a high prevalence of infections caused by multi-drug resistant organism that could lead to more mortality and morbidity rates, as a result the interest in antimicrobial stewardship programs in internet is increased. So it is important to increase the knowledge of health care professionals regarding the appropriate antibiotic use and to encourage them to change their unsuitable prescribing patterns by making lectures, seminars, and workshops about using antibiotics appropriately and to encourage the hospitals to start the implementation of interventions such as antimicrobial stewardship programs. Additionally, it is important to increase the awareness of the public regarding the correct use of antibiotics by brochures, posters, lectures and social media.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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