Reviewer's report

Title: An Evaluation of Pharmacology Curricula in Australian Science and Health-related Degree Programs

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Reviewer: Francis Achike

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REVIEWER'S REPORT (Manuscript No: )

Title: An evaluation of pharmacology curricula in Australian science and health-related degree programs

General: The authors gathered data on the state of pharmacology curricula across various professional and non-professional degree programs in Australia. They classified the degree programs under 5 major categories (Science, Pharmacy, Nursing, Medicine, and Allied Health) and explored curricula content (lecture topics) within each of 17 major pharmacology themes for each of the five degree programs. The data revealed the breadth of pharmacology coverage and the authors devised a formula by which they calculated the depth of coverage of pharmacology. The authors also explored and compared the teaching, assessment, and curriculum evaluation methods across the degree programs. On the basis of their data they ranked the five degree programs with respect to breadth and depth of pharmacology coverage. The authors then proceeded to propose an “adoption of a generic pharmacology curriculum that could be tailored to suit individual degree programs.”

Comment:

1. Overall the paper is well written. The research question and the methodology are appropriately matched. The following however, are major/minor issues of concern.

Discretionary Revisions

2. I have a fundamental disagreement with what seems to be a significant objective of this work: to propose a core pharmacology curriculum for the various professional and non-professional degree programs. Intra-professional (e.g. Medicine) core pharmacology curriculum is a sound concept, but not the idea of a generic pharmacology curriculum for both professional and non-professional degree programs. This idea sounds to me fundamentally flawed as it does not seem to recognize that pharmacology only serves as a service discipline to such professional degree programs as Medicine and Nursing, which would use/need pharmacology only to the extent it serves the attainment of their curricular outcomes. Even if one were to be developed, each professional degree program will tinker with it to suit its curricular outcomes so much so that at the end we shall be back to square one with a diverse pool of pharmacology curricula. The
authors should reflect on this and consider modifying the text accordingly.

3. Overall the study was about the extent of what was taught, how it was taught and assessed, but little on how much was learnt. The authors may want to comment on this.

4. Understanding the methodology in this study could be helped by posting the questionnaire. The authors should consider this.

5. The authors observed/classified assessment into in-semester and end-of semester. I do not see any particular benefit in this classification as against a formative versus summative classification which has greater pedagogic value. The authors should consider including this classification if the information is available.

Minor Essential Revisions:

6. Results, para 11, line three: Add the word “grade” after assessment

7. Results, para 11, last sentence: “------ and 7% of courses were assessed by examination alone (9 medicine, 3 allied health).”

Comment: I don’t understand what this part of the sentence is trying to say. What is assessment and what is examination in the context of this sentence? Would the following be what you intend to convey? “------ and 7% of courses were assessed by end-of-semester examination alone (9 medicine, 3 allied health).”

8. Results, para 13, 1st sentence: “In all degree programs with the exception of medicine, the most common method of student evaluation consisted of a mix of structured and open-ended questions.”

Comment: This sentence could be read to mean an evaluation of the students, or students’ evaluation of the course. Be more explicit.

9: Legend to Figure 1: Insert “Students” in front of “Enrolment”

10. Table 7: “A comparison of lecture----.”

11. Figure 3: “A comparison of lecture hours----.”

Major Compulsory Revisions:

12. Methods, para 1, line 3: “Of the 37 institutions contacted, 27 agreed to participate (73% response rate) and of those, staff from 22 completed the survey--.”

Comment: Do the 37 institutions contacted represent ALL the institutions in Australia that offer Pharmacology courses of any sort? This information must be made clear to the reader since the study is supposed to represent the whole of Australia and so one would like to know how representative the study sample is. If the 37 do not represent all, then the reader must know the process of selecting these 37 institutions for the study.

13. i. The authors need to make clearer their concept of depth of pharmacology
content. The assumption that more hours allocated to a lecture topic translates to greater depth is presumptuous and should be discussed in more depth that brings out the weakness of that assumption. Secondly the authors need to explain their formula for depth.

ii. A brief explanation of the rationale for the ‘index of depth’ formula will be useful to the reader. In the formula itself, the authors should make each parameter explicit. For example, the numerator, “average number of lectures” should be more explicit by indicating if it is average number of lectures for a theme or for a lecture topic.

14. Results, para 4 line 10: “The therapeutic drug theme Analgesia/Anaesthesia/Anti-inflammatories was the most widely taught, while Complementary Medicines and Future Therapies were taught in the least number of courses across all degree programs.”

Comment: This statement cannot be correct unless “therapeutic drug theme” is defined to exclude “Pharmacokinetics” (Table 6) with a mean of 58% compared with 56% for “Analgesia/Anaesthesia/Anti-inflammatories.” Similarly, “Complementary Medicines” (21%) should not be included in the list of least number of courses without mention of “Musculoskeletal drugs” (18%) (see Table 6).

15. Results, para 8: “Practical classes still dominated in science degree programs, with 63% of courses offering wet-labs with the total time allocated to these practicals ranging from 1-48 hours.”

Comment: This statement is incorrect. Practical classes with 62.7% of courses and 1-48 hour time allocation did not dominate over lectures with 90% of courses and a 4-48 hour time allocation (See Table 8). Please correct this error.

16. Results, para 8: “A third of courses in science also offered computer-based simulated practicals (i.e. computer modelling or simulation).”

Comment: The statement is incorrect. The data (Table 8) show that 22% (less than a quarter) use computer simulation in Science. Please rephrase.

17. Results, para 8, line 9: “The proportion of online teaching was skewed in the nursing degree program because two fully online courses were included in the survey; ----.”

Comment: This is an inaccurate description of the data. If any skewing at all, it is in Medicine with 3-7% of courses using online methods (Table 8). Consider simply stating that two fully online courses exist in Nursing.

18. i. Reporting the percentage composition of the total number of assessments performed under a degree program (Tables 9 and 10) is appropriate. Combining this with data on percentage of courses that actually use each assessment method (e.g. Results, para 10, 7th sentence) will be more appropriate as this will show clearly the spread of use of the assessments methods. For example, if one course contributed 90% of the total number of MCQs in a degree program
(because all assessment in that course is MCQ type), the percentage for MCQ in the overall total number of assessments in the degree program will still be high even though it is contributed mainly by just one course, indicating narrow spread.

ii. Another way to express the value of each assessment method is to report on the quantum of contribution of each assessment method to the final mid-semester or end-semester grade. For example, Table 9 shows that Laboratory Report constitutes 23.9% of assessments under the Science program, but in reality the scores from Laboratory reports may contribute an insignificant portion (weightage) to the overall score. Given that assessment drives learning, this would make Laboratory reports insignificant in motivating students’ learning.

iii. I did not find the Table legends easy to understand. Consider modifying the legend to Table 9 as follows: “Data are expressed as percentage of total number of the different assessments performed in each degree program”

Apply same to table 10.

19. In consideration of the comment above (12ii), please take a look at Figure 4 and its legend. The legend says, “a comparison of the proportion of assessment ----.”

Comment: Is proportion here with reference to the total number of assessment or the weightage of the assessments (end-of-semester versus in-semester assessments)?

20. Discussion, para 2, 2nd sentence: “Although this method of analysis inevitably caused some loss of detail, especially for science and allied health degree programs, it enabled an overall picture of pharmacology teaching in Australia to emerge.”

Comment: Why would this method of analysis ‘inevitably cause some loss of detail,” and why particularly for Science and Allied Health degree programs? Please explain.

21. Discussion, para 5, line 17: “By contrast, nursing students require a fundamental core of pharmacology knowledge for their practice rather than the depth or breadth of knowledge needed by pharmacy or medical students.”

Comment: This is an example of a general statement without an argument or evidence to support the claim.

22. The concluding paragraph reads fine, but as is it gives the impression of a study with data that have universal applicability. The word “Australia” should be inserted somewhere in the paragraph. Consider modifying the first sentence to read thus: “The survey provides an overview of pharmacology teaching in, science, pharmacy, nursing, medicine, and allied health degree programs in Australia and identifies -----.”

23. Table 6, 2nd Column states “Mean (%)”
Comment: With a set of data on mean, one expects to see the standard deviation or the standard error of the means. Apply this principle wherever applicable.

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Level of interest: An article of importance in its field

Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:
I declare that I have no competing interests