Antibiotics prescribing and antimicrobial resistance patterns in Britain

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Background

Antibiotic resistance is a complex problem – overuse and misuse of antibiotics is creating antibiotic-resistant strains of bacteria against which none of our current antibiotics work. As resistance spreads to new regions, bacteria and drugs, public health authorities warn that we could face a future in which antibiotics no longer work limiting treatments of infectious diseases and wounds, as well as surgical operations that use the available antibiotics. Alongside growing efforts to develop new treatments and diagnostics, public health authorities worldwide are engaged in local and global campaigns to limit antibiotic prescription by clinicians and demand by patients. The monitoring of antibiotic prescribing (AB) as well as cases of antimicrobial resistance (AMR) is a key component of these campaigns.

The project

This project focuses on the United Kingdom where the problem gained significant attention in the recent decade and where data on AP and AMR is routinely collected and disseminated. By collecting, wrangling and analyzing data provided by public health authorities and campaigning organizations in the UK this project explores regional patterns, prevalence of diseases, social demographics and other factors that may influence prescribing practices. Currently, the project is conducted as exploratory data analysis and establishing the key factors to be analyzed in depth.

Data

AMR Local Indicators (<https://fingertips.phe.org.uk/profile/amr-local-indicators>). The dataset includes indicators for AMR, AP, as well as Healthcare-Associated Infections (HCAI), Infection Prevention and Control (IPC) and Antimicrobial stewardship (AMS). The data is provided by Public Health England (PHE), an executive agency of the Department of Health and Social Care, that has recently launched their “Keep Antibiotics Working” campaign (October 2017) to support initiatives in this domain by the National Health Service.

Tools

Data wrangling and analysis: Python (pandas, numpy)

Visualization: Tableau, Python (seaborn, plotly)

**Published studies**

*AMR local indicators*

Johnson, A. P. *et al.* Improving feedback of surveillance data on antimicrobial consumption, resistance and stewardship in England: putting the data at your Fingertips. *Journal of Antimicrobial Chemotherapy* **72**, 953-956, doi:10.1093/jac/dkw536 (2017).

*UK initiatives and studies*

Susan, H. UK initiatives to reduce antimicrobial resistant infections, 2013-2018. *International Journal of Health Governance* **21**, 131-138, doi:doi:10.1108/IJHG-02-2016-0013 (2016).

Islam, J. *et al.* A national quality incentive scheme to reduce antibiotic overuse in hospitals: evaluation of perceptions and impact. *Journal of Antimicrobial Chemotherapy* **73**, 1708-1713, doi:10.1093/jac/dky041 (2018).

Currie, C. J. *et al.* Antibiotic treatment failure in four common infections in UK primary care 1991-2012: longitudinal analysis. *British Medical Journal* **349**, doi:10.1136/bmj.g5493 (2014).

Dolk, F. C. K., Pouwels, K. B., Smith, D. R. M., Robotham, J. V. & Smieszek, T. Antibiotics in primary care in England: which antibiotics are prescribed and for which conditions? *Journal of Antimicrobial Chemotherapy* **73**, ii2-ii10, doi:10.1093/jac/dkx504 (2018).

**Reports**

The Wellcome Trust. Exploring the consumer perspective on antimicrobial resistance. (2015).

Beech, E. Introduction to the antibiotic Quality Premium. (NHS, 2015).

PrescQipp, a Non-profit supporting NHS efforts to improve medicines-related care to patients holds an extensive repository of documents and links related to AMR:

<https://www.prescqipp.info/antimicrobial-stewardship/projects/antimicrobial-stewardship>

**Data and dashboards**

AMR local indicators, Public Health Engalnd,

<https://fingertips.phe.org.uk/profile/amr-local-indicators/data#page/4/gid/1938132909/pat/46/par/E39000030/ati/152/are/E38000010>

Visual snapshot AMS, PrescQipp

<https://www.prescqipp.info/pqva/visual-snapshot-ams>

Medicines Optimization Dashboard, NHS

<https://apps.nhsbsa.nhs.uk/MOD/AtlasCCGMedsOp/atlas.html>

Heat map infographics, Antibiotic Research UK

<https://www.antibioticresearch.org.uk/antibiotic-prescribing-heat-map-infographic-published-all-over-the-uk/>