Proceedings of the British Pharmacological Society at http://www.pA2online.org/abstracts/Vol13Issue3abst314P.pdf

Development Of An Innovative Teaching Toolbox For Pharmacokinetics

Background: The subject of pharmacokinetics presents significant learning challenges on account of its complexity, the mathematics involved and the traditional dry, didactic approaches to its teaching. However, it forms a fundamentally important aspect of Pharmacology representing a true *threshold concept* that allows students to move a higher level of understanding once they grasp the concepts involved. Feedback from students at undergraduate and postgraduate level suggest that this is an area of the curriculum that needs invigorating in order to engage students and enhance their knowledge and understanding.

Aim: Creation of a catalogue of new approaches to teaching and learning pharmacokinetics through a series of projects supported by BPS teaching grants and UOA Learning and Teaching Enhancement Project funding. These would complement one another closely and enhance the student learning experience in this difficult curricular area. By involving students in the design of such approaches, the materials were more likely to be relevant, student friendly and accessible to both UG and PGT users.

Summary of the project work: In total, 4 projects were undertaken to create an integrated approach:
1. A hierarchy of interwoven explanations, definitions, relationships and practice exercises were created as an online student friendly and attractive recap of all the main aspects of pharmacology. These are available to students through the virtual learning environment (VLE).

2. A feedback driven, experiential learning circuit was created to lead students through the process of handling, graphing and analysing pharmacokinetic data from start to finish. Designed using assessment software, this provides feedback in the event of any incorrect steps, so the student can learn and then apply the new learning to the scenario again. Again, this is fully integrated with the VLE and is available to students at any time.

3. Design of a series of laboratory practicals using a model system that mimics single compartment kinetics. This brings the Pharmacokinetic concepts to life and allows experimentation with single and multiple IV or oral drug doses, as well as infusion kinetics. The suite of practicals are simple to set-up and produce reliable and effective data for the students allowing a greater connection between them and the numbers with a visualisation of the processes underway.

4. Conversion of the practical exercises outlined in 3 into online simulations for remote or distance learning. These practical exercises were created using feedback loops and guiding information to lead the user through the process of adding drugs to the model system and then gathering pharmacokinetic data for analysis. This adds flexibility and accessibility to this unique and innovative practical set.

Outcomes: In terms of grades, these have improved progressively with the gradual introduction of these supportive teaching and learning aids with overall grades improved by an average of 10% across both cohorts while other assessed areas of the course remained stable. Student feedback has been overwhelmingly positive, with students in particular appreciating the design “by students for students”.

Conclusion: The above combination of approaches has established a new library of tools to enhance student learning of pharmacokinetics. By taking a holistic approach to the teaching delivery student grades were improved, as was their satisfaction and experience. The approaches unite aspects of elearning, with student-led learning and research to address some of the difficulties associated with this complex area of Pharmacology to produce a modern and engaging set of new strategies.