

Learn-teach-learn: Evaluating a South African near-peer teaching programme

R Spies,¹ MB ChB; H Lee,¹ MB ChB; I Esack,¹ MB ChB; R Hollamby,¹ MB ChB; C Viljoen,² MMed (Int Med)

¹ Department of Medicine, Faculty of Health Sciences, University of Cape Town, South Africa

² Division of Cardiology, Department of Medicine, Faculty of Health Sciences, University of Cape Town, South Africa

Corresponding author: R Spies (ruanspies21@gmail.com)

Background. Near-peer teaching (NPT) programmes may benefit both student learners (SLs) and near-peer tutors (NTs). However, data evaluating NPT programmes in developing countries such as South Africa are lacking.

Objectives. To evaluate the efficacy of an NPT programme in improving the knowledge and confidence of SLs and NTs, and to evaluate student perceptions of the NPT programme.

Methods. An NPT programme in which clinical year students provided tutorials to pre-clinical year students was developed. Participants completed a knowledge-assessing multiple-choice questionnaire (MCQ) and a confidence-assessing questionnaire at commencement and conclusion of the programme. Participants also completed an evaluation at the end of the programme.

Results. For 38 SLs, the median MCQ score improved from 58.9% at baseline to 78.6% at completion of the programme ($p < 0.001$; $d = 1.3$). The mean overall confidence score improved from 2.6/5 at baseline to 3.6/5 at completion ($p < 0.001$; $d = 1.3$). All SLs agreed that the NPT programme was a useful addition to the standard curriculum and that they would recommend the programme to other students at developmental level. The effect of the NPT programme was less pronounced for the 16 NTs, with median MCQ scores of 87.5% and 89.3% at baseline and completion of the programme, respectively ($p = 0.179$; $d = 0.4$). The mean overall confidence score improved from 3.8/5 at baseline to 4.2/5 at completion ($p = 0.004$; $d = 1$). Ninety-four percent of NTs agreed that their role as NTs reinforced their existing knowledge.

Conclusion. NPT programmes may improve the knowledge and confidence of SLs, while consolidating the knowledge of NTs. The NPT programme was well received by medical students. In resource-limited settings, the effectiveness and acceptability of NPT make it an attractive adjunct to traditional teaching.

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Near-peer teaching (NPT) is an education modality in which a more senior student provides teaching to junior students within the same curriculum.^[1]

Previous studies have demonstrated the benefits of NPT programmes, with student learners (SLs) reporting subjectively improved confidence, knowledge and skills following NPT interventions.^[2] Near-peer tutors (NTs) also report benefits from involvement in NPT programmes, attributing these to the reinforcement of previously learnt concepts and improved time management, leadership and teaching skills.^[3]

Teaching is a key competency for undergraduate students identified by the Medical and Dental Professions Board of the Health Professions Council of South Africa (SA).^[4] However, opportunities to formally develop teaching skills are rare in undergraduate medical training, despite the expectation for junior doctors, registrars and consultants to ultimately fulfil teaching roles. NPT programmes may offer students an opportunity to better prepare for these roles.

The literature reveals that the existing data on NPT are exclusively sourced from the developed world. SA is a unique educational environment and findings from the developed world should be extrapolated to the SA context with caution.

We aimed to study whether NPT programmes are effective as an adjunct to traditional undergraduate medical training in SA by evaluating the utility of an NPT programme in improving the knowledge and confidence of medical students, for both SLs and NTs.

Methods

We used a non-randomised, uncontrolled experimental study design to measure the outcomes – ‘knowledge’ and ‘confidence’ – in participants before and after completion of an NPT programme.

The near-peer teaching programme

In 2018, the Internal Medicine Society, a student-run society based at the University of Cape Town (UCT), established an extracurricular NPT programme. Clinical students (years 4 - 6) served as NTs, while pre-clinical students (years 1 - 3) received tuition as SLs. Each tutorial group consisted of 1 NT and 3 or 4 SLs. Four tutorials, discussing heart failure, pneumonia, liver failure and stroke, were held between March and November 2018. Each tutorial consisted of a theoretical discussion and a clinical approach at the patient's bedside. NTs were provided with consultant-approved information sheets to guide the discussion. Consent for bedside tutorials was obtained from patients and approval for the programme was granted by Groote Schuur Hospital, Cape Town, SA.

Evaluation

We invited all participants in the NPT programme to enrol as participants in a study of the programme. We obtained consent for all data collected and we preserved anonymity. Ethical approval was granted by the Human Research Ethics Committee, UCT (ref. no. HREC 251/2018).

We administered a 28-question multiple choice questionnaire (MCQ), approved by consultants from the Department of Medicine, UCT, to NTs and SLs as a measure of their explicit knowledge at baseline and completion stages of the NPT programme. This outcome was labelled 'knowledge'. Explicit knowledge refers to facts that can be readily articulated and stored. It is complementary to tacit knowledge, which refers to intuition and the kind of knowledge that is not easily expressed. We chose to measure knowledge through an MCQ, as this allowed for an objective assessment of participant performance and yielded data that were amenable to statistical analysis and comparison, both pre- and post-intervention.

We assessed self-reported confidence through a Likert scale, i.e. the overall confidence score, which we developed. This outcome was labelled 'confidence'. Participants responded to questions using a 5-point scale (1 = very unconfident, 2 = unconfident, 3 = neutral, 4 = confident, 5 = very confident). The mean value of the responses was recorded as the overall confidence score. Although the scale was not previously validated, it was only used with the aim of comparing scores at the baseline and completion stages of the NPT programme.

We evaluated participant perceptions upon completion of the programme through the completion of a survey, adapted from a survey previously used by Doumouras *et al.*^[5]

Statistical analysis

We used Stata 14 (StataCorp., USA) to analyse the data. Median values were used to measure MCQ scores, as these data were non-parametric, while mean values were used to measure overall confidence scores, as these data were parametric. We used the Wilcoxon rank-sum test to compare MCQ scores between groups, while paired *t*-tests were used to compare overall confidence scores. We determined effect size through the calculation of Cohen's *d*.

Results

Student learners

Of the 71 SLs in the NPT programme, 38 (54%) participated in the study. SLs demonstrated a significant improvement in both the knowledge and confidence scores. The median MCQ score was 58.9% at baseline and 78.6% at completion ($p < 0.001$; $d = 1.3$), while the mean overall confidence score rose from 2.6 at baseline to 3.6 at completion ($p < 0.001$; $d = 1.3$) (Table 1). All SLs agreed that the NPT programme was a useful addition to the standard curriculum and that they would recommend the programme to other students at developmental level (Supplementary material 5).

Near-peer tutors

Of the 21 NTs in the NPT programme, 16 (76%) participated in the study. There was marginal improvement in knowledge, with median MCQ scores of 87.5% at baseline and 89.3% at completion ($p = 0.17$; $d = 0.4$). However, NTs demonstrated a significant improvement in overall confidence, with scores of 3.8 and 4.2 at baseline and completion, respectively ($p = 0.001$; $d = 1$) (Table 1). Ninety-four percent of tutors agreed that their role as NTs reinforced their existing knowledge, and 81% of tutors felt that the NPT programme would be a useful addition to the standard curriculum (Supplementary material 6).

Discussion

Student learners

Upon completion of the NPT programme, SLs demonstrated a significant

improvement in knowledge scores and in the score measuring SLs' confidence in their knowledge.

The theoretical advantages of NPT are explained by the concepts 'cognitive congruence' and 'social congruence', which hypothesise that an approximate equivalence in knowledge, skill level and social role enhances the transmission of knowledge between NTs and SLs.^[6] In the traditional educational hierarchy, the gap between the student and teacher's comprehension of a subject may be so vast that the teacher cannot effectively communicate the subject at a cognitive level, which is optimal for the student's understanding. NTs, who more closely approximate the cognitive levels of those they are teaching, may be better suited to using techniques such as simplification, which may allow for more efficient and effective transfer of information. NTs also occupy social roles, which approximate the social role of the SL more closely than that of the traditional teacher, allowing for the exploration of concepts in an environment that is perceived as less threatening than the traditional educational environment.^[6]

Our study is among few that demonstrate improvement in objective measures, such as knowledge scores after an NPT programme.^[7,8] Evaluation of the NPT programme was exceptionally positive, with all SLs responding that the programme was a useful addition to the standard curriculum and recommending involvement in the programme to someone at developmental level. These findings are in keeping with those from the literature on the perceived usefulness of NPT.^[2]

Near-peer tutors

Our study suggests that serving as an NT may allow for knowledge retention. However, our findings do not suggest that serving as an NT leads to knowledge improvement. Improvement in NTs' knowledge may have been masked by the high baseline MCQ scores in the cohort, which left little room for improvement. All of the NTs in our study volunteered to teach other students, which may have resulted in the selection of a non-representative sample of clinical year students. It is reasonable to postulate that students at the higher end of the academic performance scale may have been more likely to volunteer as tutors, as they may have greater confidence in their knowledge and ability to transfer the knowledge through teaching. Furthermore, the MCQ consisted of questions at a difficulty level most appropriate for students at completion of their third year of medical school (in a 6-year undergraduate medical training programme). The questions may, therefore, not have been at a difficulty level appropriate for the assessment of clinical year students.

The increase in the overall confidence of knowledge may reflect the reinforcement of previously learnt knowledge. The consolidation of prior learning is often cited as one of the perceived benefits of NPT programmes.^[3] Our findings link this subjective perception to more objective measures of knowledge and confidence, and although the magnitude of the effect is difficult to measure, it supports the hypothesis that NPTs promote the consolidation of tutors' prior knowledge.

Study limitations and directions for future work

Our study was not without limitations. The sample size was small and the study vulnerable to confounding, as SLs continued to receive traditional curriculum teaching from faculty during the study period. It is also possible that cognitive maturation over the course of the year may have contributed to increased confidence. The precise strength of this association cannot be determined with the design of this study, and follow-up research should compare SLs with randomised control groups.

Table 1. MCQ and overall confidence scores for student learners and near-peer tutors, at baseline and completion

	Student learners, <i>n</i> =38	Near-peer tutors, <i>n</i> =16	Between-group difference, <i>p</i> -value
MCQ score, % (IQR)			
Baseline	58.9 (46.4 - 68.8)	87.5 (82.1 - 92.9)	<0.001
Completion	78.6 (67.9 - 85.7)	89.3 (86.6 - 92.9)	0.001
Within-group change			
<i>p</i> -value	<0.001	0.172	
Cohen's <i>d</i>	1.3	0.4	
Overall confidence score (SD)			
Baseline	2.6 (0.8)	3.8 (0.7)	0.006
Completion	3.6 (0.7)	4.2 (0.5)	0.016
Within-group change			
<i>p</i> -value	<0.001	0.001	
Cohen's <i>d</i>	1.3	1	

MCQ = multiple choice questionnaire; IQR = interquartile range; SD = standard deviation.

Recruitment in our study may have resulted in selection bias, as participants were not randomly sampled, but volunteered for the programme. It is difficult to ascertain how this may have led to bias in the study sample. Better-performing students may have been more likely to commit extracurricular time to academic-related activities, while worse-performing students may have sought academic support from the programme. Finally, our measures of knowledge and confidence may not have sufficiently addressed all the competencies required for the practice of medicine. Future work should consider including objective structured clinical examination (OSCE) measures for a more holistic evaluation of competency.

Conclusion

This study is the first description of an NPT programme in SA – run for students by students. Its findings suggest that NPT may result in improved knowledge and confidence in SLs, while consolidating the knowledge of NTs. It also suggests that both SLs and NTs perceive benefit from involvement in NPT and that medical students are receptive to NPT as an educational modality. In a resource-limited setting, the effectiveness and acceptability of NPT make it an attractive adjuvant to traditional teaching.

Declaration. None.

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