Child Health Essential Skills Stations: Development, Implementation, and Evaluation of an Undergraduate Child Health Clinical Skills Course

Alexander James Harper 1, 2, *, Kyriacos Gregoriou 3, 2, Caitlin Patterson 4, 2 and Prashant Kumar 1, 2

1 Department of Medical Education, NHS Greater Glasgow and Clyde, University of Glasgow, UK
2 School of Medicine, Dentistry and Nursing, University of Glasgow, UK
3 Department of Medical Education, NHS Ayrshire and Arran, University of Glasgow, UK
4 Department of Medical Education, NHS Lanarkshire, University of Glasgow, UK

*Corresponding author: Honorary Clinical Teacher, Department of Medical Education, NHS Greater Glasgow and Clyde, University of Glasgow, UK. Email: aijharper93@googlemail.com

Received 2022 September 26; Revised 2023 May 13; Accepted 2023 May 30.

Abstract

Background: Training medical students to competently apply the clinical skills they will need as qualified doctors proves an ongoing challenge for clinical educators. During undergraduate study, students spend less time with pediatric patients than adult patients, making it more difficult to gain confidence working with this patient group. There is currently myriad evidence for a “skills lab” approach to clinical skills teaching, and this has taken on greater importance for teaching procedures during the coronavirus disease 2019 pandemic. Therefore, a standardized course for child health clinical skills was designed and implemented to run in a skills lab setting. This study describes a new course training five clinical skills important in child health. The course incorporates small group teaching, simulated practice of skills, and specific feedback from tutors, all within a skills lab setting. Evaluations were carried out over approximately one academic year, with a total of 174 participants from a single United Kingdom medical school.

Objectives: This study aimed to implement and evaluate a standardized undergraduate clinical skills course for child health and improve students’ confidence in performing child health clinical skills.

Methods: Qualitative and quantitative data were collected, examining students’ self-reported confidence (pre- and post-course), along with free-text course evaluations. A paired t-test was used to calculate the mean difference in students’ pre- and post-course confidence scores. Qualitative evaluations were analyzed for themes using framework analysis.

Results: The students had greater confidence in all measured learning outcomes following the course. Qualitative data, examined using framework analysis, suggested that the course was valued by students, who felt it was relevant to their future practice. Numerous written comments suggested particular content and teaching methods that were strengths of the course, including practical elements, small group teaching, and feedback from tutors.

Conclusions: Implementing a child health clinical skills course in a skills lab setting is feasible and valued by students. The course increased the self-reported confidence of the studied cohort and might therefore support them in practicing these skills with actual patients. Further studies are required to determine whether these effects demonstrate longevity and whether they translate to increased competence in performing the taught skills.

Keywords: Clinical Competence, Procedural Skills, Child Health, Pre-self-assessment and Post-self-assessment, Medical Students, Pediatrics, Undergraduate Medical Education

1. Background

The advent of the patient safety movement has encouraged medical educators to find new, controlled-practice environments in which to train clinical skills (1). The evidence suggests that “skills lab” teaching for undergraduates is associated with further skills being exercised during placements (2) and improved long-term performance (3). The traditional mantra of “see one, do one, teach one” quickly becomes confined to the past.

The integration of pre-clinical and clinical portions of medical school curricula has seen students enter the workplace sooner, with classroom, laboratory, and online-based teaching often spread throughout the duration of degree courses (4). While acknowledging the benefits of this approach, the fragmentation of time spent in clinical settings presents a challenge for educators, who must try to ensure undergraduates gain the necessary exposure and opportunities concerning clinical skills. Recent evidence suggests that the disruption of clinical placements by the coronavirus disease 2019 (COVID-19) pandemic has
resulted in United Kingdom (UK) medical students feeling less prepared to undertake their roles as new doctors (5) and has necessitated a revamping of the way clinical skills are taught in health professions (6). A recent review demonstrated that UK medical students feel less prepared for certain aspects of practice, in particular prescribing and certain procedural skills (7). This makes the work performed to prepare medical students for the clinical workplace especially important at this critical juncture.

Professional bodies mandate that UK undergraduate medical students show competence in practical skills relating to child health (8, 9). However, final-year placements in child health might be the only clinical exposure students have in this specialty before graduation (10). This puts an onus on the child health placement to provide students with the necessary opportunities to learn and practice core skills before graduating as new doctors. With the knowledge that exposure to teaching and skills is highly variable (11), there is a move to standardize child health teaching across the UK (12), and it is our role as educators to ensure students all gain some opportunities to practice clinical skills.

Historically, the opportunities to exercise necessary procedural skills on placement have been lacking (2, 11, 13) and have generated graduates who did not feel prepared for the clinical environment (7). However, bespoke clinical skills training in the laboratory setting might improve confidence to exercise skills (2, 11) and improve objective competence in skills beyond traditional teaching methods (14). One retrospective study reported that new doctors who underwent a procedural skill course as undergraduates had significantly higher self-reported competence as opposed to those who did not (11).

At this UK medical school, final-year medical students rotate through a variety of five-week specialty placements, one of which is child health. During this placement, students attend both clinical (i.e., outpatient clinic, inpatient ward, and acute admissions) and non-clinical (i.e., lectures, seminars, online learning, and personal study) activities. The students are expected to shadow clinical staff, take histories, examine patients, and be observed exercising specific clinical skills that form part of the medical school curriculum. These skills include counseling on inhaler technique, counseling on the use of peak flow meters, urinalysis, and the measurement of vital signs. The students have a responsibility to ensure skills logbooks are completed and signed off by an appropriately skilled healthcare worker, signifying that they have been observed completing each skill competently.

There is evidence that a skills lab approach provides students with more confidence to apply skills in clinical environments (2). Therefore, this study developed, implemented, and evaluated the Child Health Essential Skills Stations (CHESS) course for medical students to attend during their child health clinical placements. The course was piloted from October 2020 to April 2021 and continues to this day. Students’ self-reported confidence in achieving the course learning outcomes was measured before and after the course, alongside the qualitative free-text evaluations of the course.

2. Objectives

This study aimed to implement and evaluate a standardized undergraduate clinical skills course for child health and improve students’ confidence in performing child health-related clinical skills.

3. Methods

3.1. Course Design

Based upon standards set by the UK General Medical Council (8) and UK Royal College of Paediatrics and Child Health (9) and after careful consideration for relevance to the medical school curriculum, resources, and feasibility, five skills were chosen to be included in the course (Table 1). These topics were refined through consultation with the university’s subdean for child health and adapted iteratively from student feedback.

Table 1 shows the five skills stations selected to be included in the CHESS course and which of these skills are on the general medical council outcomes for graduates: Practical skills and procedures document (8) and/or the Royal College of Paediatrics and Child Health (RCPCH) Undergraduate Curriculum for Child Health (9). These curricula provide guidance on the procedures expected to be performed competently by UK medical graduates (8, 9).

During the course, each skill is taught in small groups (of two to five students) using standardized teaching materials and equipment, with each station lasting 30 minutes. Facilitators initially guide students through relevant theories concerning the performance of a particular skill. Students can then practice the skill in a simulated manner, with feedback and support from facilitators. Stations were facilitated by either one or two pediatric clinicians of varying seniority.

The CHESS course is run twice per child health rotation (i.e., twice every 5 weeks). This allows each student on their child health rotation to participate once. By integrating the course within the child health rotation, students can practice these learned skills concurrently within the clinical environment. The integration of clinical placements with relevant practical skills has been shown to be feasible and effective at other institutions (15).

3.2. Participants

The target population identified for the study were medical students undertaking clinical placements in child health. Therefore, a convenience sample was chosen within the local region where the course was piloted. There were no specific inclusion or exclusion criteria. At this institution, medical students have a single child-health rotation during their final year of study. Every final-year medical student was given a place on the CHESS clinical skills
course as part of their timetabled activities during their child health placement. Each student was invited to attend the course only once. Between 16 and 18 students attended each course. All the students attending the first 10 consecutive courses between October 2020 and April 2021 were invited to participate in the course evaluation.

3.3. Course Evaluation

Evaluations consisted of two parts as follows:

1. A self-reported confidence questionnaire was administered before and after the course.
2. Free-text qualitative feedback questions were asked after the course in order to explore students’ perceptions of the course and their recommendations for future improvements to the course.

Each student was asked to score their confidence in performing the skills immediately before and after the course using a five-point Likert-type scale ranging from “not at all confident” to “very confident”. Selections were coded as numerical values from 1 to 5. The items were constructed directly from the intended learning outcomes (ILOs). For example, self-reported confidence in the ILO “practice counseling on the correct use of an inhaler + spacer with a colleague” was measured using the item “How confident do you feel counseling patients on the correct use of an inhaler?”. Therefore, the questionnaires demonstrated face validity.

Following each course, attending students were also invited to complete a written, free-text evaluation under four headings (Appendix 1).

3.4. Data Collection

The data were collected using anonymous paper questionnaires given to every student attending the CHESS course between October 2020 and April 2021. Pre-course confidence scores were obtained immediately before commencing the course; nevertheless, post-course confidence scores and written qualitative feedback were obtained immediately following the course before leaving the site. The students were not interviewed as part of this study, and qualitative data were extracted from students’ written free-text responses (Appendix 1). The questionnaires were handed out and collected from the students by administrative staff.

3.5. Data Analysis

Raw data were entered into Microsoft Excel (version 2010). The internal consistency of pre-course and post-course confidence questionnaires from the first two pilot courses was calculated manually in Excel using Cronbach’s alpha. Mean differences in pre- and post-course confidence scores were calculated using a paired t-test. This quasi-experimental approach of comparing pre- and post-course scores was felt to improve the internal validity of the study.

Qualitative data collected from students’ free-text responses were analyzed using framework analysis, as described by Ward et al. (16). One of the authors (AH) formatted and analyzed the data using Microsoft Word (version 2018). Analysis was carried out through the lens of a realist epistemology, aligning with the chosen method for analysis (16). This study explored students’ perceptions regarding the quality and effectiveness of the course, the aspects which they felt could be improved upon, and the features that might be translatable to other courses. Framework analysis is commonly used to answer questions that have practical applications, such as the aforementioned ones (16). It also employs a clearly defined, structured approach, resulting in a series of notes and tables generated during the analytic process (16), thereby demonstrating dependability in the qualitative analysis (17).

Given that these data have been analyzed by a single researcher (AH), a short reflexive statement on the researcher’s background is relevant to the confirmability of the data (17). AH is a UK medical school graduate and currently works as a pediatric clinician with experience in undergraduate medical education. As someone with significant lived experience of the institution, curriculum, and student culture, AH is well-placed to interpret the students’ qualitative data on the CHESS course.

3.6. Ethical Approval

Formal ethical approval was deemed unnecessary for this study by the Institutional Ethics Committee (University of Glasgow, Scotland). Course evaluations were col-

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Table 1. Five Skills Stations Selected to Be Included in the Child Health Essential Skills Stations Course and These Skills on the General Medical Council Outcomes for Graduates: Practical Skills and Procedures Document (8) and/or the Royal College of Paediatrics and Child Health Undergraduate Curriculum for Child Health (9)

<table>
<thead>
<tr>
<th>List of Skills Stations Included in the CHESS Course</th>
<th>On GMC Outcomes for Graduates</th>
<th>On RCPCH Undergraduate Curriculum for Child Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Neonatal hip examination</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>2. Counseling on the inhaler and peak flow meter technique</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>3. Basic pediatric prescribing</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>4. Pediatric fluid management and prescription of fluids</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>5. Pediatric Early Warning Score use and urine collection</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Abbreviations: CHESS, child health essential skills stations; GMC, general medical council; RCPCH, royal college of paediatrics and child health
Table 2. Each of the Five Skill Stations and Learning Outcomes Associated with Each Station

<table>
<thead>
<tr>
<th>Station and Learning Outcome</th>
<th>Mean Difference in Self-reported Confidence Pre-Vs. Post-course (95% CI)</th>
<th>N (Complete Pre- and Post-responses)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drug prescription</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prescribing analgesia and antibiotics</td>
<td>+1.98 (1.82 - 2.14)</td>
<td>140</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Fluid prescription</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recognizing signs of dehydration</td>
<td>+1.16 (1.02 - 1.29)</td>
<td>140</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Prescribing fluids intravenously</td>
<td>+1.36 (1.21 - 1.52)</td>
<td>140</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>PEWS and urine collection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plotting PEWS score using the chart</td>
<td>+1.25 (1.05 - 1.46)</td>
<td>75</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Interpreting PEWS chart</td>
<td>+1.15 (0.93 - 1.36)</td>
<td>75</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Identifying indications for urinalysis</td>
<td>+1.50 (1.35 - 1.65)</td>
<td>145</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Interpreting urinalysis</td>
<td>+1.24 (1.09 - 1.39)</td>
<td>140</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Undertaking urine collection</td>
<td>+1.69 (1.53 - 1.86)</td>
<td>140</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Inhaler and peak flow meter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Counseling on the use of peak flow meter technique</td>
<td>+1.39 (1.03 - 1.75)</td>
<td>140</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Counseling on the use of an inhaler (with spacer)</td>
<td>+1.32 (1.17 - 1.47)</td>
<td>139</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Neonatal hip examination</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performing newborn hip examination</td>
<td>+1.96 (1.79 - 2.13)</td>
<td>126</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Identifying abnormal findings</td>
<td>+1.87 (1.72 - 2.02)</td>
<td>145</td>
<td>&lt; 0.0001</td>
</tr>
</tbody>
</table>

Abbreviations: CI, confidence interval; PEWS, Pediatric Early Warning Score.

4 New learning outcomes added to the course based on students’ evaluations.

4. Results

A total of 184 medical students were invited to attend and evaluate the CHESS course between October 2021 and April 2021. A total of 174 students participated in the course evaluation, completing part or all of the written evaluation (94.6% response rate). The items with missing data responses (for pre- and/or post-course confidence scores) were excluded from the analysis for that particular item. The completed response rate for each item can be observed in Table 2.

Quantitative data from the first two CHESS courses were analyzed using Cronbach’s alpha to ratify the internal consistency of the questionnaires. The two courses yielded 36 responses from each questionnaire. Their alpha values were 0.706 and 0.785, respectively.

A significant increase in students’ self-reported confidence was observed for all ILOs measured after attendance at the course (P < 0.0001) (Table 2). This finding was particularly evident for outcomes relating to prescribing and neonatal hip examinations.

Table 2 shows each of the five skill stations and the learning outcomes associated with each station. The mean difference in students’ self-reported confidence between their pre- and post-course confidence scores on each learning outcome is shown in the middle column. There were statistically significant positive increases in mean self-reported confidence scores for all learning outcomes (P < 0.0001). The final column shows the number of complete pre- and post-confidence questionnaire responses used in the analysis.

The framework analysis of written student evaluations identified four themes, namely applicability, practice, facilitation, and timing. Numerous subthemes were identified within each theme, with exemplar comments reported below (Table 3).

Table 3 shows the four themes and relevant subthemes derived from the framework analysis of student free-text evaluations (see questions in Appendix 1). Supporting exemplar comments are provided alongside. Changes made to the course based upon feedback included splitting fluids and prescribing into separate stations, introducing Pediatric Early Warning Score into the course, and removing the practice of urinalysis.

5. Discussion

Regulatory bodies require graduating doctors in the UK to meet set criteria, including the ability to perform...
Table 3. Four Themes and Relevant Subthemes Derived From Framework Analysis of Student Free-text Evaluations with Supporting Exemplar Comments

<table>
<thead>
<tr>
<th>Theme and Subtheme</th>
<th>Quotation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Applicability</strong></td>
<td>“Prescribing station - great teaching on an essential subject”</td>
</tr>
<tr>
<td>Useful and relevant to practice</td>
<td>“The fluid station was very helpful and made me feel a lot more confident.” “Clearer in giving instructions and techniques. Good session. Built confidence.”</td>
</tr>
<tr>
<td>Confidence building</td>
<td>“Going over fluid and medication prescribing with practical examples” “Clinical scenarios are very helpful in learning common hospital scenarios.” “Good to hold a case-based teaching session.”</td>
</tr>
<tr>
<td>Case-based</td>
<td>“The course covered core skills that are relevant to Objective Structured Clinical Examinations.” “Very relevant to exams.”</td>
</tr>
<tr>
<td>Relevant to exams and revision</td>
<td>“Urinalysis (we have had so much teaching on this already)” “Urinalysis and peak flow - I was confident in these prior to the course”</td>
</tr>
<tr>
<td><strong>Practice</strong></td>
<td></td>
</tr>
<tr>
<td>Hip model</td>
<td>“Good to feel what an abnormal hip was like” “Hip examination - hard to get the technique right from online resources online”</td>
</tr>
<tr>
<td>Using a drug card (Kardex) and British National Formulary</td>
<td>“It was useful to practice prescribing.” “Going over fluid and medication prescribing with practical examples” “Also learning how to prescribe fluids and medications in real kardex”</td>
</tr>
<tr>
<td>Lack of prior prescribing opportunity</td>
<td>“Prescribing as not getting much practice in wards” “Really good, particularly prescribing, as this is something we do not get much.”</td>
</tr>
<tr>
<td>High levels of interactivity</td>
<td>“Having each skill demonstrated and then a go was helpful.” “Really interactive.”</td>
</tr>
<tr>
<td><strong>Facilitation</strong></td>
<td></td>
</tr>
<tr>
<td>High-quality facilitators</td>
<td>“Brilliant quality of teaching, all tutors very engaging.” “Helpful facilitators who share clinical tips” “It was useful to practice prescribing and get immediate feedback.”</td>
</tr>
<tr>
<td>Small group work</td>
<td>“It is good to be in small groups.” “Small groups, good to ask and answer questions”</td>
</tr>
<tr>
<td>Opportunity to ask questions</td>
<td>“Lots of opportunities to ask questions”</td>
</tr>
<tr>
<td><strong>Timing</strong></td>
<td></td>
</tr>
<tr>
<td>Rushed or more time needed</td>
<td>“Not enough time at clinical stations - very helpful but felt rushed.” “Difficult to fit everything into the fluids and prescribing stations”</td>
</tr>
<tr>
<td>Suggestion for prior reading</td>
<td>“Going through the lectures during stations - would have preferred to have read these prior to attending” “I did not have enough theoretical knowledge on developmental dysplasia of the hip before coming in, so I struggled with the hip examination station”</td>
</tr>
</tbody>
</table>

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clinical skills relevant to child health (8, 9). Procedural skill competency has been identified multiple times as a weakness in curricula for training doctors (2, 7, 11). Inconsistent opportunities to observe or attempt procedures (2, 11), minimal clinical exposure in child health settings (10, 13), and a dearth of evidence on how to transfer skills training into the clinical environment (3, 14) all act as barriers to students obtaining procedural competencies relating to child health. Disruption to attachments during the COVID-19 pandemic has exacerbated these existing deficiencies and created new challenges for educators training medical students in procedural skills (6). Some clinicians in training feel relatively unprepared to perform the expected skills (18). However, some data suggest junior doctors are objectively under-skilled in certain procedures (7). Therefore, currently, more than ever, there is a rationale to move away from traditional skills teaching and build the evidence base for effective skills training.

The literature describes various interventions that have targeted the training of clinical skills, including log-books (19), skills labs (20, 21), deliberate practice (14), integration within curricula (15), and the use of realistic clinical scenarios to train skills (22). The level and type of evidence available for such interventions vary. Some interventions proved popular with participants (20), while few demonstrated an objective improvement in skill performance (14).

More important than simply demonstrating better skill performance within the teaching environment shows that learning is transferred to the clinical environment. Miller’s seminal pyramid model (23) on demonstrating competency puts “does” at the peak. Therefore, training
will ideally see students able to apply skills training in clinical environments. The original intervention enabling this issue is the skills logbook. A logbook acts as a guide for medical students, mandating that they are signed off as competently exercising a list of key skills on clinical placements by an experienced practitioner. However, the data collected in the Netherlands suggest that simply providing a skills checklist for students to tick off is unlikely to provide students with exposure to all of the necessary skills (2).

Another study reviewed the logbook element of an undergraduate medical placement, finding that few students could complete all the skills suggested; however, many completed extracurricular skills not in the logbook (19). They discuss that completed logbooks do not necessarily confer competence; therefore, clinical placements should supplement practical experiences with other forms of training (19). The medical students in the present study had a logbook of procedural skills to complete during their child health placement. The presence of a logbook in itself is insufficient to train students in competency, and the rationale of the current intervention was to complement this existing logbook. Clinical skills teaching in labs has been linked to more skills students perform while observed in the clinical environment (2). This phenomenon might be related to the confidence gained through formal practice and feedback from tutors while in a skills lab.

A 2018 study by O’Donoghue et al. investigated 85 undergraduate students performing child health-related clinical skills in a skills lab. O’Donoghue et al. demonstrated that self-reported confidence before performing a skill did not correlate with objective performance (13). Focus groups following objective skill assessments allowed discussion about this, where the same student cohort suggested that they had few opportunities for skills practice with actual patients in child health and that these tasks were particularly complex (13). The aforementioned study overlaps with the current study in that they looked at pediatric prescribing, including intravenous fluid calculations. In addition, the present study included other procedural skills which were patient facing rather than simply paper-based.

O’Donoghue et al. (13) concluded that standardizing teaching and providing formative feedback on skills would be the best way to train competence in these undergraduate clinical skills (13). The present study complements the aforementioned findings by demonstrating a standardized course delivered to all students in the region wherein formative feedback was provided on each skill. While the present study’s findings do not measure competence, qualitative feedback suggests that getting immediate, individual feedback from a trained clinician is a strength of the CHESS course. O’Donoghue et al. also focused on the dangers of inconsistent teaching with particular relevance to pediatric fluid prescribing (13). The present study has tackled this issue by standardizing the teaching of this topic across the entire region within the present course. Therefore, although the current study did not measure competence, it is hoped to have improved students’ competence in these skills and given students the confidence to demonstrate these skills with actual patients under appropriate supervision.

In this cohort of final-year medical students, a statistically significant increase in self-reported confidence was observed for all course learning outcomes. Increased confidence here is the first step to enabling students to grasp real opportunities to demonstrate these skills on placement. The largest difference in self-reported confidence was observed in the prescribing and neonatal hip examination. A theme within the qualitative data was the high value of teaching in these domains, where students might have few opportunities or limited prior experience. The students commented that the course was helpful (“Particularly prescribing as this is something we do not get much of” and “Hip examination - hard to get the technique right from online resources online”).

Triangulating the above-mentioned data with the self-reported confidence scores might suggest that the large difference in confidence is attributable to a particular lack of confidence in these areas to begin with. One study on skills logbooks for undergraduates explains that despite providing a checklist of skills, student exposure inevitably varies (19). Therefore, those designing medical curricula should take this issue into account. The current study’s data have further implications for educators, suggesting a greater focus on areas where medical students have few opportunities to practice and therefore lack confidence.

The patient safety initiative has necessitated safe training environments for procedural skills to be practiced via simulation (18). Several authors have described the process of transitioning medical student teaching to skills labs (20, 21, 24) and emphasized the opportunity for repeated practice and the ability to make mistakes in this environment (1, 21). Issenberg et al. (25) summarized the evidence for making the most use of high-fidelity simulation training, and much of this applies to teaching procedural skills. The CHESS operationalized various aspects described by Issenberg et al. as making high-fidelity simulation exercises successful (25). For example, there is a strong evidence base for feedback in simulated exercises. This was a strong theme in the qualitative feedback from the investigated students, who discussed that “It was useful to practice prescribing and get immediate feedback”. Beyond this, the students specified that they valued small group sizes and time to ask questions. This might enhance opportunities for immediate, individual feedback. Another undergraduate clinical skill course similarly showed that students valued particularly group learning, clinically-based scenarios, and specific feedback (26). For other educators planning simulated skills training, these techniques for allowing feedback are assets to a course.

The present study demonstrated the feasibility of integrating a clinical skills session into a clinical attachment for child health. Curricular integration is another technique that Issenberg et al. note to improve the outcomes of
simulation (25). One article discusses the reform of a clinical skills curriculum to integrate fully with the rest of the taught curriculum (15). This issue provides a theoretical advantage for learners regarding the cognitive load, wherein fewer new ideas are presented each semester; nevertheless, the skills taught match up physiology they are being taught at the time (27). Moreover, as discussed above, by providing the simulated learning of skills within a clinical placement, students might then have more confidence to perform such procedures on the wards and reach Miller’s (23) “do” stage of competency (2).

It is known from previous studies that a level of competence is not always maintained after a skill is learned (28). Offiah et al. describe “skills decay” in a prospective cohort of medical students following a skills course, noting that this is closely related to how many times a skill was performed after the course (28). They suggest providing a log-book, along with an increased curriculum focus on providing students with opportunities to perform skills (28). Meanwhile, another group teaching their course across 4 weeks encouraged students to practice taught skills on patients in between the sessions, likening this to a “spiral learning” model wherein concepts are revisited in more and more detail (26). With undergraduates increasingly under-exposed and under-confident in practical skills, simulated practice can act as a springboard to encourage students to seek and attempt procedures on patients (28). Similarly, the CHESS course complements the current child health curriculum and logbook of procedures that students complete during their placement.

This study has important strengths to note. Firstly, while a convenience sample was used, a large sample size of 184 students with a high response rate of 94.6% indicates that the study population closely matches the target population, thereby reducing the risk of selection bias. The second strength of this study is the use of a mixed methods approach. The ability to analyze both quantitative and qualitative data provides some concurrent validity across measures, and qualitative analysis assists and deepens our understanding of the quantitative results. Thirdly, using Cronbach’s alpha, the questionnaires demonstrated great internal consistency, thereby suggesting reliability. Finally, this study reported the various methods used to ensure the trustworthiness of its qualitative data analysis, including measures to support honest responses from students, triangulation with quantitative data, stating the researcher’s background, a reflexive statement, and explicitly detailing the method of qualitative analysis employed (16, 17, 29). These methods directly correlate with the four characteristics associated with trustworthiness in qualitative research, namely credibility, dependability, confirmability, and transferability (17).

This study also has several limitations that are important to acknowledge. Firstly, improved self-reported confidence is not analogous to competence (13). Although prior meta-analyses in the undergraduate population suggest a correlation between self-reported confidence and competence, this often demonstrates poor accuracy (30). Nevertheless, self-reported confidence, discrete from competence, might have an intrinsic value for new medical graduates, who must have a sense of their limitations to seek help appropriately (31). Secondly, the self-reported confidence scores and evaluations were collected directly following the course. Therefore, it was impossible to comment on any longitudinal difference in students’ confidence in exercising these skills. Promisingly, however, another undergraduate study that used similar training methods for teaching cannulation and nasogastric tube insertion skills to medical students demonstrated a positive effect on competence up to 6 months following the intervention (3). The medical students who were trained in the skills lab, with tutors providing feedback, performed significantly better than the control group taught with a “see one, do one” methodology, both initially and at 6 months of follow-up (3). Thirdly, this cohort represents a single academic-year group from one UK medical school, and their baseline demographic details were not collected. Therefore, the results might not necessarily be generalizable to other cohorts of students. Finally, it is recognized that conducting interviews or focus groups might have yielded richer qualitative data.

5.1. Conclusions

This particular cohort of medical students experienced unprecedented disruption to clinical attachments during the COVID-19 pandemic. The pandemic has crystallized the importance of facilitating medical students reaching competence in required clinical skills, where, traditionally, opportunities to practice these might have been variable. Therefore, providing the opportunity to practice skills in a safe environment, with immediate, focused feedback, is especially valuable. The CHESS course has been developed to fill the gap for a standardized clinical skills course in pediatrics. There was a statistically significant increase in self-reported confidence across all of the skills taught, and the course was universally valued by students. The students particularly valued the small group learning, opportunities to practice, and gaining immediate feedback on their practical skills. Alongside prior evidence on undergraduate skills teaching, this study suggests that these aspects of the course are distinct strengths that have a positive impact on students’ confidence following course attendance. This might provide a good model for skills teaching during undergraduate courses as a foundation to supplement learning skills through practice with actual patients. Further studies should focus on using an objective measure of competence following this intervention and determining whether it results in a long-term improvement.

Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].
Acknowledgments

The authors would like to express their gratitude to all those who contributed to the development and successful implementation of the CHESS course, particularly the staff that volunteered their own time to teach, without whom CHESS could not run, and the supporting staff who were invaluable in its implementation (Laurence Garvey, Murron Harrison, and Lisa Hamilton). The authors were fortunate to have use of the teaching space within the NHS Louisa Jordan Hospital in Glasgow, Scotland, for the initial runs of this course. The authors would like to show appreciation to all the staff who worked very hard to keep the building functioning throughout the COVID-19 pandemic.

Footnotes

Authors’ Contribution: Study concept and design: A. H., K. G., C. P., and P. K. Acquisition of the data: A. H., K. G., C. P., and P. K. Analysis and interpretation of the data: A. H. and C. P. Drafting of the manuscript: A. H. Critical revision of the manuscript for important intellectual content: A. H. and P. K. Study supervision: P. K. In addition, the manuscript was reviewed by A. H., K. G., C. P., and P. K. prior to submission, and any adaptations were made accordingly. All the authors approved the final manuscript.

Conflict of Interests: A Harper, K Gregoriou, C Patterson, and P Kumar have no competing interests to declare. No remuneration, financial or otherwise, was received by any author for or relating to their involvement in this study.

Data Reproducibility: The dataset presented in the study is available on request from the corresponding author during submission or after publication. The data are not publicly available due to institutional rules on data sharing.

Ethical Approval: The Institutional Ethics Board (University of Glasgow) was approached for advice prior to the commencement of this project. They informed the authors as per local institutional guidelines.

Funding/Support: No additional funding or support was provided for this work.

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