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Cynthia Jackevicius, BScPhm, PharmD, MSc   
Associate Editor   
Circulation: Cardiovascular Quality and Outcomes

Dear Dr. Jackevicius and reviewers,

Thank you for your careful review of our manuscript, **What's in a Name? Factors that influence the usage of Generic vs. Trade Names for Cardiac Medications among Healthcare Providers,** submitted to Circulation: Cardiovascular Quality and Outcomes. Your helpful suggestions are much appreciated, and have led to significant improvements in the manuscript. Please find our responses below, outlining edits tracking in the accompanying document.

**1) Explain what insight this figure provides that a standard table would not provide.**

Thank you for considering our data visualization. The fundamental conclusion of our paper is that there is significant variation in the use of generic and brand names for medications, both by provider type and by medication class, and this variation exists regardless how frequently a medication is used. In this newest iteration, we show that the variation in the use of generic and brand names does not relate with FDA approval year, difference in the number of syllables, whether the drug is on patent, and average unit price.

We visualized this variation in a format similar to forest plot in meta-analysis with a ratio plotted along the x-axis and medication names along the y axis. On either side of the main figure, other variables of interest are plotted along a shared y-axis. This figure allows for rapid analysis of the information and highlights the key points of our analysis - that there is significant variation independent of whether a drug has a much shorter trade name compared to generic name, whether the drug is on patent, or how frequently a drug is mentioned. There is also clear representation that nurses are more likely to use a brand name compared to a generic name.

**2) Given that a Data Visualization article focuses on the visualization, the figure needs greater explanation to understand how to use it, as it is not entirely intuitive. 3) Please provide 1 or more illustrative examples to walk a reader through how to interpret and understand the figure.**

We agree that further explanation of the data visualization show be provided and have significantly added to the accompanying text. We also further describe its presentation using an illustrative example focusing on Lasix/furosemide. In light of word limits and with further description of our data visualization with an emphasis on this being the central theme of our paper, we have decided to remove the multivariate analysis and incorporate some of the key variables as part of the data visualization.

**4) Explain the implications of this work on what the problem of the findings are and how health professionals should change behavior or other actions that should be taken to address the problem identified.**

We believe this is an important issue as the use of brand names is associated with failure to substitute brand name drugs for generic alternatives and leads to significant excess cost (lines 94-95). This has also been recognized as an issue of bias in medical education as medical students often take on the habits of their healthcare team (lines 43-45). The introduction and conclusion has been changed to reflect the impact of this work.

**5) We find our readers benefit more and there is more interest in papers when code is provided for this type of work.**

We agree with this assessment and believe our code would be useful in further analyses of this time. We have further clarified the methods and also provide a link to the code on github (lines 57-58).

**6) We refer you to prior examples of Data Visualizations, collected at**[**http://circoutcomes.ahajournals.org/category/data-visualizations**](http://circoutcomes.ahajournals.org/category/data-visualizations)**, to assist you with your revision.**

Thank you for the additional suggestions. In light of the prior examples, we have decided to remove the multivariate analysis, add that to the data visualization, and in the text of the manuscript focus more on the description of the data visualization (lines 67 - 99).  **Reviewer #1:   
  
This is an interesting brief report on the relative frequency of generic vs brand name use of cardiovascular medication, as assessed from text pages at a single center. It is a nice application of big data analytics and reminds us that preferential use of brand names for many drugs is alive and well. The study has appealing novelty insofar as many clinicians have expressed a preference for using generic or brand names, but there are very few studies on the topic.   
  
However, the study has some limitations. The most important limitation is that the framing of the problem and the questions that this study is trying to answer are a bit unclear. In particular, more than half of text pages used as data were sent by pharmacists or nurses. It is unclear what proportion of the remainder were sent by physicians (vs. byother health professionals whose profession could not be ascertained from the content to the text pages). Yet, naming preference has traditionally been thought of as most important for prescribers (e.g. physicians). The authors do not clearly lay out what is the meaning and role of non-physician health professionals' use of medication names, and thus what lessons we should be learning from the results.**

Thank you for your thorough review of our manuscript and the insightful comments to improve it. A limitation of our study is that we are unable to identify the sender’s profession for text pages wherein the profession is not explicitly identified in the body of the text. That said, our visualization shows differences between subclasses, which can suggest variation in culture and sentiment. We believe a uniquely appealing aspect of our dataset is the inclusion of pharmacists and nurses, and that these providers’ behaviors are of interest to the overall issue of bias and behaviors. Residents and medical students learn from many members of the multidisciplinary team in addition to attending physicians, including absorbing habits and vernacular from pharmacists and nurses. As medicine becomes more of an interdisciplinary "team sport" with many institutions having pharmacists and nurses round with the physician team, behaviors of each individual member of the healthcare influence one another and patient care. This viewpoint has been codified in institutional policies and professional guidelines to minimize the use of brand names, regardless of profession.

**Some variables in the multivariable analysis could be collinear, for example on-patent status and year of FDA approval, which could create model instability and might account for the unusual results observed for the on-patent variable. Also, it would be helpful to see the bivariate associations, so as to better understand the relationships being evaluated.**

Thank you for this comment. In order to make room for more description of our data visualization, we have removed the multivariate analysis and incorporated relevant variables into the main figure.  **It is difficult to tell from the figure, but it appears that some drugs were only cited a small number of times, which may lead to wide confidence intervals around the estimates (especially for subgroup estimates of pharmacist and nurse usage). It would be prudent to manage this situation, for example by dropping these drugs from the analysis, or showing the confidence intervals.**

Thank you for the feedback. In our most recent figure, we have dropped medications that were mentioned less than 50 times to create a more concise and clean visualization. We additionally add 95% confidence intervals for the overall point estimate. **Minor comments   
  
The categorization scheme by cardiology specialty seems somewhat arbitrary and is not supported by an a priori hypothesis. It is a bit confusing and appears to add little to the reader's ability to interpret the results.**

Thank you for the comment. We believe this categorization shows the variation across cardiology specialties and demonstrates that this variation between generic and brand name use is present in all specialties. We introduce a new version of our data visualization with the categorization removed.  **In the figure, the meaning of the grey and red horizontal bars at <.01 and >100 is unclear. Also, the color scheme is difficult to see and somewhat confusing, and would be best to omit.**

We appreciate this feedback. The horizontal bars and color scheme have been removed. A new color scheme with whether the drug is on or off patent is included.  **Reviewer #2:   
  
Thank you for the opportunity to review this manuscript. Ouyang et al have conducted an analysis of text from a medical paging system at a large academic hospital to assess the use of trade versus generic medication names in communications between health care providers. While this is a novel idea, I think the manuscript could be strengthened in a number of ways.   
  
General comments:   
1. Given that you have submitted this manuscript in the "data visualization" section, there needs to be, at minimum, more description of the figure as right now it is not effective to communicate your findings, nor is it adequately described.**

Thank you for considering our data visualization. We have significantly changed the text of the submission to better describe the figure and its construction. We have greatly expanded the data visualization to let it be the focus of the submission rather just a part of the submission. Important covariates in the multivariate analysis were added to the data visualization.

**2. While the idea behind the work is interesting, the link between what medication name a provider types into a paging service to what nomenclature is actually used when prescribing is missing. In other words, providers may be using simpler names (regardless of brand/generic name) when typing but this may not have any relationship to what they actually prescribe the patient. I think this manuscript needs to be revised to include a stronger rationale for the work and an increased discussion of the limitations of the project.**

Thank you for this feedback. We believe there is interest in how different classes of healthcare workers use the medication names and believe it does have inherent insight into the training and biases of each group. Pharmacists and nurses are using the same text paging system but use language differently, and we believe this language influences practice. In our updated analysis, we show that there is not a clear relationship towards using the "simpler" name, as there are clear examples of names with similar number of syllables being used very differently. Sotalol is used much more frequently than Betapace (both 3 syllables), while Prasugrel and Effient are used close to parity (both three syllables). We agree that there might not be a clear relationship between prescribing patterns in this analysis and we have added an acknowledgement of this limitation (line 99), as it is indeed true that previous findings demonstrating that brand name usage via other types of communication are associated with increased use of these drugs may not be applicable to text pages.

**Specific comments:   
1. Line 42: I don't think 'brand-names' needs to be hyphenated, or at minimum, should remain consistent with how you spell 'trade names'.**

Thank you, this has been changed. We now consistently use trade names as the terminology. **2. You should introduce the concept of looking at paging data in the introduction. Otherwise, the reader expects that you would be looking at medical record or prescription data.**

Thank you, we have moved the description of looking at text pages and rationale to the introduction (lines 45 – 49).  **3. Line 46: You state that you will look across multiple cardiology subspecialties, but this isn't discussed in the results. Your main objective, clearly stated in the introduction, should match the main results presented.**  
Thank you, we were trying to highlight the variation that is present across cardiology specialties by separating them in the data visualization. We have omitted and rephrased this sentence (lines 48-51).

**4. The methods should be expanded to provide more detail about the other variables collected, etc.**

Thank you for comment. In order to make room for more description of our data visualization, we believe the manuscript is strengthened by the removalof the multivariate analysis. The additional data has been excluded from this submission.  **5. Line 58-59: 34% of pages were from nurses, 20% from pharmacists, were the remainder from physicians?**  
Thank you for your thorough review of our manuscript and the insightful comments to improve it. A limitation of our study is that we unable to identify the sender’s profession for text pages wherein the profession is not explicitly identified in the body of the text. We edited the manuscript to explicitly mention this (line 97). That said, our visualization shows differences between subclasses which can suggest variation in culture and sentiment. We believe a uniquely appealing aspect of our dataset is the inclusion of pharmacists and nurses, and their behaviors are of interest to the overall issue of bias and behaviors.

**6. Line 59: How did you define "commonly used" cardiac medications? Were they the most frequently used in your patient population (based on what?)? Or based on the authors' experience?**  
Thank you for the comment. We looked at the most frequently mentioned medications and excluded medications that were not specific to cardiology (Tylenol, Colace, etc.). We have omitted and rephrased this sentence (line 54).

**7. In the conclusion, you mention that use of trade names has been linked to decreased patient compliance and worse health outcomes. This is true, however, your study looks solely at communication between providers. One finding is that increased use of trade names is associated with an increased number of syllables in the generic name; so this is really because it's easier to type. Do we know if how providers communicate to each other influences what they document in a medical record or on a prescription? This idea needs to be fleshed out, or at least clearly stated as a limitation.**Thank you for this comment—this point is well taken.We have now stated this lack of proven connection between text pages and other modes of communication between providers as a limitation of the study (lines 99).We do believe that there is a connection between the language one uses and the actions of the provider. This is a unique dataset that describes the common vernacular that might not be explicit in formal documentation, yet can give insight to a provider’s thought process. While it’s true that the number of syllables influence which name is chosen, in this context we show that this ease/comfort greatly influences a provider to the extent of ignoring ideals of potentially ignoring bias or avoiding brand names. This in itself is interesting as there is much thought and effort in choosing both the generic and brand names of medications (<https://www.cnn.com/2016/11/25/health/art-of-drug-naming/index.html>).   
 **8. I found the figure quite difficult to understand. You need to explain it more, at minimum by including a legend (as stated in the instructions for "data visualization" submissions). These types of manuscripts are meant to provide innovative depictions of data - I am not sure that this current version of the manuscript, or this figure, are meeting that goal.**

Thank you for this feedback, which we recognize as very central to the purpose of this type of manuscript. Our figure has been improved by the additional of 95% confidence intervals, removing superfluous color, and avoiding the previous categorization by specialty. We have increased and improved the description of the figure, as well as removed medications mentioned fewer than 50 times each from the analysis in order to streamline the figure itself. With the removal of the multivariate analysis, we introduce visual comparisons with key covariates to show a similar conclusion.

We hope you will look favorably on our revisions, and consider the manuscript now suitable for publication in *Circulation: Cardiovascular Quality and Outcomes*.

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