Accurate blood pressure (BP) recording is an essential part of clinical decision-making. Yet, with the introduction of automated recording devices, the skill of manual blood pressure recording has declined (Mulryan, 2011). There are circumstances where a manual recording will be needed, for example, where an automated BP reading appears inaccurate when considered alongside a patient’s clinical picture.

Student nurses need to become competent at manual BP recording and to do so need a robust understanding of the theory of the technique. We undertook a small-scale action research intervention as part of a postgraduate certificate in education programme at the University of Bolton. The aim was to improve knowledge with manual BP recording in a group of pre-registration student nurses. Our objective was to provide an intervention that would supplement the students’ previous education and training on this skill.

**Context**
Clinical skills are the foundation of nursing practice (Bloomfield et al, 2010) but the increasing use of technology in the past two decades has seen a decline in manual measurement in preference to reliance on automated recording (Myers, 2010). While using automated devices requires minimal training or skill and is often undertaken by non-registered staff (Peate and Wild, 2016), manual BP measurement is a more complex psychomotor skill requiring training and practice (Bland and Ousey, 2012). As BP recordings directly inform clinical decisions, there is a clear implication that inaccurate recordings may cause potential harm to patients. As a result, only staff who have been suitably trained or students acting under direct supervision should manually record BP.

**Key points**
- Manual blood pressure recording is a vital clinical skill but competence is being lost due to increasing use of automated devices
- We designed a supplementary teaching session which boosted student nurses’ knowledge of the technique
- Students reported feeling more confident and competent in measuring blood pressure after the intervention
- Wider discussion is needed on how best to embed this learning in the curriculum so required knowledge is understood and retained

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**Abstract**
Accurate blood pressure recording is of paramount importance for patient safety but with the introduction of automated recording devices, the skill of manual blood pressure recording has declined. In some settings it is still necessary to take manual blood pressure readings and for students to develop competence they will need robust knowledge of the technique. We completed an action research enquiry with pre-registration student nurses at a university in the North West to look at their understanding of a specific aspect of manual blood pressure recording – Korotkoff sounds. Our goal was to evaluate the impact of a taught session on understanding Korotkoff sounds and their importance for accurate blood pressure recording. A pre- and post-learning quiz was used to establish baseline knowledge and evaluate whether the intervention improved their understanding. This small-scale study found that the intervention improved students’ knowledge.

**Citation**
With the increase of electronic equipment used to measure BP, the Medicines and Healthcare products Regulatory Agency (MHRA, 2006) recognised that nurses were losing their competence at manual BP recording. The Independent Advisory Group on Blood Pressure Monitoring in Clinical Practice (2005) recommended that auscultation (manual recording) should still be taught to student nurses, highlighting that under some clinical conditions an automated device is inappropriate.

In addition, national guidelines recommend a manual BP recording if there is any doubt about the accuracy of an automated measurement or if the patient has hypertension or hypertension (National Institute for Health and Care Excellence, 2011).

Manual BP recording is considered technically challenging to master (Bland and Ousey, 2012) but is an essential feature of accurate patient assessment and clinical decision-making and, as such, is taught in the pre-registration nursing curriculum (Armstrong, 2002). However, there are a range of factors that have been found to potentially affect the student learning experience. Morgan (2006) noted that pressure from a high workload led to a variation in student experience of carrying out skills. This could inhibit the student’s progression from novice to expert (Benner, 1984) and keep them at beginner level. Workload pressures have been recognised nationally and measures taken to address workforce shortages, including the Department of Health announcing 10,000 extra training places on pre-registration programmes for 2017. However, with a 24% drop in applications for student nurse programmes for 2017, we evaluated the students' learning on manual BP recording after a supplementary teaching session. The specific aim of the intervention was to improve their knowledge about the theory of manual BP recording but with the belief that this could also directly shape their practice and ability to carry out this skill consistently and competently.

An education session provided a theoretical account of manual BP taking, which included the changes to the local physiology of the upper arm in relation to the Korotkoff sound in a theoretical session, after which a practical skills workshop was held with demonstrations and supervised student practice. An action research approach was used to evaluate the impact of the education session on both student knowledge and practice.

Methods

During a clinical skills development week in 2017, we evaluated the students’ learning on manual BP recording after a supplementary teaching session. The specific aim of the intervention was to improve their knowledge about the theory of manual BP recording but with the belief that this could also directly shape their practice and ability to carry out this skill consistently and competently.

An education session provided a theoretical account of manual BP taking, which included the changes to the local physiology of the upper arm in relation to the Korotkoff sound in a theoretical session, after which a practical skills workshop was held with demonstrations and supervised student practice. An action research approach was used to evaluate the impact of the education session on both student knowledge and practice.

Prior to the skills week, pre-registration student nurses (n=24) were invited to participate and the aims and objectives were cascaded to them and verbal consent gained at this point for them to participate. They were provided with an information sheet about the intervention and proposed evaluation along with an explanation of what participation would involve. Participation was voluntary and involved completing an anonymised quiz pre- and post-intervention to test knowledge of topic. At the start of the skills week (run in 2017), students were invited again to participate and gave verbal consent.

Intervention

The intervention had two dimensions. First, students were given a lesson on the physiology of the upper arm and Korotkoff sounds. They were quizzed about their knowledge before and after the session. The quiz was developed from relevant subject literature with input from specialist practitioners and academic staff. It was
used to establish the students’ baseline knowledge and any improvements after the session. A pilot study of the quiz (n=19) was carried out to refine questions to enhance clarity.

A student evaluation questionnaire was also used to explore students’ views on whether or not the intervention increased their self-assessment of confidence and competence. It included a free text box for comments. The process of designing the intervention is outlined in Fig 1.

### Analysis and findings

The nominal quantitative data from the before and after quiz was descriptively analysed (Table 1). A post-intervention improvement in student knowledge was found in eight of the 10 questions. This suggests that the training had provided the required knowledge to successfully answer those questions. The analysis also found that students’ answers to two questions had the same maximum correct responses pre- and post-intervention (Fig 2).

The second part of the evaluation explored students’ feedback on whether or not the intervention increased their self-assessment of confidence and competence. The findings (n=24) showed a positive response (Table 2). A selection of short written comments only recorded appreciation of having had the supplementary session (n=5). These included:

“**This session enhanced my understanding for BP taking**”.

“I feel much more confident now”.

“Lee explained it in detail and helped me understand the sounds more”.

“I will take this knowledge in to practice; gained valuable knowledge that will underpin my practice”.

### Discussion

This small-scale action research study led to several issues being identified: students’ current knowledge; using different methods to develop retention of knowledge; and maintaining its currency in the longer term. It was worth undertaking the intervention, as our evaluation showed that aspects of the students’ knowledge of manual BP recording had improved. However, a further follow-up study would be needed to determine the extent to which that knowledge was retained and embedded in their everyday practice. It also allowed us to revisit some areas that the group found difficult and raised the question as to whether the teaching of the theory behind this skill could be delivered in a more effective way. Indeed, some of the knowledge tested had previously only been minimally dealt with. In terms of curriculum design, this leads us to question the approaches that translate most effectively into student learning and retention of key information.

As part of an integrated curriculum that promotes evidence-based practice, this intervention gave students a

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### Table 1. Pre- and post-intervention quiz responses (n=24)

<table>
<thead>
<tr>
<th>Question</th>
<th>Pre-intervention</th>
<th>Post-intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Correct</td>
<td>Incorrect</td>
</tr>
<tr>
<td>1. What type of noise is the bell of a stethoscope used to listen to?</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>2. How many Korotkoff sounds are there?</td>
<td>22</td>
<td>2</td>
</tr>
<tr>
<td>3. What type of noise is the diaphragm of a stethoscope used to hear?</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>4. Which arm can a BP recording be taken on?</td>
<td>22</td>
<td>2</td>
</tr>
<tr>
<td>5. Which arm should a BP be taken on?</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>6. Name one alternative site a BP can be recorded on?</td>
<td>22</td>
<td>2</td>
</tr>
<tr>
<td>7. In BP reading what do S and D stand for?</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>8. Is an electronic BP reading more accurate than manual?</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>9. While on clinical placement how often does your clinical educator advise you to take a manual BP reading when possible?</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>10. On placement when should you find out where the sphygmomanometer is kept?</td>
<td>24</td>
<td>0</td>
</tr>
</tbody>
</table>

### Table 2. Self-assessment of confidence and competence (n=24)

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes response</th>
<th>No response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Has this training increased your knowledge regarding manual BP taking?</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>2. Has this session improved your understanding of manual BP taking?</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>3. Has this session increased your confidence regarding manual BP taking?</td>
<td>23</td>
<td>1</td>
</tr>
<tr>
<td>4. Are you more likely to practise taking a manual BP because of this session?</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>5. Do you think this session has been beneficial to your development as a student nurse?</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>6. Do you think other student nurses would benefit from this training?</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>7. Students asked to rate session with a score between 1 and 10 (1=poor, 10=excellent). Overall average score 9.47.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
real-world experience of small-scale research, albeit as participants. It allowed an appreciation of the stages in the research process, including enrolment, consent and data gathering. As Brooke et al (2015) point out, there is value to developing an understanding of the importance and implications of evidence-based practice and this example is something the students would revisit when learning about this topic at a later date.

The small scale of this action research precludes any generalisable findings but did inform local practice. The triangulation of free-text comments with the quantitative data did afford explanatory insights into the responses. Indeed, Kerlinger and Lee (2000) argued that combining these two approaches in action research strengthens its validity.

Conclusion
The aim of this action research project was to improve the students’ knowledge and understanding of the manual BP recording through a supplementary learning intervention. Supporting students to accurately perform this skill will have a direct positive impact on patient care as well as individual professional development. Comparisons between pre- and post-intervention questionnaires suggest improvement in knowledge and understanding, but further study is needed to evaluate how current such knowledge remains and whether this continues to translate into safe practice.

Sharing learning in such small-scale activities can lead to incremental improvement in the student learning experience and open the way to further team collaboration around challenges raised about the effectiveness of the current curriculum. NT

References
Nursing and Midwifery Council (2019) Standards Framework for Nursing and Midwifery Education. NMC.