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WEB PAPER

Introducing clinical paediatrics to medical students: A novel hospital visitation programme involving Kindergarten children

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Abstract

Background: Increasing numbers of medical students in Australia and shorter paediatric hospitalisations require new and creative ways to teach clinical paediatric medicine. At the University of New South Wales, Sydney, we developed a programme involving well Kindergarten children visiting Sydney Children's Hospital to introduce medical students to clinical paediatric medicine.

Aim: The aim was to teach medical students how to engage children and gain their cooperation while performing paediatric examinations.

Methods: Eight sessions were conducted involving 240 Kindergarten students from seven local primary schools and 217 medical students. School children were escorted by medical students through five activities comprising examination of gross motor skills, testing visual acuity and otoscopy, measuring growth parameters, chest auscultation, pulse counting and blood pressure cuff inflation. Questionnaires were used to gather quantitative and qualitative evaluation data.

Results: The programme achieved its main objective, with 94% of students rating highly their learning about interacting with children and appreciating the challenges in examining them. Medical students (94%), tutors (100%) and participating schools (100%) thought the programme should be continued.

Conclusion: This new, innovative programme involving well children introduces medical students to clinical paediatric medicine.

Introduction

In Australia, in the past decade, seven new medical schools have opened and existing medical schools have expanded, with an expected 60% increase in medical students between 2005 and 2010 (Lennon 2005). This has resulted in an increase in demand for clinical teaching at a time when fewer hospitalisations with reduced length of stay occur (Crotty 2005). Of particular relevance to Sydney Children's Hospital (SCH), the single tertiary paediatric hospital affiliated with the medical faculty at the University of New South Wales (UNSW), Australia, the demand for paediatric clinical teaching increased two- to three-fold during a recent restructure of the 6-year undergraduate course. In addition, there have always been competing demands for clinical teaching resources at SCH by resident and registrar doctors undertaking postgraduate and specialist training. The challenge is for medical students to acquire appropriate clinical experience in teaching hospitals because of the reduced availability of suitable patients (Olson et al. 2005). It is recognised, however, that early introduction to the clinical setting and patient contact is an invaluable part of medical education (Dornan & Bundy 2004; Dornan et al. 2006).

The 'meet the medical student' programme was developed out of the need for new and creative ways to teach paediatrics

Practice points

- Medical students can learn how to engage children and gain children's cooperation while performing basic paediatric examination.
- Kindergarten students are able to become familiar with a hospital and student doctors, and consolidate classroom learning regarding health and the human body.
- The programme promotes the important ongoing relationship of the children's hospital and its local primary schools.

to second-year medical students, given the relative patient shortage and the early stage of their training. This is a unique programme involving a cohort of well children visiting a hospital to help teach medical students the techniques employed in basic paediatric examination. It also highlights the role a university medical faculty and a Children's Hospital can play within the community.

The aims of this project were threefold. First, for medical students to learn how to engage children and gain their cooperation while performing basic paediatric examinations. Second, for Kindergarten students to become familiar with a

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hospital and student doctors, and consolidate classroom learning regarding health and the human body. Finally, to promote the ongoing relationship between SCH and its local primary schools.

Methods

In June 2007, over eight days, Kindergarten students (aged 5–6 years) from seven local schools attended SCH for a 90 min excursion. Fifty minutes were spent with second year medical students.

Approximately 30 primary schools in the local area were sent flyers advertising the 'meet the medical student' programme, along with accompanying letters to the teachers describing the relevance of the programme to the educational needs of the children, as outlined in the Kindergarten Personal Development, Health and Physical Education (PDHPE) syllabus. Eight sessions were attended by the Kindergarten classes of seven schools (one school chose to have its classes attend on two different days). A month prior to the sessions, participating schools were sent a package consisting of hospital permission notes, risk assessment guidelines, parent information sheets and consent forms for photographs to be taken for teaching purposes and presentation use. The package also contained students' excursion certificates, which were then stamped during the session at each activity station (Appendix 1).

The number of children attending the hospital for a given session varied (20–45 students per session, total 240 Kindergarten students) depending on the number and size of Kindergarten classes. In total, 217 medical students attended the compulsory sessions, with an average of 27 students per session. The medical students arrived 30 min prior to the start of the session with the Kindergarten students. The preparatory segment involved tutors (at least 2 tutors per 14 medical students) demonstrating the six stations that were to be completed with the Kindergarten children to the medical students (Table 1). The tutors were doctors each with a minimum of 6 years' paediatric experience. The emphasis was on the use of age-appropriate language and communication techniques, including the use of toys such as teddy bears as demonstration mannequins, to effectively engage 5–6-year

olds in basic medical examinations. Tutor guidance was required particularly in the use of the otoscope and sphygmomanometer. Kindergarten students were attached to medical students in a ratio of either 2:1 or 1:1. Following the session with the Kindergarten students, the medical students had approximately 30 min to discuss their experience with the tutors, while the Kindergarten children completed activities as described in Table 1. Each class was issued with medical dress-up kits for educational use at school. These kits included stethoscopes, plastic syringes, forceps, kidney dishes, crepe and sling bandages and surgical caps, masks and booties.

Evaluation

Quantitative and qualitative evaluation of the 'meet the medical student' programme was performed by distribution of questionnaires to medical students, primary schools and medical tutors.

All second year medical students of the undergraduate medical course at UNSW who attended the 'meet the medical student' session ($n=217$) in 2007 received a questionnaire at the end of their session. Questionnaires asked medical students to rate 13 aspects of the sessions, based on the skills demonstrated and graduate capabilities addressed in the session, using a five-point Likert scale ranging, for example, from 'very poor' (1) to 'very good' (5). Graduate capabilities are the desired capabilities of UNSW medical students at time of graduation and are categorised within three broad areas of applied knowledge and skills, interactional abilities and personal attributes. The students are required to achieve these learning outcomes during their 6-year degree.

Questionnaires were also distributed to the teachers of each of the primary schools that participated in the programme ($n=7$, one questionnaire completed per school). They addressed various facets of the 'meet the medical student' programme including the pre-excursion material sent to the schools, relevance of the programme to the Kindergarten PDHPE syllabus and the effectiveness of the programme in allaying Kindergarten students' fears of hospitals and doctors. The questionnaires distributed to the medical tutors ($n=6$) asked them to rate aspects of the sessions including preparation provided to tutors and suitability of venue and clinical stations.

Data analysis

The questionnaires were coded and analysed using SPSS (version 14.0 for Windows). The percentage of respondents for each question and the percentage of respondents who gave a rating of 4 or 5 were calculated. The respondents who failed to provide a score were included in the percentage of respondents who issued a rating of 3 or below for the question. This was done to minimise the risk of falsely inflating numbers in the group giving a rating of 4 or 5. Comments supplied in the questionnaires were recorded in Microsoft Excel. These were reviewed by four medical tutors and coded for dominant themes.

Table 1. 'Meet the medical student' programme schedule for Kindergarten students.

Session with medical students	50 min
<ul style="list-style-type: none"> Gross motor skills (hopping, skipping, heel-toe gait and jumping 3 m) Pulse and blood pressure Auscultation of heart and lungs Visual acuity and otoscopy Measuring head circumference, height and weight 	
Students from different rooms converge to meet in common venue	10 min
Light refreshment	10 min
Clown doctors/play therapist	10 min
Starlight Express Room visit*	10 min

Note: *The Starlight Express Room is designed to provide fun and entertainment for patients and their siblings.

Results

All medical student questionnaires (217) were returned although not all questions answered, resulting in a response rate of less than 100% for most questions.

Table 2 shows the percentage of medical students and tutors who provided a rating of 4 ('well') or 5 ('very well') in response to each question. As shown, key elements of the medical curriculum were rated as well addressed while graduate capabilities (such as basic and clinical sciences, social and cultural aspects of health and disease, and ethics and legal responsibilities), which were not the focus of the session, rated poorly. A large proportion of students and tutors felt that the session did not effectively highlight the role the hospital plays within the community. In general, questions evaluating the design of the programme rated well in contrast to that addressing the venue.

The teachers from each school completed the questionnaires collectively. The majority of statements received a score of 4 or 5 by 100% of schools (Table 3).

The dominant themes from comments provided by medical students, teachers and tutors are listed in Table 4.

In addition, verbal feedback provided by the medical students following the session strongly suggested that the programme provided a worthwhile learning experience. The students discovered the sometimes 'exhausting' and physical nature of clinical paediatrics. The children needed frequent encouragement to complete the examinations, with the students often having to demonstrate the gross motor skills

and lower themselves to the height of the children to effectively complete examination elements. The main complaint related to the size of the venue, which led to overcrowding and excess noise level, at times making examination difficult.

Table 3. Schools' assessment of the 'meet the medical student' programme.

Question	Number of schools attending (<i>n</i> = 7)	Rating 4 or 5 (%)
Rate 'meet the medical student' flyers	7 (100%)	100
Rate booking system	7	100
Rate pre-excursion package sent to school	7	100
Rate structure of programme	7	100
Rate session with the medical students	7	100
Rate talk from clown doctors or play therapist	6 (86%)	72
Rate visit to Starlight Express Room	7	86
Indicate relevance to Kindergarten PDHPE syllabus	7	100
Rate effectiveness of programme in allaying students' fears of hospitals and doctors	7	100
Rate effectiveness of programme in promoting the hospital as part of community	7	100
Rate programme overall	7	100
Indicate likelihood of school participating next year	7	100

Table 2. Medical students' and tutors' assessment of the session.

Question	Number of students responding (%)	Student responses rating 4 or 5* (%)	Number of tutors	Tutor responses rating 4 or 5 (%)
Rate demonstration of practical skills by tutor	216 (99.5)	92	Not asked	N/A
Indicate how the graduate capability of effective communication was addressed during the session	217 (100.0)	93	6	83
Indicate how the graduate capability of basic and clinical sciences was addressed	214 (98.6)	31	6	50
Indicate how the graduate capability of social and cultural aspects of health and disease was addressed	211 (97.2)	28	6	17
Indicate how the graduate capability of patient assessment was addressed	216 (99.5)	80	6	83
Indicate how the graduate capability of ethics and legal responsibilities was addressed	213 (98.2)	48	6	50
Rate how the session helped medical students appreciate the challenges involved in examining children	216 (99.5)	94	6	100
Rate how the session helped medical students appreciate the cognition level of a 6 year old	216 (100)	83	Not asked	N/A
Rate how the session helped medical students appreciate the gross motor skills of a 6 year old	215 (99)	82	Not asked	N/A
Indicate how the session highlighted the role the hospital plays within the community	216 (100)	47	6	50
Rate how session achieved its main aim of teaching medical students how to interact with well children	215 (99)	94	6	100
Rate session overall	216 (100)	97	Not asked	N/A
Indicate whether this session merits ongoing inclusion in curriculum	214 (99)	94	6	100
Rate tutor's guide	Not asked	N/A	6	67
Rate preparation provided to tutors	Not asked	N/A	6	83
Rate suitability of venue	Not asked	N/A	6	0
Rate suitability of stations	Not asked	N/A	6	83

Notes: N/A = not applicable.

*4 or 5 indicated 'well' or 'very well'.

Table 4. Dominant themes from comments supplied by medical students, tutors and teachers.

Group	Positive comments	Negative comments
Medical students	<ul style="list-style-type: none"> • challenges of examining children were appreciated • experience was enjoyable 	<ul style="list-style-type: none"> • larger venue was required • more emphasis on accurate recording of signs such as blood pressure measurement was desirable
Tutors	<ul style="list-style-type: none"> • should have ongoing inclusion in curriculum • ongoing inclusion warranted as programme was innovative 	<ul style="list-style-type: none"> • venue was too small • more preparation for students prior to the session in form of pre-reading material and demonstration time was required
Teachers	<ul style="list-style-type: none"> • experience was positive for the Kindergarten children • keen to participate in programme again the following year 	<ul style="list-style-type: none"> • parts of the programme were a little rushed such as the visit to Starlight Express Room

Discussion

We aimed to explore the views of second-year medical students, Kindergarten teachers and tutors involved in the pilot 'meet the medical student' programme, established following recognition of the increased demand for clinical paediatric subjects within the teaching context. Feedback from the previous year's students had highlighted the need for more patient contact. Kindergarten students were identified as a group of non-hospitalised children that could help to teach medical students important skills while at the same time benefiting from the experience themselves. These skills included techniques required for effective communication and engagement with children, essential in performing a paediatric examination. This is a novel method of teaching medical students and has not been published as part of any other medical school curriculum. We performed a literature search and found no comparable programmes. Programmes in Australia and elsewhere have been limited to the delivery of health promotion by medical students to young school children and have not involved clinical examination (Kochar et al. 2004; Chapman 2007).

The stated aim for this programme was to teach medical students how to interact with well children and to appreciate the challenges involved in examining children. The medical students also had the opportunity to perform basic paediatric examinations. The evaluation demonstrated that the programme was able to achieve its aims despite identified limitations in venue size, with 94% of students giving a rating of 'well' or 'very well' regarding learning 'how to interact with well children' and 'appreciating the challenges in examining children'. The majority of medical students (94%) and tutors (100%) felt that the session warranted ongoing inclusion in the curriculum while all the participating schools were highly motivated to be involved in the programme again the following year.

The learning goals for the programme include the graduate capabilities, amongst them ethics and legal responsibilities, which form the core of the UNSW medical curriculum and hence were assessed in the questionnaire. The graduate capabilities of basic and clinical sciences, social and cultural aspects of health and disease, and ethics and legal responsibilities, were rated as well addressed by this programme by a lower proportion of students. The graduate capability of basic and clinical sciences considers the mechanisms of health and disease, diagnostic investigations, approaches to management

and communication of understanding while the graduate capability of social and cultural aspects of health and disease examines the social determinants of health and disease, health care systems and improving health by social approaches. The 'meet the medical student' programme does not provide the scope for addressing these capabilities, nor was it intended to do so. Future modifications could expand the scope of the programme in these directions.

It is of interest that the graduate capability of ethics and legal responsibilities rated poorly in the evaluation process. Medical students appeared not to appreciate the range of ethical issues involved in bringing school children into the hospital environment and having them examined by medical students. These include ensuring Criminal Records Checks (working with children) had been performed on medical students and supervising paediatric doctors, the issue of undressing children in the absence of their parent/s (which the programme decided not to do), placing hospitalised children (who they may encounter during the visit) at risk by potentially bringing contagious infectious illnesses into the hospital setting and appropriate processes in the case of a medical student detecting an abnormality during clinical examination. The organising team had considered each of these issues carefully and each had been addressed prior to commencement of the programme through excursion permission notes, risk assessment guidelines, parent information sheets and consent forms for photographs to be taken for teaching purposes and presentation. The risk assessment guidelines outlined the potential risks and risk management strategies for falls, sensitivity at seeing sick children, allergic issues and child protection issues. The parent information sheet emphasised that the children would not be asked to remove any item of clothing or be given any injections or medication. Medical students could be made aware of the aforementioned ethical and legal considerations of the 'meet the medical student' programme either during the preparatory session or included in pre-session reading material. Accordingly, the graduate capability of ethics and legal responsibilities could be more suitably addressed in future sessions. The students' evaluations also indicated that the role of the hospital within the community was not adequately highlighted. Unfortunately, the time restriction of the preparatory session did not allow discussion of this theme. Provision of pre-reading material about this topic could introduce the students to this aspect of the role of a children's hospital.

The authors had identified the lack of an optimal venue as a problem in the early stages of the programme's development. During some sessions there were up to 60 individuals, comprising 25 school children, 30 medical students, two tutors and three teachers, in one room. The noise level in the room was often difficult to control and thus some examinations, such as chest auscultation, were challenging. Inadequacy of the existing venue was raised by medical students, all the tutors and a few teachers. Unfortunately, this problem is unlikely to be resolved in the short term at SCH, but warrants due consideration for other hospitals or universities considering adopting this teaching approach.

The evaluation indicated that many students were keen to measure clinical signs such as blood pressure accurately. The students had only been expected to measure the growth parameters and radial pulse rate and to inflate blood pressure cuff. It had been anticipated that the high noise level in the room would preclude accurate blood pressure readings and there were insufficient numbers of tutors to check abnormal measurements. Therefore, the focus of the exercise was to engage the children and use age-appropriate language such as 'pillow hugging the arm' to explain the process.

Many Kindergarten students also enjoyed inflating the cuff, either on their own arm or that of a medical student. There were many examples of school children using medical equipment such as stethoscopes to examine themselves, their classmates, medical students or teddy bear props. For the Kindergarten students, gaining familiarity with body parts, including internal organs such as heart and lungs, medical equipment and a 'group of people who keep children healthy' (learning areas from the Kindergarten PDHPE) was a goal of the 'meet the medical student' programme. The excursion certificates and the stamps issued at each activity station proved to be extremely popular with the school children.

We found that a ratio of 1:1 medical to Kindergarten student worked best. On the occasions where there were more Kindergarten students than medical students it was difficult for the medical students to complete the stations or keep the Kindergarten students occupied.

We felt strongly that the 'meet the medical student' programme had to provide a worthwhile educational experience for the Kindergarten students. The ratings given by the school teachers for various aspects of the programme indicate that the excursion had been successful. Notably, all schools felt that the programme was of relevance to the Kindergarten PDHPE syllabus and allayed students' fears of hospitals and doctors. Qualitative evaluation of the programme by Kindergarten children would also provide valuable information and could be considered for future sessions.

Despite some problems identified in both the quantitative and qualitative aspects of the questionnaires such as venue size, the overwhelming consensus from medical students, Kindergarten teachers and tutors, was that this innovative programme, which introduces school children to the hospital and allows medical students to gain the invaluable experience of interacting with well children and performing basic paediatric examinations, achieved its main aims and should have ongoing inclusion in the curriculum. Our programme was delivered to medical students in the early stage of their training

as an introduction to clinical paediatric medicine. Therefore, it was appropriate to use well children to teach medical students skills required for engaging the paediatric patients and performing basic paediatric examination. In addition, many UNSW medical graduates will have careers in general practice and thus require skills in examining relatively well children rather than complex paediatric patients. As medical student numbers expand across Australia, there is mounting pressure to find novel ways in which students can learn clinical paediatric medicine in order to ease the burden on hospital patients. The 'meet the medical student' programme was created out of this need and was felt to be successful in delivering a fun, educational experience to Kindergarten and medical students alike. It illustrates the multi-faceted role the hospital and medical school can play within the community.

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Appendix 1

Kindergarten students' excursion certificates

