Impact of a Novel Multimodal Pharmacodynamics Educational Approach Deployed for First Year Doctor of Pharmacy Learners

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Abstract ID 102596   **Poster Board 423**

Mastery of fundamental pharmacology concepts is an essential component of Doctor of Pharmacy programs (Pharm. D.). The acquisition of these skills, however, is challenging for most trainees and a solid understanding of the meaning and use of appropriate pharmacology terms such as efficacy, potency, receptor reserve, allostery and biased agonism is often not fully realized. In an effort to overcome these challenges, I have developed an intuitive didactic approach based on three interrelated components: 1) a consistent theoretical framework and terminology, 2) tangible in-class demonstrations with props and role-playing and 3) a versatile computer simulation tool. The impact of the first two components of this teaching approach when implemented for first-semester students of the Pharm. D. program at the University of Michigan (86 learners) was evaluated through a focused questionnaire. Analysis of the data (46% response rate) indicates that nearly all (90%) of the learners had a moderate to minimal previous exposure to pharmacodynamics concepts. More than half of the responders strongly agreed that the in-class use of props and analogies is an effective, innovative, and memorable approach to learn pharmacodynamics principles. A large majority of learners (>80%) found that the analogy of a bell without a striker (receptor) and balls of different properties (ligands) helped to understand the concepts of affinity, intrinsic efficacy and stimulus. Similarly, nearly all learners (>90%) found the analogy of a light sleeper spouse vs. a sleep deprived son helped them to understand the concepts of tissue sensitivity and magnitude of response. Notably, before the experience, the majority of learners somewhat or strongly disagreed that they had a consistent framework to understand concepts such as the factors that determine drug potency, maximal response and receptor reserve. After engaging with the strategy, nearly all (>90%) of the learners somewhat or strongly agreed that they now had acquired a consistent framework to understand these concepts. Free form written comments such as: "*I really did like all of the analogies used (the bells, the light sleeper, etc) because this was an easy way to help me remember more challenging concepts*" or "*The best part was definitely using the props! I definitely found the content to be more engaging and made more sense*" support the quantitative results of the survey. Overall, this initial evaluation supports the view that an internally consistent framework coupled with live interactive demonstrations is a valuable approach to enable learners to progressively master pharmacodynamic concepts generally considered to be abstract and difficult to understand.