

June 28, 2019

COMMUNITY ANTIMICROBIAL STEWARDSHIP PROGRAM

Annual Report 2018/19



BC Centre for Disease Control
An agency of the Provincial Health Services Authority



BRITISH
COLUMBIA

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Executive summary

Beginning in 2005 with Do Bugs Need Drugs?, the Community Antimicrobial Stewardship program at the B.C. Centre for Disease Control (BCCDC) has been tackling the important issues of antibiotic overuse and misuse and antimicrobial resistance. In 2018/19 the team undertook a wide range of activities aimed at addressing this growing public health concern.

Activities

- A public transit advertising campaign in late 2018 garnered more than 100 million impressions in communities across B.C.
- The program's online presence continued to grow through the Antibiotic Wise and Do Bugs Need Drugs? websites, and social media channels (Instagram account launched for first time).
- Paid social media advertising expanded this year, with multiple short campaigns on Facebook and Twitter.
- 5,028 individuals were provided education through the Do Bugs Need Drugs? program.
- Collaborative partnership with Kids Boost Immunity grew to include I Boost Immunity this year, with 1,250 users and more than 50,000 questions answered.
- 2,741 health care professionals received antimicrobial resistance continuing education.
- B.C. users of the Bugs & Drugs online reference guide grew by 57% this year.

Outcomes

- Overall prescription rate of antibiotics in B.C. decreased 2% in 2017, and is down 19% overall since 2005.
- The dental prescribing rate decreased 3.3% in 2017, but is still up 5.5% since 2005.
- Antimicrobial resistance trends of bacteria to specific antibiotics continued to be tracked and reported publicly across B.C. in the program's [Antimicrobial Resistance Dashboard](#).
- An update on the utilization of antibiotics for UTI in long term care was published in the *Canadian Geriatrics Journal*.
- A research collaboration with the CHILD cohort was completed exploring the link between decreased antibiotic use in infants and a reduction in childhood asthma.

Impacts

- The prescription rate of clindamycin is down 24% since 2010. The prescription rate for ciprofloxacin decreased 61% in this same period.
- The defined daily dose per prescription for naturopaths is nearly 3 times the rate for other prescribing professions, but decreased 9% from 2016 to 2017.
- Overall defined daily dose per prescription remained steady from 2016 to 2017, but is still up 6% since 2005.

Introduction

Antibiotics have been used since the mid-20th century to treat bacterial infections, and great strides have been made in health care and public health due to their use. Infections which in the past may have been deadly are now often easily treated, and the use of antibiotics has made modern medical procedures such as surgeries and chemotherapy possible.

However human antibiotic use is a known driver of antibiotic resistance^{1,2}. Although antibiotic resistance is a naturally occurring biological phenomenon, it has been exacerbated by the overuse and misuse of antibiotics. When antibiotics are used too much or incorrectly, bacteria causing illness may no longer respond to the drug.

Antibiotic resistance is a global concern. If not managed, it has the potential to undo many of the gains made in global health over the past century³. It is estimated that 23,000 people die each year in the United States as a direct consequence of antibiotic resistance⁴, and infections by resistant organisms complicate tens of thousands of routine physician visits each year in B.C. As such, concerted effort is needed to strategically reduce the overuse and misuse of antibiotics at the individual and population levels. Combined, these efforts not only have the potential to arrest and possibly reverse the current upward trends in resistance, but also have the potential to alleviate the burden placed on individuals and the health care system associated with antimicrobial resistant infections⁵.

The Community Antimicrobial Stewardship program at the B.C. Centre for Disease Control is tackling this important issue. Beginning with Do Bugs Need Drugs? in 2005, the program has grown into a multifaceted initiative with activities focusing on community outreach, public and healthcare professional education, and research and surveillance. The program aims to reduce the overuse and misuse of antibiotics in B.C. to ensure we continue to have effective treatments for bacterial infections in the future.

The wide array of projects and activities undertaken by the Community Antimicrobial Stewardship program all tie back to three key messages which are targeted at the public and health care professionals in the community:



Wash your hands

Hand washing is the best way to stop the spread of infections.



Know that not all bugs are created equal

Antibiotics work against bacteria, but not against viruses.



Use antibiotics wisely

Bacteria can become resistant to antibiotics if not used appropriately.

Program logic model

| RESOURCES | ACTIVITIES | OUTPUTS | OUTCOMES | IMPACTS |
|--|---|---|--|--|
| <p>Funds and endorsement for the program from the Ministry of Health</p> <p>Community Antimicrobial Stewardship Program team</p> | <p>Public outreach and awareness</p> <ul style="list-style-type: none"> Public engagement and advertising Online engagement Public events Materials and resources | <ul style="list-style-type: none"> Campaign reach Social media reach Website traffic Event attendance Materials distributed | <p>Increased public knowledge</p> <ul style="list-style-type: none"> Viral infections do not require antibiotics Some bacterial infections do not require antibiotics Limitations of antibiotics for asymptomatic bacteriuria and in dentistry | <p>Reduction in morbidity associated with antibiotic use in BC</p> <ul style="list-style-type: none"> Decreased adverse events from antibiotics (e.g. <i>C. difficile</i> infection) No increase in harms associated with decreased antibiotic use Decreased prescribing of fluoroquinolones and clindamycin |
| <p>Contribution from health care professionals, health science school programs, health care students, and ECE staff and students</p> <p>Program support from the BCCDC</p> | <p>Public education</p> <ul style="list-style-type: none"> Preschool-aged education programs School-aged education programs Older adult education programs Online engagement | <ul style="list-style-type: none"> Education session attendance/courses completed Number of community partners Website traffic | <p>Change public behaviours</p> <ul style="list-style-type: none"> Proper handwashing Decreased requests for antibiotics Return unused antibiotics to pharmacist Acceptance of symptomatic treatment | <p>Stabilization or reduction of antimicrobial resistance in community pathogens in BC</p> |
| <p>Program stakeholder committee consisting of physicians, nurses, epidemiologists, pharmacists, infectious disease specialists, dentists, naturopaths, nurse practitioners and others</p> | <p>Professional education</p> <ul style="list-style-type: none"> Continuing education (in-person and online) Clinical tools and resources Curriculum contribution Online engagement Professional audit and feedback | <ul style="list-style-type: none"> Education session attendance/courses completed Website traffic Clinical resource use Number of professional education opportunities Materials distributed Prescribing portraits and college outreach | <p>Increased healthcare practitioner knowledge</p> <ul style="list-style-type: none"> Evidence-based guidelines for prescribing and infection control | <p>Reduction in prescribing and use of antibiotics in BC</p> <ul style="list-style-type: none"> Decreased overall prescribing rate Decreased prescribing by dentists Prescribing by naturopaths adheres to evidence-based guidelines Decreased prescribing for UTI in the elderly Decreased prescribing for respiratory infections Decreased length of antibiotic courses |
| <p>Collaboration with external groups including DBND Alberta, prescribing colleges, and other local, national and international partners</p> | <p>Surveillance and research</p> <ul style="list-style-type: none"> Published research Updating dashboards and data analysis Knowledge translation | <ul style="list-style-type: none"> AMR/AMU dashboards Dashboard traffic Articles published Policy input/development | <p>Change healthcare practitioner behaviours</p> <ul style="list-style-type: none"> Decreased unnecessary and inappropriate prescribing of antibiotics for suspected viral infections Increased use of first line antibiotics | |

The program logic model depicts the different components of the overall program as well as how they contribute to a decrease in antibiotic resistance in B.C. through public and professional education and an increase in proper antibiotic prescribing practices. The model is used in the planning, implementation, and evaluation of the program. The model is dynamic and changes as the program develops. An update on the progress of logic model impacts is included in the **Impacts** section of this report.

The logic model is a living document, and was significantly revised in the 2017/18 fiscal year. New long term impacts have been identified to help determine the future success of the program.

Program team



The Community Antimicrobial Stewardship program team

Team members

| | |
|-------------------------------|---------------------------------------|
| Dr. David Patrick | Medical Epidemiology Lead |
| Dr. Edith Blondel-Hill | Medical Director, Do Bugs Need Drugs? |
| Stephanie Dion | Public Health Manager |
| Nick Smith | Project Manager |
| Abdullah Mamun | Epidemiologist |
| Dr. Erin Fraser | Public Health Veterinarian |
| Kate O'Connor | Nurse Educator |
| Hattaw Khalid | Administrative Assistant |
| Dr. Hannah Lishman | Post-Doctoral Fellow |

The team would also like to recognize the contributions of former team members Tiffany Barker, Annelies Becu and Jason Curran in 2018/19.

A young girl with dark hair, wearing a blue and white striped long-sleeved shirt, is sitting at a desk. She is leaning forward, focused on writing in a notebook with a light blue pen. Her left hand rests on the desk. The background is a blurred classroom setting. The image is overlaid with a semi-transparent blue circular graphic.

ACTIVITIES



Public outreach

Public transit advertisements

This year's public transit media campaign ran from September to December 2018 with two separate messages united under the theme of "Say naaah to antibiotics:" 1) "Many toothaches and oral infections don't need antibiotics. Ask your dentist," and 2) "Make sure antibiotics are what you really need. Antibiotics won't cure the cold or flu. Ask your doctor."

| | | | |
|-----------|--------------------------|--------------|------------------------------|
| 8 | week campaign | 1,250 | interior bus ads |
| +4 | bonus weeks | 275 | interior train ads |
| 33 | communities in BC | 20 | Skytrain platform ads |

100 million+ total impressions⁶



Social media



Twitter

| | @AntibioticWise | @DoBugsNeedDrugs |
|----------------------------|-----------------|------------------|
| Total followers | 504 | 1 279 |
| Followers gained this year | 156 | 71 |
| Change in followers | +45% | +6% |
| Total reach | 220,120 | 751,576 |
| Reach this year | 162,730 | 129,462 |



Facebook

| | /AntibioticWise | /DoBugsNeedDrugs |
|----------------------------|-----------------|------------------|
| Total followers | 113 | 365 |
| Followers gained this year | 69 | 26 |
| Change in followers | +157% | +8% |
| Total reach | 123,817 | 3,787,979 |
| Reach this year | 108,022 | 17,913 |



Instagram

| | @AntibioticWise |
|----------------------------|-----------------|
| Total followers | 42 |
| Followers gained this year | 42 |

Social media advertising

Paid social media advertising was used to extend the reach of the *Say Naaah* campaign in October (dental messaging) and February (cold and flu messaging). Paid advertising was also used as a tool to complete an evaluation of the fall portion of the public campaign.



AntibioticWise
Sponsored · 🌐

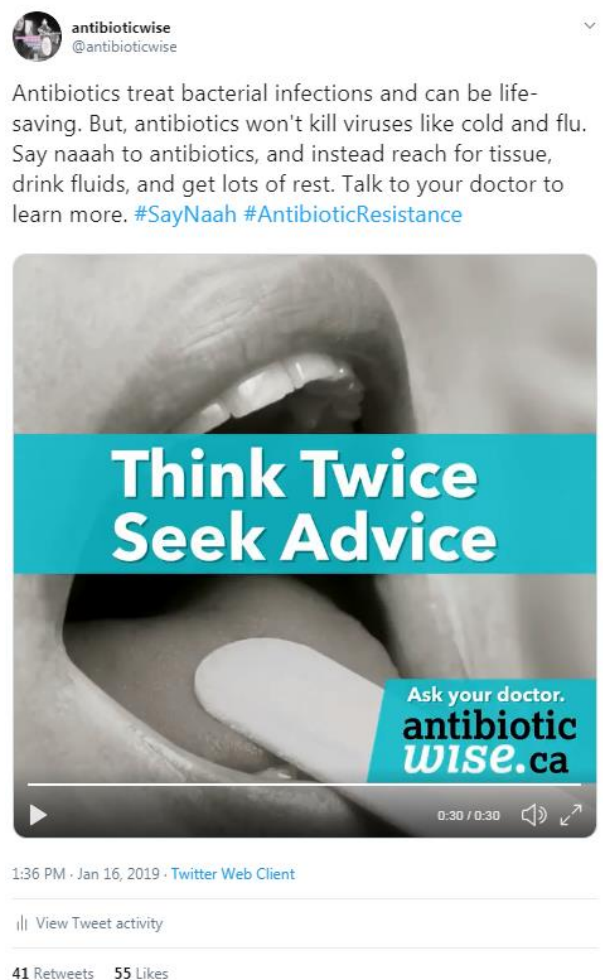
Did you know many toothaches and oral infections don't require antibiotics? Click to see the full video. #AntibioticWise #SayNaaah

SAY NAAAH

antibioticwise.ca
Be Antibiotic Wise [LEARN MORE](#)

👍❤️😄 9 2 Comments 10 Shares

👍 Like 💬 Comment ➦ Share



antibioticwise
@antibioticwise

Antibiotics treat bacterial infections and can be life-saving. But, antibiotics won't kill viruses like cold and flu. Say naaah to antibiotics, and instead reach for tissue, drink fluids, and get lots of rest. Talk to your doctor to learn more. #SayNaaah #AntibioticResistance

**Think Twice
Seek Advice**

Ask your doctor.
**antibiotic
wise.ca**

1:36 PM · Jan 16, 2019 · Twitter Web Client

||| View Tweet activity

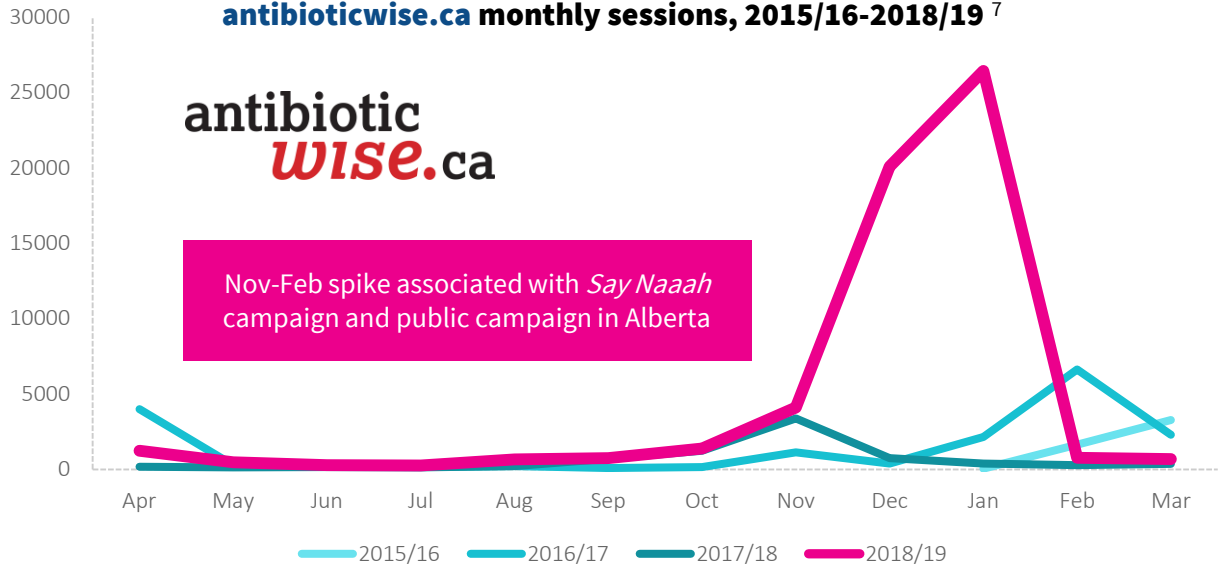
41 Retweets 55 Likes

| | |
|-------------|---------------|
| Weeks | 3 |
| Impressions | 26,142 |
| Video views | 2,811 |
| Link clicks | 551 |

| | |
|-------------|---------------|
| Weeks | 4 |
| Impressions | 64,010 |
| Video views | 32,649 |
| Engagements | 563 |

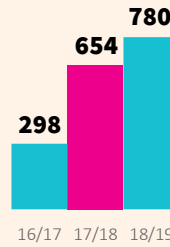
Websites

antibioticwise.ca monthly sessions, 2015/16-2018/19 ⁷

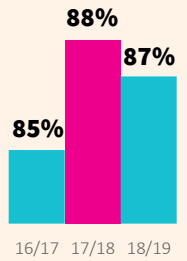


A quiz about antibiotics and AMR available on antibioticwise.ca saw an increase number of completions, while average scored dipped only slightly in 2018/19. Knowledge of the basics of antibiotic resistance remains high.

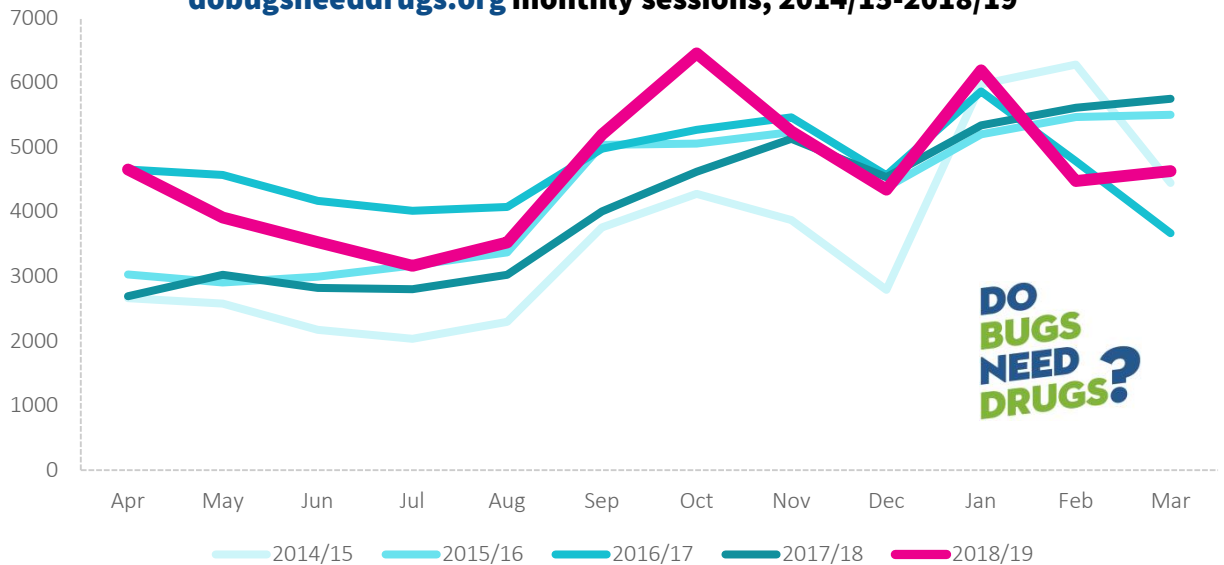
Quiz Completions



Average Score



dobugsneeddrugs.org monthly sessions, 2014/15-2018/19 ⁷

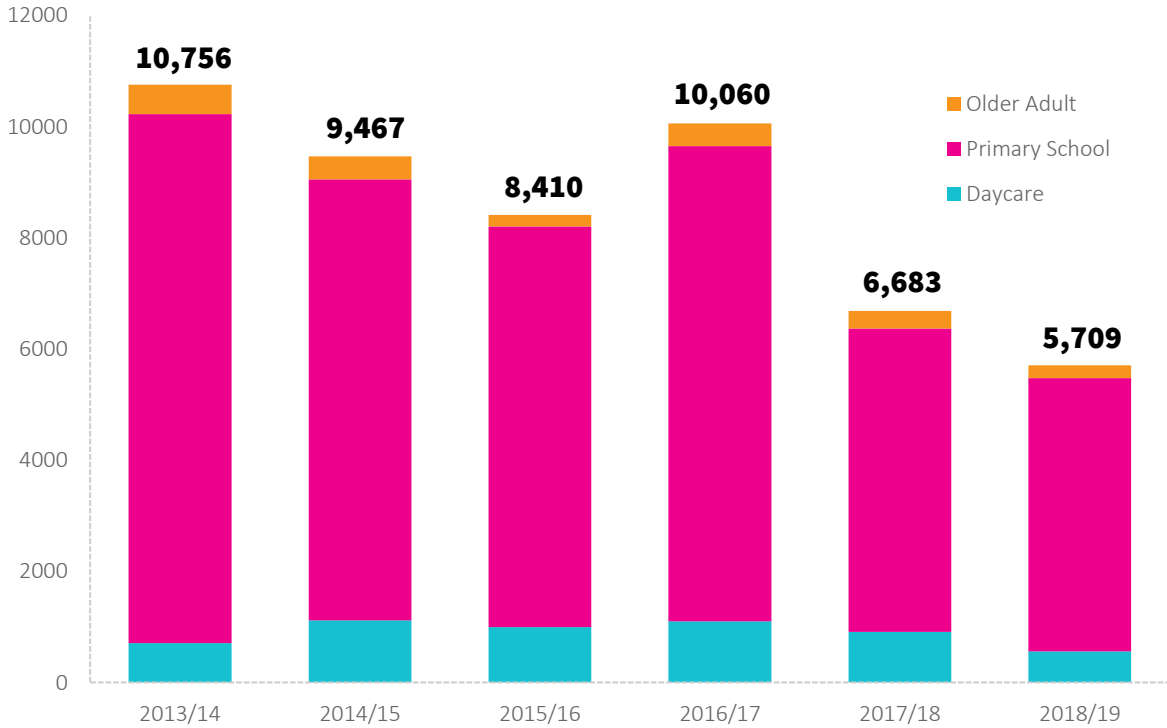


Do Bugs Need Drugs?



| Program | Description |
|-------------------------------|---|
| Daycare | For pre-school children aged 2-5 emphasizing the importance of handwashing and introducing germs and illness through activities, songs and parent-intended material. |
| Grade 2 | For children aged 7 and 8 stressing the importance of proper and frequent handwashing, the dangers of misusing antibiotics, and the basic differences between viruses and bacteria. |
| Kindergarten – Grade 3 | Resources meeting B.C. education curriculum that allow teachers to incorporate Do Bugs Need Drugs into their classroom, intended for children approximately 6 to 10 years of age. |
| General Teaching | Sessions incorporating elements of the formal education programs adapted for different age groups or abilities. Delivery and adaptations of these sessions is at the discretion of the trainer. |
| Older Adult | Focused on teaching older adults in care the three key messages of Do Bugs Need Drugs. |

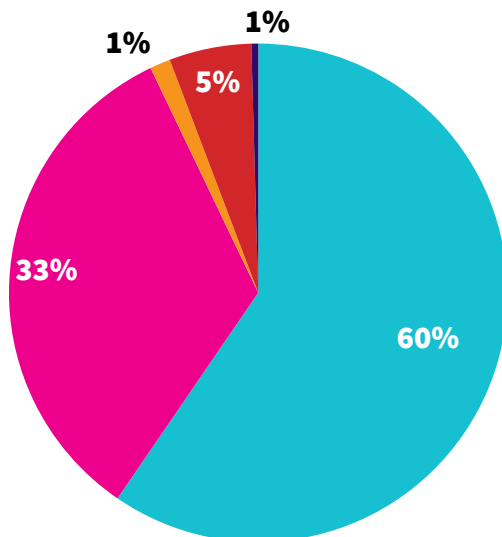
Number of individuals taught *Do Bugs Need Drugs?* curriculum



Under-reporting and curriculum fatigue may be contributing to the decrease in DBND participants. Both these issues are being addressed through a new online reporting form, and a refresh of all teaching curricula in 2019/20.

132,563

people across B.C. have been taught the *Do Bugs Need Drugs?* curriculum since 2005



Designation of person providing *Do Bugs Need Drugs?* curriculum

- Nursing Student
- Medical Student
- Nurse
- ECE Student
- Teacher

Kids Boost Immunity & I Boost Immunity



Kids Boost Immunity (KBI) is an online learning resource linked with science and social studies school curricula that provides an opportunity for students to earn vaccines for children in need through UNICEF. The CAS program has partnered with KBI for antibiotic resistance content since 2017.

1,067

students completing AMR content



I Boost Immunity (IBI) is an immunization advocacy program which provides quizzes, articles and stories related to vaccination, and allows users to earn vaccines for children in need through UNICEF. The CAS program has partnered with IBI for antibiotic resistance content since 2018.

183

users completing AMR content

50,982 total questions answered

67% questions answered correctly

3,336 total vaccines earned

Answers to questions on both KBI and IBI indicate that the public has a strong understanding that antibiotics only treat bacterial infections, and that overuse and misuse of antibiotics can cause an increase in resistant bacteria.

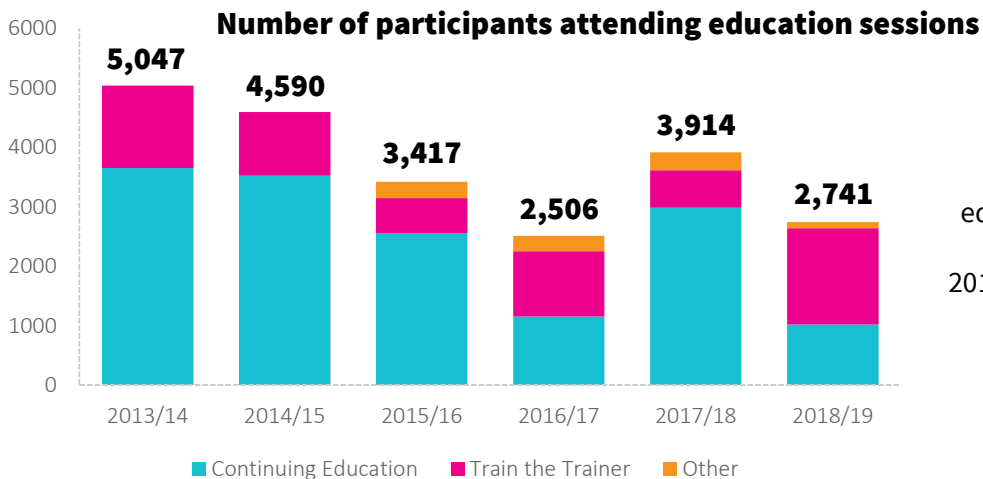
Conversely, there is still a widespread belief that resistance occurs within an individual's body, rather than within bacteria, and that antibiotics are ineffective at treating colds and flu.



Professional education

Education sessions

Professional education sessions provide training for healthcare professionals and students to teach the DBND education curriculum, as well as continuing education for professionals on the program's main messages, including CME events, and conference posters and presentations.



While overall professional education numbers were down in 2018/19, there was a **158%** increase in train the trainer participants

2018/19 professional education highlights



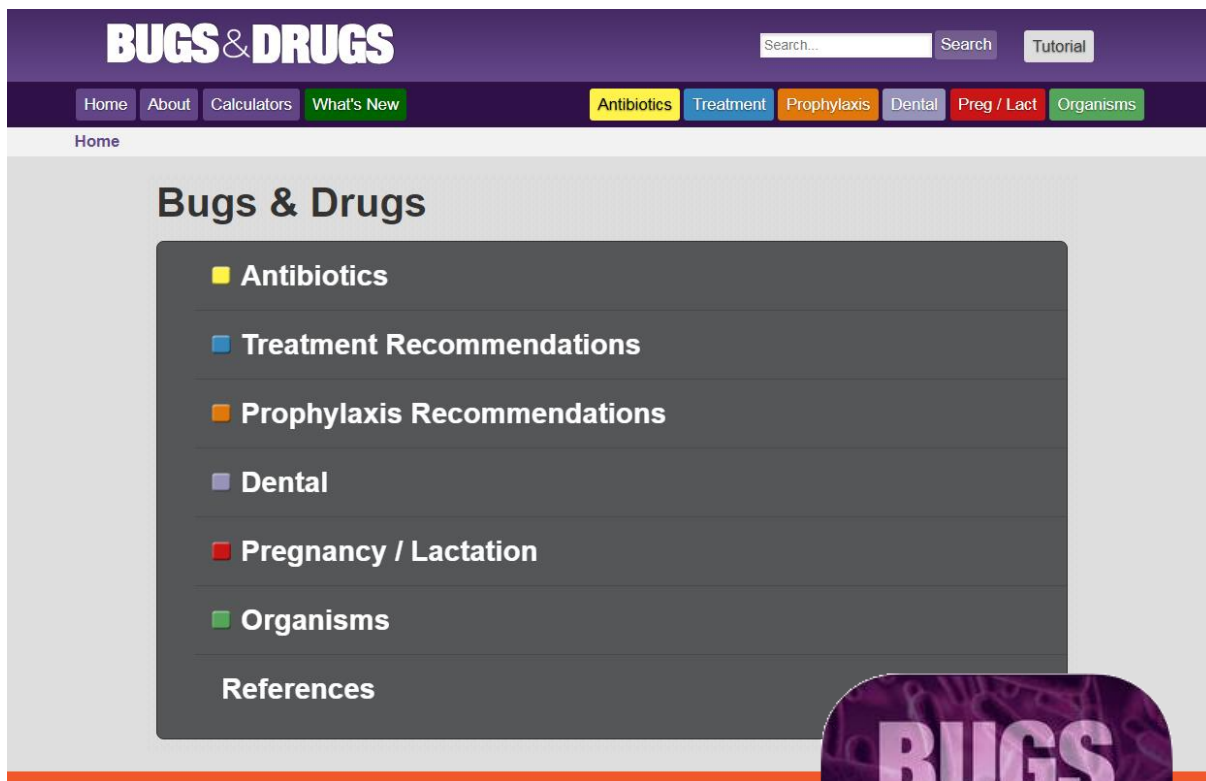
**Antibiotic Use & Dental Practice:
How You Can Become a Resistance Fighter**
published in BCDA member magazine
The Bridge, Fall 2018

More than 400 pharmacy students from UBC were provided *Do Bugs Need Drugs?* training this year. This is the first time the program has been provided within the Faculty of Pharmaceutical Sciences.



Pacific Dental Conference | March 7 & 8, 2019 | Vancouver, BC
14,117 total attendees
Presentation
Safe and Effective Antibiotic Prescribing – Dr. Victor Leung
Antibiotic Wise Exhibitor Booth
>300 visitors to booth

Bugs & Drugs reference guide



The Bugs & Drugs Antimicrobial Reference Guide has been available free-of-charge across B.C. since March 2017. The guide is also available for purchase as an iPhone/Android mobile app. The statistics below represent the web version of the guide only⁸.



| 2018/19 Bugs & Drugs website statistics | | 2017/18 |
|--|---------------|----------------|
| Total users | 15,864 | +57% |
| Total sessions | 52,157 | +84% |
| Pages per session | 8.6 | -3% |
| Number of communities guide accessed in | 89 | +3.5% |



OUTCOMES

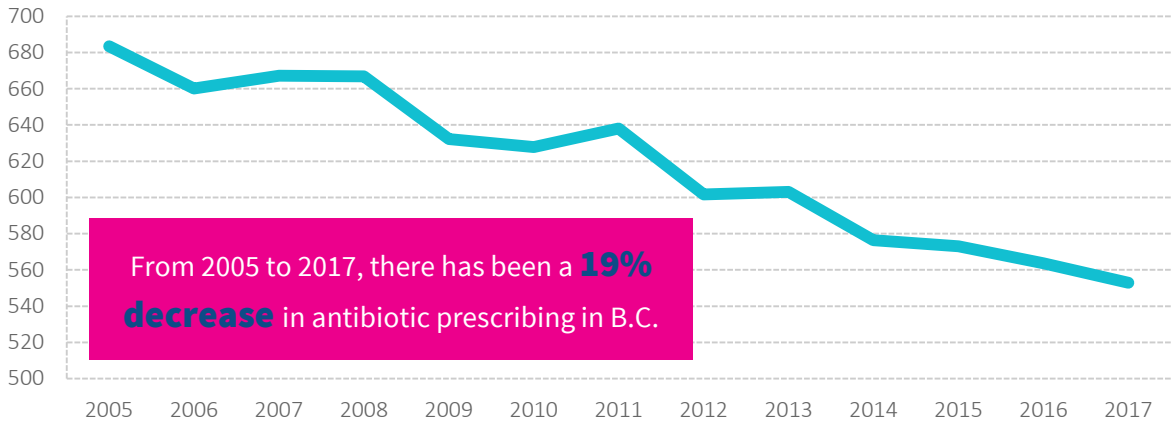


Antimicrobial utilization



Detailed prescribing data for B.C. can be found on the **Antimicrobial Utilization Dashboard** on the **BCCDC website**

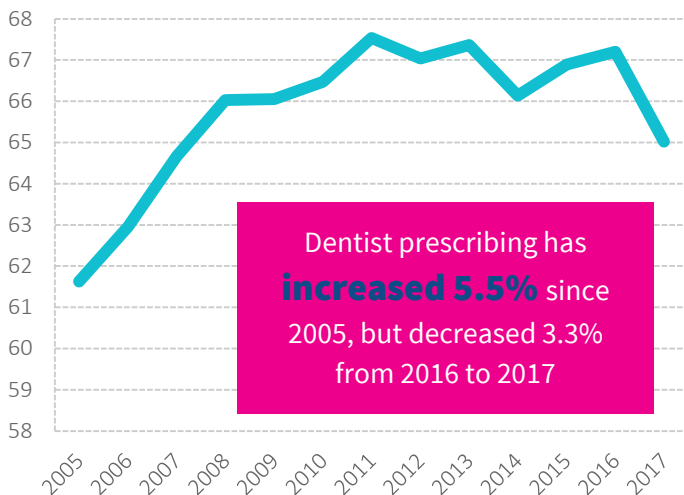
Overall B.C. prescription rate/1000 population/year



Top prescribed antibiotics in B.C.
Amoxicillin | Clarithromycin | Azithromycin |
Amoxicillin and enzyme inhibitors | Doxycycline

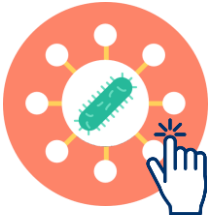


Dentist prescribing rate/1000 population/year



Recent analysis of prescribing patterns are showing there are individual outliers in each prescribing profession who are not prescribing based on best practices. The CAS program will be doing further analysis and working with the various prescribing colleges to better understand the reasons for these outliers and how to address them.

Antimicrobial resistance



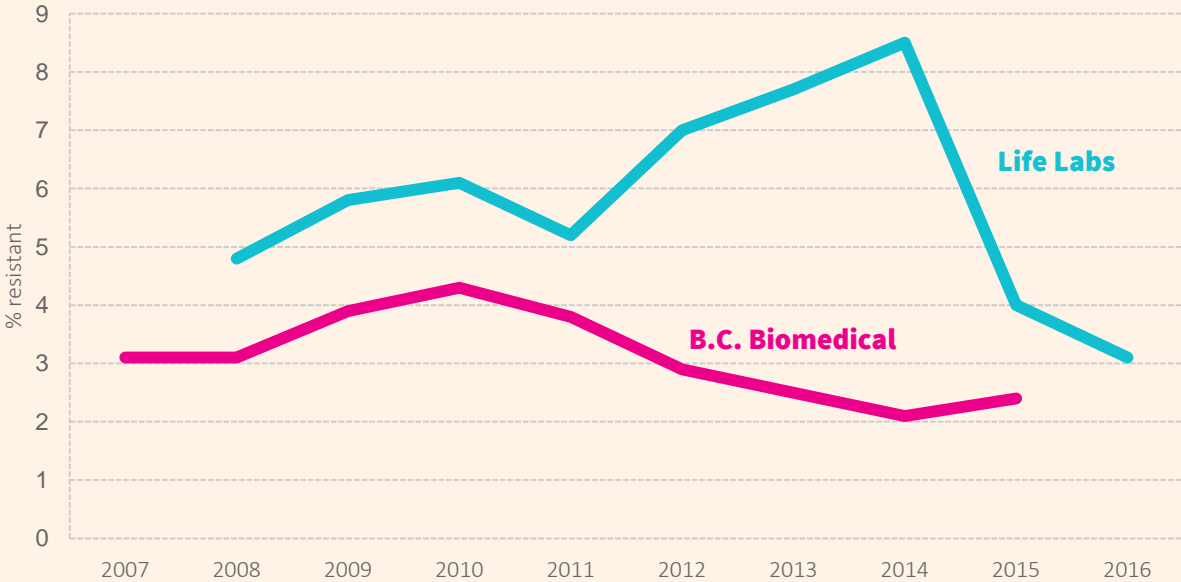
Detailed resistance data for B.C. can be found on the Antimicrobial Resistance Dashboard on the BCCDC website

Surveillance activities allow for the evaluation of the impact of the Community Antimicrobial Stewardship program on resistance rates for specific pathogens and drug classes of interest in B.C.

Prior to 2016, antimicrobial resistance data was provided in two separate datasets from B.C. Biomedical Services and LifeLabs Medical Laboratory Services. As of 2016, a single consolidated dataset from Life Labs has been used.

Due to data analysis limitations, 2017 data was unavailable at time of publication. 2016 highlights from the Antimicrobial Resistance Dashboard as well as recent activities to further track resistance rates in B.C. are presented below.

***E. coli* resistance to nitrofurantoin**



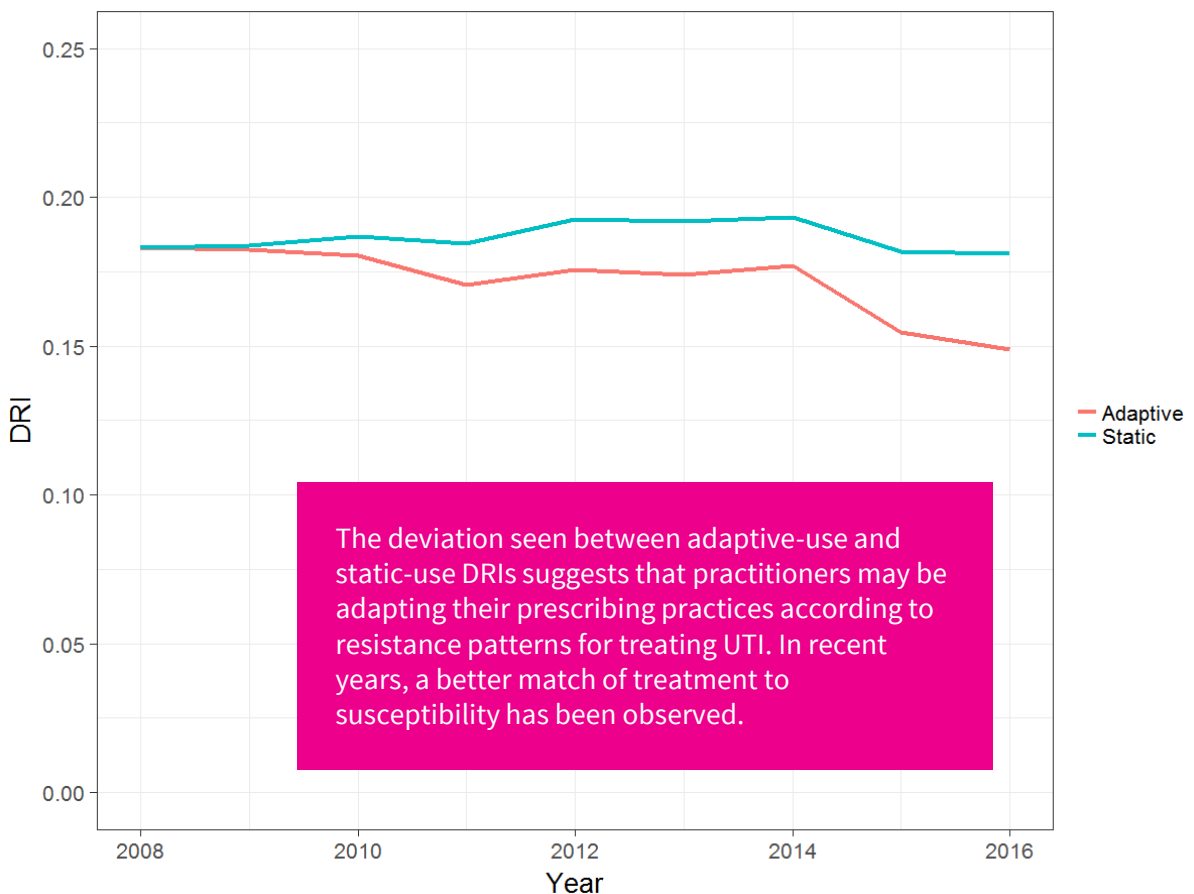
Nitrofurantoin is the preferred treatment for UTI. While utilization of nitrofurantoin has increased four fold since 1996, resistance rates are showing a declining trend in recent years.

Drug Resistance Index

Drug resistance indices (DRIs) combine rates of antimicrobial resistance with prescription rates for antimicrobial drugs into a single composite measure of the effectiveness of empirical antibiotic treatment. DRIs allow for easier communication of the threat of antimicrobial resistance to audiences which do not have expert knowledge in the field (e.g. policymakers or the general public)⁹.

MPH practicum student Madeleine Wilson is currently completing a drug resistance index analysis for community-acquired cystitis in B.C., and promising results have been found in the preliminary analysis. This project will inform future program surveillance using the DRI metric.

Adaptive-use and static-use DRI for cystitis



DRI values range from 0 to 1, where 1 means that infections are untreatable with any of the antibiotics used in the given setting and 0 means all isolates included in the calculation were susceptible.

Static-use DRI assumes that practitioners have not changed the proportion of each drug class prescribed since 2008. **Adaptive-use DRI** accounts for the changing proportion of drug classes in each year. The difference seen in the graph above indicate that in 2016, the likelihood that the organism causing cystitis would be resistant to the chosen treatment was **14.9%**, compared with **18.1%** if no change in drug class prescribing were observed during this period.

Research

Published



A Decrease in Antibiotic Utilization for Urinary Tract Infections in Women in Long-Term Care Facilities

Marra F, McCabe M, Mamun A, Patrick DM

Canadian Geriatrics Journal, Volume 21, Issue 3 – September 2018

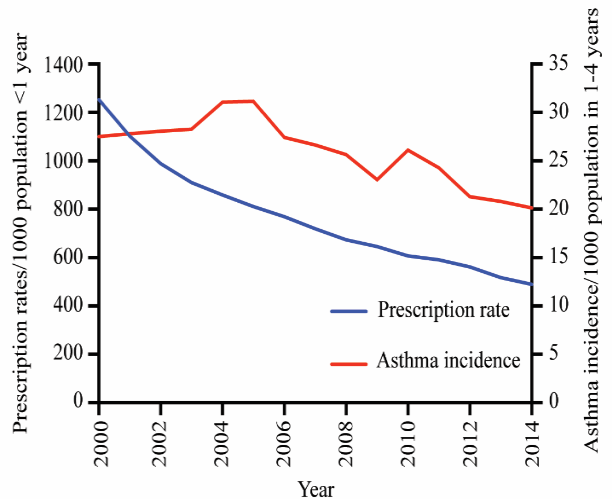
Submitted manuscripts

A manuscript entitled **Cost-benefit analysis of a population-based education program on the wise use of antibiotics** has been submitted for publication in the *Canadian Journal of Public Health*, outlining the results of the program's cost-benefit analysis.

Results of the program's collaboration with the CHILD Cohort to explore the correlation between decreasing antibiotic use in infants and decreased incidence of childhood asthma has been summarized in a manuscript entitled **Declining antibiotic use can explain a fall in asthma incidence in children: Evidence linking population and prospective cohort studies with the gut microbiota**. It is in the final stages of submission to *the Lancet*.

The findings of the study suggest that a significant reduction in pediatric asthma incidence is an unexpected dividend of prudent antibiotic use acting through preservation of the diversity of the infant gut microbiome.

Asthma incidence among children 1-4 years B.C. 2000-2014 vs. average antibiotic prescription rate experienced by that cohort during infancy



Upcoming research

- MPH student Laurel White is completing an analysis comparing trends in resistance between human and companion animal isolates. This research will offer unique insights into how antibiotic use in veterinary medicine can impact antimicrobial effectiveness in humans.
- The program is collaborating with the UBC Faculty of Pharmaceutical Sciences on a project to measure the appropriateness of prescribing of antibiotics in B.C.

Impacts

The Community Antimicrobial Stewardship program’s logic model outlines a number of measurable indicators of change representing the intended outcome’s of the program’s activities. While direct causation for these impacts cannot be attributed to the program, these achievements reinforce the value of the program’s initiatives. An overview of the progress made on current impacts is listed in the table below.

Community Antimicrobial Stewardship Logic Model Impacts

| Impact Measure | Description |
|--|--|
| Reduction in morbidity associated with antibiotic use in B.C. | |
| Decreased adverse events from antibiotics (e.g. <i>C. difficile</i> infection) | Antibiotic exposure as a risk factor for <i>C. difficile</i> is not currently tracked by PICNET. The proportion of beta lactam antibiotics (associated with lesser adverse events) has increased 6.1% since 2012, accounting for 34% of all antibiotic prescriptions. |
| Decreased unnecessary prescribing of fluoroquinolones and clindamycin | Since 2010, the prescription rate/1000 population/year has decreased 20% for clindamycin and 38% for ciprofloxacin. From 2016 to 2017, 3.5% and 12% reductions were seen, respectively (see figure below). These antibiotics are associated with increased risks of adverse events (including <i>C. difficile</i>). |
| No increase in harms associated with decreased antibiotic use | A research study is currently being designed to track potential unintended consequences of decreased antibiotic use (i.e. complications from untreated infections). This retrospective study will track trends from 2001-2018, with the goal of monitoring annually in the future. |

Stabilization or reduction of antimicrobial resistance in community pathogens in B.C.

See Outcomes – Antimicrobial Resistance (pages 19-20)

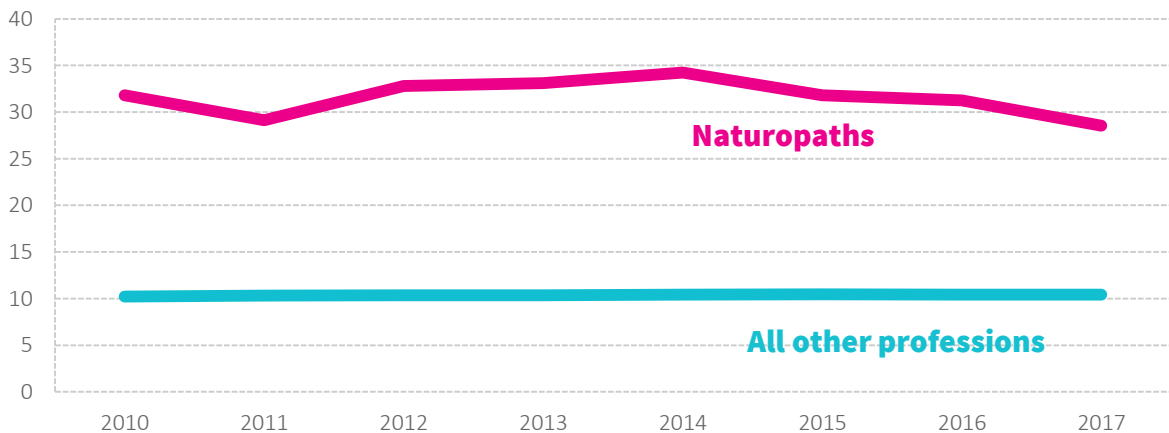


Community Antimicrobial Stewardship Logic Model Impacts (cont.)

Reduction in prescribing and use of antibiotics in B.C.

| | |
|---|---|
| Decreased overall prescribing rate | The overall community prescription rate/1000 population/year has decreased 19% since 2005. From 2016 to 2017, a 2% reduction was observed. |
| Decreased prescribing by dentists | The prescriptions rate/1000 population/year for dentists has increased by 5.5% since 2005, but decreased 3.3% from 2016 to 2017. Targeted program activities to address dental prescribing began in 2018. |
| Prescribing by naturopaths adheres to evidence-based guidelines | Defined daily dose (DDD) per prescription for naturopaths was 28.5 in 2017, nearly 3 times higher than all other professions (10.4 DDD/prescription). Since 2014, naturopath DDD/prescription has decreased by 17%. A 9% reduction was observed from 2016 to 2017 (see figure below). |
| Decreased prescribing for UTI in the elderly | Prescribing for urinary tract infections in those aged 65+ has increased 2.3% since 2005, but a declining trend has been observed since 2012 (-7.3%). A 4.2% decline was seen from 2015 to 2016. (<i>*Note: 2017 data unavailable at time of publication</i>) |
| Decreased prescribing for respiratory infections | Antibiotic prescribing for respiratory tract infections has decreased 31% since 2005. From 2015 to 2016, a 1.6% reduction was observed. (<i>*Note: 2017 data unavailable at time of publication</i>) |
| Decreased length of antibiotic courses | Overall defined daily dose (DDD) per prescription has increased 6% since 2005. DDD per prescription remained steady from 2016 to 2017. |

Defined daily dose/prescription for naturopaths and all other professions



Conclusions

The Community Antimicrobial Stewardship program continues to be a leader in the field in Canada, providing a strong reference for other stewardship programs across the country.

Program components have been implemented to various degrees across the province over the past 14 years and continue to expand. A large number of children, adults and health professionals continue to receive teaching through the Do Bugs Need Drugs? program. Advertising through traditional media channels has built strong awareness of the program with the general public.

In addition, new approaches for reaching the public have been implemented. For example, the program's social media presence continues to grow and allows for more direct engagement with the target audience.

At the same time, engagement with health care professionals continues. Through ongoing collaboration with the Provincial Academic Detailing program, development of continuing education opportunities, and providing access to clinical resources such as the Bugs & Drugs reference guide, significant gains have been made in addressing the unnecessary and incorrect

prescribing of antibiotics. A focus on prescribing in dentistry this year is addressing worrying trends seen within this profession over the last decade.

While the work completed in the past 14 years has had a significant impact on antimicrobial resistance in B.C. (and saved the public and government hundreds of millions of dollars), more work needs to be done to identify innovative ways to engage with the public and create partnerships with other public health programs. All program components need to be reviewed to ensure information continues to be up-to-date and relevant, and that objectives are still being met.

At the same time, other professions continue to see worrying prescribing trends. More targeted interventions are needed to continue to see positive impacts in antibiotic use and resistance in the province, including continued focus on the dental profession.

The indicators reflected in this report will continue to inform program planning in an attempt to further improve appropriate utilization of antibiotics, stabilize trends in antibiotic resistance, and ultimately minimize negative health outcomes.



References

- 1 Bronzwaer SL, Cars O, Buchholz U, et al. A European study on the relationship between antimicrobial use and antimicrobial resistance. *Emerg Infect Dis*. 2002; 8(3):278-282.
- 2 Goossens H, Ferech M, Vander SR, Elseviers M. Outpatient antibiotic use in Europe and association with resistance: a cross-national database study. *Lancet*. 2005; 365(9459):579-587.
- 3 Review on Antimicrobial Resistance. Tackling drug-resistant infections globally: final report and recommendations. https://amr-review.org/sites/default/files/160525_Final%20paper_with%20cover.pdf. Published May 19, 2016. Accessed May 25, 2018.
- 4 Antibiotic resistance threats in the United States, 2013. Centers for Disease Control and Prevention. <https://www.cdc.gov/drugresistance/threat-report-2013/index.html>. Updated April 9, 2018. Accessed May 17, 2018.
- 5 Arnold SR, Straus SE. Interventions to improve antibiotic prescribing practices in ambulatory care. *Cochrane Database Syst Rev*. 2005;(4):CD003539.
- 6 Mixed Buy Transit Report. Lamar Advertising. Email Communication. December 4, 2018.
- 7 Google Analytics Report. Accessed June 4, 2019.
- 8 Bugs & Drugs. Alberta Health Services. <http://bugsanddrugs.org>. Updated May, 2019. Accessed June 3, 2019.
- 9 Laxminarayan R, Klugman KP. Communicating trends in resistance using a drug resistance index. *BMJ Open*. 2011; 1:e000135. doi: 10.1136/bmjopen-2011-000135



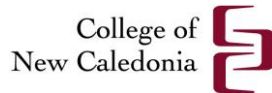
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