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SHORT REPORT

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Interprofessional Arclight™ eye health workshop: impact on students' clinical identification and ophthalmic skills

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ABSTRACT

Visual impairment and blindness affect an estimated 2.2 billion people worldwide. Accessible low-cost diagnostic tools and interprofessional education and collaborative practice are part of ongoing strategies to improve eye care services. This study evaluated the impact of an interprofessional Arclight workshop on undergraduate healthcare students' clinical identification skills related to eye health, and self-reported confidence in ophthalmic skills. Undergraduate students from clinical medical officer, ophthalmic clinical officer, Bachelors and Diploma nursing, and medical programs at the University of Rwanda participated in a pilot interprofessional eye health workshop. The Arclight device, a low-cost ophthalmoscope and simulation eyes were used to enable students to practice ophthalmic skills and thereafter equip them. Clinical identification skills related to common eye conditions, and self-reported confidence in ophthalmic skills were assessed pre and post workshop. Overall, students' ability to identify common eye conditions, and self-reported confidence in relation to all skills statistically improved post workshop, with some differences between professional groups in relation to eye health skills. This IPE experience used the Arclight package as a vehicle for IPE, enabling healthcare students to share and acquire new skills and confidence in relation to recognizing common eye conditions and assessing eye health.

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Arclight; clinical skills; eye health; impact; interprofessional education

Introduction

Worldwide, an estimated 2.2 billion people experience poor vision with the majority being preventable or treatable (World Health Organisation, 2019b). Many regions are impacted disproportionately, particularly South Asia and sub-Saharan Africa (SSA). A lack of access to affordable equipment and training (Singh et al., 2019) as well as a scarcity of ophthalmologists underlines the need for a more integrated approach to delivering eye care (World Health Organisation, 2019b). There is increasing evidence that to achieve this integration, a wider array of health professionals should gain ophthalmic knowledge and skills and be able to work more collaboratively (Budning & El Defrawy, 2016; World Health Organisation, 2019a).

Rwanda has consequently started to integrate Primary Eye Care services into community health centers. Nurses now assess and treat many eye diseases and manage uncorrected refractive error. More serious cases are referred to district and tertiary level national units where ophthalmic clinical officers have been trained to provide higher level eye care services (Bright et al., 2018; Rwanda Ministry of Health, 2018; Yip et al., 2018). This system relies on effective interprofessional collaborative practice (ICP) between all of the health professionals involved. Interprofessional education (IPE), "where members or students of two or more professions learn with, from and about each other to improve collaboration and the quality of care and services" (CAIPE, 2002) has the potential to ensure that healthcare students are ready for ICP that will tackle global health issues such as blindness, they need to have the opportunity to learn how to work together (World Health Organisation, 2010). The aim of this paper is to report on the impact of an interprofessional eye health workshop on healthcare students' clinical identification skills related to eye health, and self-reported confidence in ophthalmic skills. As a partner to this paper, students' experience of this interprofessional workshop has previously been reported (O'Carroll et al., 2020).

Methods

Context

As part of a collaborative study between the University of Rwanda, and the University of St Andrews, the interprofessional eye health workshops took place in June 2019 in the College of Medicine and Health Sciences at the University of Rwanda. The students involved in the workshops were from the following programs: clinical medical officer (CMO), ophthalmic clinical officer (OCO) nursing bachelor (NB), nursing diploma (ND), and medicine (M). Basic eye anatomy, recognizing common eye diseases, and visual acuity assessment were common learning for all groups in these programs. However, there were differences between these groups in relation to prior exposure to ophthalmic skills, such as examining the back of the eye using an ophthalmoscope. This was a skill

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that was covered more in depth for ophthalmic clinical officer students in comparison to their peers.

Workshop structure

A series of nine 3-h workshops involving 179 students were organized over the course of 5 days. The content was carefully considered by an interprofessional faculty who brought a range of perspectives and awareness of students' prior knowledge and skills to ensure a quality and relevant IPE experience (Webb et al., 2019) and to reflect the skills and knowledge reinforced by the Primary Eye Care training program in SSA (World Health Organisation, 2018). The first part of the workshop consisted of students working in small interprofessional groups of four to five to: identify the similarities and differences in eye health teaching in each of their programs; explore their understanding of their respective professions' roles and responsibilities in relation to eye health; and to discuss what they perceived to be the enablers and barriers to ICP. The second part demonstrated how to use the Arclight device (AD), an inexpensive yet equally effective alternative to traditional direct ophthalmoscopes (Kousha & Blaikie, 2019; Blundell et al., 2018). Students examined and practised a range of skills on each other (Table 1) and used simulation tools that mimic all the major causes of blindness in the SSA setting.

Ethical approval was granted by the respective ethics review boards of the University of Rwanda and the University of St Andrews University (approval code MD14240). The workshops and associated study were advertised to all undergraduate year three and four students from the University of Rwanda. Participation in the workshops and in the study was voluntary. Students who expressed interest in taking part were emailed and provided with a participant information sheet, and an electronic link to an online consent form.

To measure students' clinical identification skills and confidence in ophthalmic skills, students completed a pre- and post-workshop assessment. Clinical identification skills were assessed using three multiple choice questions showing images of cataract, strabismus, and keratitis. Different images for the same conditions were used in the post test.

To assess students' self-reported confidence in a range of ophthalmic skills, students were asked to record on a self-rating scale. Numerical rating scales are commonly used in health-related self-assessment (Williamson & Hoggart, 2005). Students in this study were asked to indicate on a scale of 0–100%, how confident they felt regarding specific ophthalmic skills. These skills are summarized in Table 2. Statistical analysis was performed using IBM SPSS Statistics for Windows, Version 22. The tests were two tailed with type I error set at $\alpha = 0.05$. When analyzing continuous paired data, means were compared using students' paired t test. McNemar's test was used to analyze paired nominal data.

Results

Completed paired pre- and post-assessment data were collected from 155 students, 86.6% of the total number of workshop participants. Characteristics of the study participants are included in Table 2.

Identifying clinical signs

Supplementary file 1 provides a more detailed summary of the clinical identification skills and self-reported confidence scores pre and post training. The overall score for clinical identification skills for all student groups increased from 60.6% to 84.6%, $p < .001$. An increase in skills was noted for strabismus (from 56.8% to 75.5%, $p < .001$) and keratitis (from 41.9% to 73.5, $p < .001$) but not for identifying cataracts (from 94.2% to 94.8%, $p = .213$). The OCO group demonstrated better pre- and post-clinical identification skills compared to other professional groups (OCO pre = 87.5%, other groups = 61.6%, $p = .009$; OCO post = 93.8%, other groups = 79.9%, $p = .020$). Of the non-ophthalmic professions,

Table 1. Overview of the clinical skills covered in the workshop.

(1) Visual acuity: Students tested each other's visual acuity
(2) Anterior segment: Students examined each other's eyes and simulation eyes using the loupe end of the AD
(3) Fundal Reflex: Students used the direct ophthalmoscope of the AD to assess each other's fundal reflexes and then a range of simulation eyes illustrating pathology
(4) Fundoscopy: Students used the direct ophthalmoscope of the AD to examine the fundi of each other and then examined a range of Arclight simulation eyes illustrating common blinding diseases seen in Africa
(5) Recognizing signs of eye disease
(6) Knowing when to refer a patient with eye disease

Table 2. Pre and post workshop assessment participant characteristics.

Participant characteristic	Number of participants (n %)
Total number of participants who completed the pre and post workshop assessment	155 (86.6% of total workshop participants)
Female	55 (35.5%)
Male	100 (64.5%)
Average age [standard deviation] Years	24.5 [*SD*=2.6]
Professional group	
• Ophthalmic clinical officer (OCO)	16 (10.3%)
• Medical clinical officer (MCO)	17 (11.0%)
• Medical (M)	29 (18.7%)
• Nursing Bachelor (NB)	50 (32.3%)
• Nursing Diploma (ND)	43 (27.7%)

students from the ND program were the least likely to correctly identify the clinical signs (pre-51.9%, post-71.3%).

Self-reported confidence scores

Self-reported confidence statistically improved after the workshop: 59.6% to 85.0%, $p < .001$. This increase between pre- and post-workshop scores was evident in all four non-ophthalmic groups. The OCO students did not report an increase in confidence in measuring visual acuity or in knowing when to refer patients for further care. Overall, the students reported the highest increase in confidence in assessing the back of the eye (40.3%) and using the eye examination equipment (37.7%). The lowest increase in confidence was reported in relation to knowing when to refer patients for further care (11.4%). On average, for all six skills, the confidence scores of the four non-ophthalmic professional groups (M, MCO, NB & ND) increased by 27.5% while the confidence score of the OCO students only increased by 4.3%. The overall increase in self-reported confidence was the same between males and females in all professional groups (25.1% vs 25.9%, $p = .198$).

Discussion

This study has shown that an IPE eye health workshop has some positive impact on students' clinical identification skills and confidence in ophthalmic skills. With the integration of Primary Eye Care services into community health centers in Rwanda, and the increased need for a range of health workers to provide higher level eye care services (Bright et al., 2018; Rwanda Ministry of Health, 2018; Yip et al., 2018), it is important that these professions gain appropriate knowledge, skills, and confidence early in their professional training so that they can identify common eye conditions early, and recognize the need for effective ICP in eye health. In community health, referring patients promptly to appropriate onward services are important measures for reducing preventable blindness (World Health Organisation, 2018, 2019b).

The biggest increase in self-reported confidence in ophthalmic skills was noted in examining the back of the eye and in using equipment. This confidence increase is to be expected amongst the non-ophthalmic students who usually have less exposure to these skills, compared to their OCO peers. The AD and simulation eyes were observed to be readily adopted by the students from all professional groups. This observation contributes to the existing evidence that these are accessible and user-friendly devices that can be used by a range of health workers, in comparison to the traditional more expensive ophthalmoscopes (Blundell et al., 2018; Lowe et al., 2015).

In considering students' self-reported confidence in their ability to recognize common eye conditions and in performing specific ophthalmic skills, it is interesting to reflect on the Bandura's theory of self-efficacy (Bandura et al., 1994). Evaluating the impact of IPE on students' self-efficacy has been previously studied as an outcome measurement (Mann et al., 2012; Nørgaard et al., 2013; Williams et al., 2017). Self-efficacy is defined as "people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives" (Bandura et al., 1994, p2). Bandura proposes in this theory that individuals with higher perceived self-efficacy will approach tasks as a welcome challenge and that collaborative learning can influence positive perceptions of self-efficacy. As noted in the previous partner paper, collaborative learning was particularly evident in the learning relationship between students and facilitators noted that OCO students were forthcoming in supporting their peers with learning new skills (O'Carroll et al., 2020). This collaborative learning may have influenced students' self-efficacy and perceived confidence in their ability to perform ophthalmic skills.

Limitations

Confidence level scores may have been greater post workshop as this assessment was undertaken immediately after students had just practised the skills under supervision. Further studies would need to determine the long-term impact on confidence and to compare an IPE intervention and control group. An additional limitation is that students' confidence levels were self-reported. Clinical identification and technical clinical skills could be better measured with objective measures such as an objective structured clinical examination.

Conclusion

In terms of lessons learnt from developing and implementing this IPE workshop, the findings have demonstrated that eye health is relevant content for an interprofessional workshop involving undergraduate nursing, medical clinical officer, ophthalmic clinical officer, and medical students. The findings indicate some positive impact of this interprofessional learning on students' clinical identification skills in relation to common eye conditions, and confidence in their ability to perform ophthalmic skills. These findings add to the IPE evidence base and have the potential to influence how future IPC is delivered as primary eye care training is rolled out in the SSA region. Further research is required to determine the long-term impact of IPE on collaborative practice in eye health.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Dr Andrew Blaikie is a Consultant Ophthalmologist in NHS Fife, Senior Lecturer in the Global Health Division team at the University of St Andrews and clinical lead for the Arclight Project. The Arclight Project is a social enterprise that enables teaching institutions and NGOs working in low resource countries to equip, train and empower all grades of health care workers to confidently diagnose and manage eye disease. Academically his main interests are in the development, evaluation and implementation of frugal diagnostic and teaching tools for eye and ear care in resource poor settings.

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