**Research informed teaching:**

**Pill School: teaching life-skills that aid patient adherence, improve accessibility to new and existing solid oral dosage form (pill) therapies and facilitate better health outcomes.**

**General Context (100 words)** *what area of work is involved and which school, faculty, staff does this represent*

Solid oral dosage forms (SODFs) are considered ‘patient friendly’ medicines, and widely available and economical to produce. However, up to 50% of patients experience difficulties swallowing SODFs. It is inappropriately assumed that adults can swallow SODFs without difficulty and children can’t. To ensure optimal medication use and clinical outcomes, a medicine must be taken as agreed between the patient and prescriber. Difficulties taking SODFs triggers poor medication adherence, and adoption of inappropriate coping or modification strategies. There are limited “age-appropriate” paediatric formulations resulting in use of unlicensed or “off-label” therapies. To improve SODF adherence and facilitate access to wider treatment options, all patients over three years of age can be taught to swallow SODFs.

**Specific Project Work (200 words)** *one or more linked projects, which PGR students involved, other collaborators or partners*

Dr McCloskey collaborates with the KidzMed team at Newcastle Children’s Hospital, training qualified and student healthcare professionals nationally (UK webinars, hospitals, and universities) and internationally (Jordanian and Malaysian universities) that pill swallowing is a life-skill and “easy” when you know how. Members of the MPharm teaching team, Susanne Mason, Michael Traynor and Jonathan Davies, have assisted Dr McCloskey’s introduction of the “Pill School” within the School of Pharmacy and Biomolecular Sciences. Academic collaborators from other institutions include Dr Adam Rathbone Newcastle University and Dr Andrew Lunn University of Central Lancashire who have enabled multi-site introduction of e-learning pill tutor training for undergraduate student pharmacists, Dr Mohanad Odeh at Hashemite University Jordan, NHS collaborators in Bristol and Edinburgh Children’s hospitals, Dr Mary-Carmel Kearney Queen’s University Belfast, and The Pediatric Medicines Research Unit-Dr Louise Bracken and Postgraduate Diploma student Rachel Rowley who facilitated Pill School introduction to Alder Hey’s cystic fibrosis clinic. This project involves teaching student and qualified healthcare professionals the importance of asking about SODF-taking abilities and adopts an evidence-based process to teach patients of all ages to successfully swallow pills. The training has been adopted as an integral part of undergraduate MPharm teaching in LJMU with feedback captured in a manuscript for publication and conference presentations at the Royal College of Paediatrics and Child Health 2022 and Heart UK 2022.

**Impact on curriculum (300 words)** *which course or modules changed, what changes occurred, link to specific students (delivery) or content*

LJMU is the first UK School of Pharmacy to adopt this training as an integral part of undergraduate MPharm teaching. Final year MPharm students at LJMU complete masterclasses in specialist clinical areas including child health (*7100IMPHAR Advancing Patient-centered care*). This masterclass captures the unmet therapeutic needs of children, importance of designing, selecting and prescribing age-appropriate formulations, and conducting paediatric clinical trials. Dr McCloskey has introduced Pill School to the Child Health Masterclass. Pill School facilitates development of professional independent learners with skills necessary for future practice. It utilizes Health Education England e-learning for healthcare developed by the KidzMed team as pre-work. It raises awareness of the importance for healthcare professionals to enquire about SODF taking experiences by using validated screening tools including PILL-5. Students are taught, through active engagement in a Pill School workshop and application of their pre-work, to overcome SODF ‘pill’ swallowing difficulties using the pop bottle method and sweets/ empty hydroxy propyl methyl cellulose capsules as placebo pills.

The session highlights how open questioning and short interventions (approximately 15 min per patient) can meaningfully improve patients’ medication use and medication-taking experiences. Students are encouraged to reflect also on their own pill swallowing experiences. Post workshop students can include their learning as evidence in their portfolios thus facilitating development of essential professional skills and development of reflective practitioners. They also had the opportunity to listen post-workshop to KidzMed podcasts highlighting the importance of teaching pill swallowing from the perspective of the multidisciplinary team and an adolescent patient who had successfully completed the programme. KidzMed will be introduced from a formulation and informed drug design perspective in Pharmaceutical Science programs at LJMU from September 2022. At the end of the day the best formulation in the world is only beneficial if it is acceptable to patients and can reach the intended biological site of action. Assessment of pill swallowing ability or the need for pill school alongside prescribing and dispensing of a marketed SODF should be an important part of this design process.

**Broader Changes (300 words)** *did curriculum impact lead to change in skills, career choice and employability, student evaluation, other impacts (advertising case studies, alumni lectures)*

Student views were key to permanent adoption of Pill School in our MPharm programme. It was extremely well received with feedback confirming that students recognized the importance of the topic and its relevance for clinical practice. Students liked the “quick … useful and very beneficial” nature of the learning. They enjoyed “hands on practice” and described the workshops as “really fun… and interactive”. The material was viewed as “very transferable” and “useful for future practice” as well as being highly “beneficial for a lot of patients”.

Most MPharm students continue with training post-graduation from LJMU in the form of a foundation year. This is often completed in clinical settings. Students recognized that regardless of their future career choice the learning can be applied to both adult and paediatric patients. In addition to NHS training events, Dr McCloskey and the KidzMed team organized and led a Royal Pharmaceutical Society and Royal College of Paediatrics and Child Health webinar viewed by over 300 healthcare professionals to date. NHS stakeholders who have attended these sessions know that our graduates come with this unique skill that can be utilized from day one in the foundation year, differentiating our graduates from others.

The project is significantly improving patient care in a real-life clinic since being introduced to Alder Hey by Dr McCloskey and Rachel Rowley her diploma pharmacist. Teaching children pill swallowing in the cystic fibrosis clinic is hugely beneficial as this skill allows children access to novel life-prolonging and life-saving therapies that are only available as SODFs. Rachel provided a pre-recorded case-study on Pill School implementation in Alder Hey for our MPharm students highlighting its impact in a real-life clinical setting. The students recognize that this intervention can have similar benefits for patients if introduced to other clinics/ primary care settings.

Dr McCloskey was also invited to run a pill training session for MPharm students at Queen’s University Belfast and to run meet the expert workshops at two conferences Royal College of Paediatrics and Child Health and Heart UK. Dr McCloskey’s efforts are recognized at a European level with invitation to sit on the European Paediatric Formulation Initiative Committee and contribute to their working document on developing age appropriate SODFs.



