

DATA VISUALIZATIONS

AQ1

What Is in a Name? Factors That Influence the Usage of Generic Versus Trade Names for Cardiac Medications Among Healthcare Providers

AQ2

The use of trade names for drugs in clinical practice raises awareness of these brand names and has been shown to increase their use.¹ Although academic medical centers have made an effort to teach generic medication names and discourages the use of trade names to reduce bias and contain costs, usage of trade names persists. Variation in trade name usage has been thought to be related to novelty of medication, pharmaceutical advertising budget, differences in pronounceability between generic and trade names, and familiarity of medications.² We previously showed analysis of text paging behaviors provides a reflection of real-world provider-to-provider communication outside of formal documentation and can highlight bias in the use of medication names.³ In this analysis, we applied a high-throughput method of analyzing medication naming sentiment to demonstrate significant variability in brand name versus generic name usage in cardiology for common drugs and its lack of association with novelty of medication, medication cost, or linguistic differences between names.

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METHODS

We analyzed 1048576 text pages to housestaff between June 1, 2013 and April 24, 2017, at an academic university hospital. Mentions of the most frequently used medications in cardiology were identified and tallied. When explicitly mentioned in the body of the text page, the profession of the sender was established. Common misspellings and alternative spellings were identified by regular expression and included in the analysis. Average wholesale price of medications was pulled from Micromedex's RED BOOK online. Text pages were algorithmically processed using Python and analysis was performed in R and the packages ggplot2, ggthemes, scales, and plyr. Complete code for the data visualization is available online.⁴

RESULTS AND DATA VISUALIZATION

We identified 102243 pages about medications, of which 34489 (33.7%) pages were from nurses and 20446 (20.0%) pages were from pharmacists. Forty-seven commonly used cardiac medications were mentioned a total of 26463 times. The most common classes of medications were antiarrhythmics (14.6%), angiotensin-converting enzyme inhibitors (14.6%), and β blockers (12.5%). There was significant variation in the use of trade names versus generic names (Figure).

F1

We created a 5-part data visualization to display the variation in the use of generic and brand names for medications across provider types and its correlation with average wholesale price, Food and Drug Administration approval date, whether the medication was on patent, difference in the number of syllables between trade name and generic name, and the frequency of mention. The focal point of our data visualization is in the center, with a plot of the ratio of generic to trade name mentions. A point estimate and 95% CI line is used to represent total mentions, whereas mentions that can be attributed

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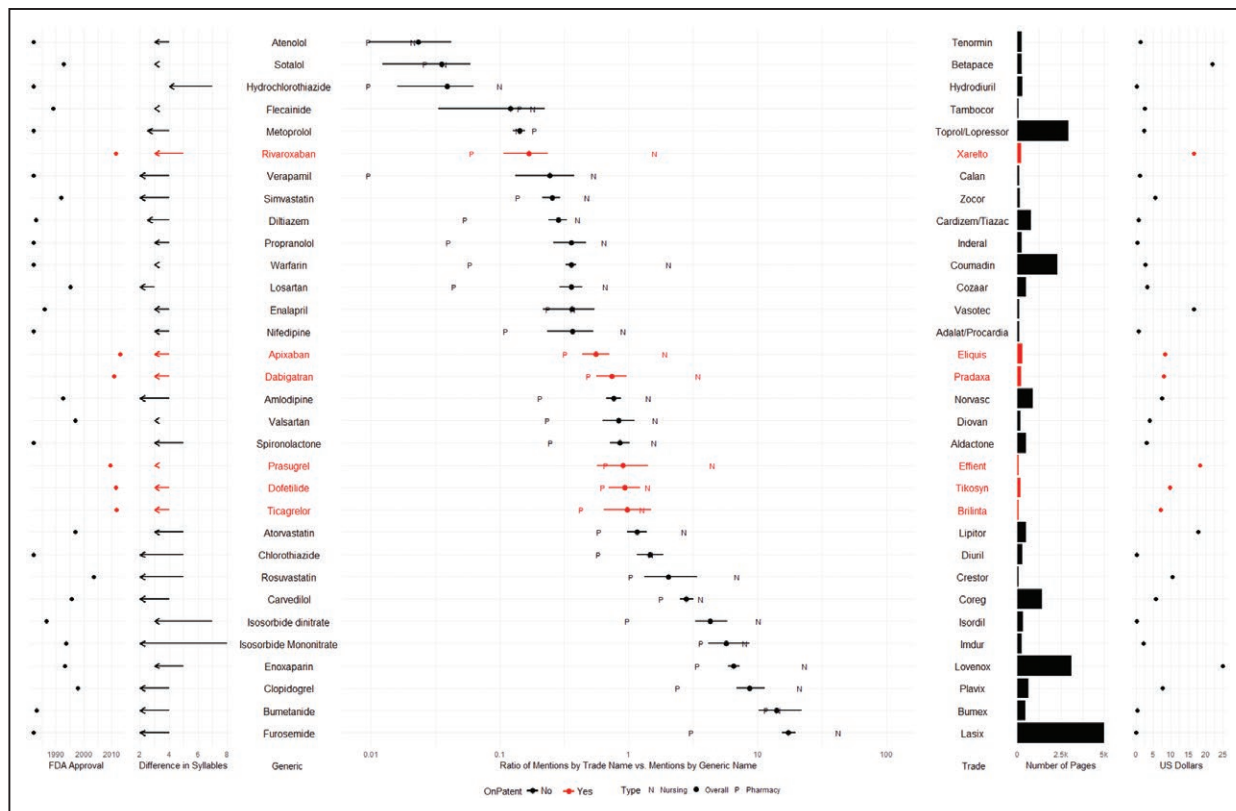


Figure. Variation in medication name usage compared with Food and Drug Administration (FDA) approval year, number of syllables, frequency of paging mentions, and cost.

to either a pharmacist or a nurse are independently analyzed and the ratio denoted by P or N respectively. Medications on patent are denoted by red, whereas medications no longer on patent are black. For example, furosemide is a commonly mentioned off-patent medication, and the ratio of mentions for Lasix to furosemide is 17.4 and is denoted by a black point estimate in the bottom right of the central figure. Of the text pages from pharmacists and nurses, the ratios are 3 and 42.5, and the point estimates are denoted by P or N respectively to the left and right.

Using the same y axis, to either side of the center figure, we display the relationship between each medication and the year of Food and Drug Administration approval, the difference in number of syllables between generic and trade names, the frequency of mention, and the average unit price. We show the relationship between each medication and difference in number of syllables between generic and trade names using an arrow, with the head of the arrow identifies the number of syllables in the trade name and the back of the arrow identifies the number of syllables in the generic name. The length of the arrow is the difference in the number of syllables between trade and generic name.

CONCLUSIONS

In our study, we use a high-throughput method of analyzing and visualizing healthcare worker sentiment

toward medications. From our data visualization, we see that there is significant variation in the preference of trade names versus generics names across drug classes and healthcare providers. This variation did not visually correlate with the year of Food and Drug Administration approval, the number of syllables in the trade name or brand name, frequency of mention, average unit price, or whether the drug is on patent. Nurses are more likely to use trade names than pharmacists. Physicians do not usually self-identify their role in the text page; thus, we were unable to independently assess their behavior. To the extent that text pages reflect other modes of communication and prescribing patterns, the patterns of name use suggest that further interventions to promote the use of generic names and limit bias in medicine are needed.

ARTICLE INFORMATION

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Disclosures

None.

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