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The Development of a Primary Dental Care Outreach Course.

P.J. Waterhouse¹, A. Maguire¹, D. Tabari², V. Hind¹, J. Lloyd¹.

¹ School of Dental Sciences, Newcastle University, Newcastle upon Tyne, UK.

² Newcastle Primary Care Trust, Newcastle upon Tyne, UK

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Correspondence:

Dr Paula Jane Waterhouse
The School of Dental Sciences
Framlington Place
Newcastle upon Tyne
NE2 4BW, UK
Tel: 0191 222 7353
Fax: 0191 222 5928

Email: p.j.waterhouse@ncl.ac.uk

Abstract

The aim of this work was to develop the first north-east based primary dental care outreach (PDCO) course for clinical dental undergraduate students at Newcastle University.

The process of course design will be described and involved review of the existing Bachelor of Dental Surgery (BDS) Degree Course in relation to previously published learning outcomes. Areas were identified where the existing BDS course did not meet fully these outcomes. This was followed by setting the primary dental care outreach course aims and objectives, intended learning outcomes, curriculum, and structure. The educational strategy and methods of teaching and learning were subsequently developed together with a strategy for overall quality control of the teaching and learning experience. The newly developed curriculum was aligned with appropriate student assessment methods, including summative, formative and ipsative elements.

Background

According to d'Andrea (1), within higher education generally there appears to be greater emphasis within newly developed curricula to match the skills achieved by the time of graduation more closely to those required to function successfully in the postgraduate arena. This process is aided by designing medical courses which are outcome-based (2). In the UK, the general trend towards this has been mirrored within dentistry; 'Options for Change' (3) proposed that future dental education should focus on developing skills needed in practice, with greater use of primary care outreach schemes throughout undergraduate education. A similar ethos was also propounded by 'The First Five Years. A framework for Undergraduate Dental Education' (4) with the recommendation to *"increase student teaching and learning by extending the clinical environment into any primary care setting approved by the dental school for the purpose of undergraduate education"*. Nationally in the UK, undergraduate dental education could be described as undergoing a period of restructuring and modernisation. This may be attributed to many factors including the expansion of student numbers, reduction in the number of dental clinical academics (5), the requirements of bodies such as the Quality Assurance Agency (6) and the General Dental Council (GDC) and a general trend within UK Universities to improve teaching quality and review curricula.

Until 2004 the undergraduate clinical experience in Newcastle was obtained from treating patients within Newcastle Dental Hospital and local District General Hospitals, all providing secondary or tertiary care. Students gained

very little, if any, experience of providing 'hands-on' dental care for patients within a primary care setting despite the fact that this is where most dentists choose to pursue their career (7). It could be argued that the clinical curriculum provided at this time did not address fully the requirements of the workplace.

Outreach teaching in UK dentistry is not a new concept. The first scheme developed was in Manchester in the 1970's (8) involving paediatric dentistry. This scheme continues today and has subsequently successfully expanded into adult restorative care (9). When the PDCO course in Newcastle was within its initial design stage in 2003 only a handful of schools had outreach courses. **During development of the course, Newcastle became part of a three school funding consortium; one of the schools involved in the consortium already had an outreach course.** Presently, all UK schools provide their undergraduates with some form of outreach experience. **From a European perspective, improving the oral health of individuals, families and groups in the community is seen as a major competence requirement for European dentists (10). Experience of providing oral health care and promotion for patients in primary care can be enriched by the incorporation of primary dental care outreach teaching within undergraduate dental degree programmes.**

Within UK populations many dental inequalities persist and dental care may be seen as most lacking in the neighbourhoods most at need. Primary dental care facilities involving undergraduate students have been shown to increase

access to care within deprived areas (9) and complement existing community-based services (11).

The aim of this paper is to describe the processes of design and implementation of a new primary dental care outreach (PDCO) course within an undergraduate dental curriculum in the UK.

Course Design

Extension of the clinical dental undergraduates' experiential environment was suggested by the GDC in 2002 (4). The GDC Education working group highlighted the primary dental care environment as a potential solution to training issues including team working, and knowledge of/familiarity with the impact of patients' social needs upon dental care provision.

In Newcastle, clinical dentistry is taught in years 3, 4 and 5 of the BDS Degree Course, with groups of up to 8 students allocated to clinics every week day.

The PDCO Course involved the secondment of groups of 3 or 4 students from a clinical group on a fortnightly basis during the three terms of year 4 and two terms of year 5 to two clinical facilities within the Community Primary Care Trust in Newcastle upon Tyne. These dental clinics, **forming part of a larger healthcare centres**, are situated in areas where there is a socially disadvantaged population, who may not have access to the General Dental Service (GDS). Initially, **although these facilities provided dental care for a wide range of patients (adults, children, special needs, socially disadvantaged**

groups) facilities were available for students to provide care for mainly paediatric dental patients.

Best practice in course design is strongly linked to Biggs' theory of "*constructive alignment*" (12, 13). This theory "*connects the abstract idea of a learning outcome to the things teachers actually do to help students learn, and the things that students do actually learn*" (14).

Therefore, before the design process began, the skills, knowledge and attitudes that students should possess by the successful completion of the BDS Degree Course were assessed. This allowed reflection (referring to guidelines) upon what the new course should achieve, and, more importantly, what the students should learn from the experience, defined by intended learning outcomes (4, 6, 15).

Once the intended learning outcomes were derived, relevant teaching and learning strategies were agreed, with the aim of providing each student with appropriate learning opportunities. It was implicit that the PDCO Course possessed an appropriate bias towards clinical experiential learning, but it was important to ensure that both the clinical and paraclinical teaching addressed specific requirements relating to competence/familiarity/knowledge. The seminar programme was thus designed to incorporate the teaching and learning needed to address these issues.

Aims of the BDS Degree Course and Learning Outcomes specific to PDCO

In Newcastle, the preventive and restorative aspects of the undergraduate clinical dental curriculum are broadly taught within four main themes.

1. Prevention of oral disease
2. Diagnosis and treatment planning
3. Restorative management of the primary and permanent dentition
4. Communication and professionalism

As well as incorporating these themes into the PDCO Course (16), the development of this new course provided the opportunity to include additional learning outcomes into the BDS Degree Programme (Figure 1). Each topic included within the PDCO curriculum was cross-referenced to one or more learning outcomes for each of the four themes. In this way the clinical skills which were to be developed during the course were 'mapped' to one or more relevant learning outcomes.

Structure of the Course

The PDCO Course may be described as a complex network structure (17). The three main components are Paediatric Dentistry, Dental Public Health and Restorative Dentistry, with a smaller fourth component of 'Special Needs' dentistry (Figure 2). These components interplay with the four themes encompassed within the BDS Degree Programme.

Educational Strategy

The teaching and learning opportunities are provided by community-based healthcare with a large clinical experiential component of psychomotor, attitudinal and communication-based tasks.

By virtue of each student providing comprehensive dental care for a number of different patients over an extended time period of two years, information gathering and problem solving were inherent to effective care. The course design also provided a smaller component of problem solving and information gathering via small group teaching seminars **delivered by primary care teachers** and in-course assessed essay/projects.

Methods of Teaching and Learning

Teaching formats included:

- Induction lectures - delivered jointly by the academic and outreach-based course leaders.
- Practical/clinical induction seminars, **delivered by primary care teachers and nursing staff**.
- Clinical experiential learning where the maximum student to staff ratio is 4:1 and the student to nurse ratio is 1:1.
- Small group teaching - seminars and tutorials **delivered by primary care teachers** (Figure 3). Some seminars form part of the preparation students require before they attempt subject- related clinical competency tests (Figure 3).
- Directed self-study using a Virtual Learning Environment.

Design of Student Assessment

Methods of assessment were designed by referencing the original intended learning outcomes of the PDCO Course. The general trend within the Faculty of Medical Sciences has been towards criterion-referenced assessment of

students. Assessment within the course can be categorised by purpose as being either summative, formative or ipsative in nature (18).

Clinical Skills

It has been argued that summative assessments should be restricted to areas that can be reliably assessed, such as knowledge, and that skills development, such as communication and psychomotor skills should be assessed formatively (19). However, in a vocational skill-based course such as dentistry, the University and Profession's regulatory council has a responsibility to ensure that our young graduates are fit to practise, in order that they can provide safe and effective healthcare to the general public. In the United Kingdom, this is a legal requirement of each School's Dean of Dentistry who is obliged to 'sign-up' each graduating student as 'fit to practise' prior to their registration with the GDC.

Patient management

During the PDCO course, in line with School teaching policy, formative and ipsative assessment **is provided by primary care teachers** and occurs on a daily basis before, during and after each student-patient contact. The grading system used is that of Merit (M), Satisfactory (S), Borderline fail (B) and Unsatisfactory (U). Each grade is criterion-referenced. Students reflect upon their own performance, grade themselves and present this reflective grading to their teacher. The two then discuss the episode and overall grades are awarded for the patient contact using the categories:

- Organisation and efficiency

- Subject knowledge
- Patient management
- Treatment quality

This process is documented within the student's clinical reflective portfolio and a single composite grade is awarded and recorded for the particular patient contact. This is also the time when the ipsative feedback is employed, particularly if a teacher is allocated to the same clinical group for a substantial time period. In PDCO, students have the same clinical teachers (dentist and nurse) for at least an academic year. The course aims to foster, as part of good practice in clinical governance, students becoming skilful in appraising their own experiences in an ipsative, reflective way (20, 21). Continual staff allocation to the same group of students (both clinician and nurse) enhances greatly the process of formative and ipsative feedback. Teachers soon learn the capabilities of their 'own' students, seek the gaps in their knowledge or skill base and are well placed to help an individual rectify areas of weakness. Certain specific activities can be related back to the previous time when that activity was undertaken and comparisons can be made.

This process has been strengthened further by the school-wide implementation of the portfolio review process (22).

Each student's Outreach-based reflective clinical portfolio is stored at the appropriate outreach clinic and relevant data transferred to the school as required. This portfolio is a satellite to the main student-held reflective portfolio used within the school (22). The system has a confidential reflective section

for learners to document their own reflections, encouraging them to derive their own action plans and begin to direct their own learning goals.

Clinical Competency

The dental course is highly practical and the student must acquire complex psychomotor skills to perform clinical dentistry. Objective assessment of these skills is imperative and provides evidence of 'fitness to practise'.

The professional domains reported in TFFY (4) for undergraduates' clinical skills highlight specific learning outcomes for each teaching discipline. These are expressed on 3 different levels and are:

*'**Be familiar with:** students should have a basic understanding of the subject, but need not have direct clinical experience or be expected to carryout procedures independently.'*

*'**Have knowledge of:** students should have a sound theoretical knowledge of the subject, but need have only a limited clinical/practical experience.'*

*'**Be competent at:** students should have a sound theoretical knowledge and understanding of the subject together with an adequate clinical experience to be able to resolve clinical problems encountered, independently, or without assistance.'*

The highest level of student ability is 'competence'. Not all clinical skills have an attached competency; however core clinical skills are required at the level of competence.

Clinical competency tests are a method of assessing a students' core practical skills base during routine clinical treatment clinics (23). Teachers

need to know that certain core clinical skills are being attained by everyone.

To this end, competency-based summative assessments are used.

Assessment of clinical competency in the PDCO course uses a modified version of the Structured Clinical Observed Test, SCOT (23-25) and each test has its own unique set of criteria, depending upon the task (26, 27).

Clinical competency tests in the PDCO course were developed specifically because certain areas were not assessed clinically within the existing BDS programme and included:

- Cross infection control and sterilisation of instruments
- Writing a referral letter
- Prescribing a medication
- Obtaining valid consent for a child

The checklists produced for each competency were developed by clinical academics and primary care teachers during educational planning meetings.

An example of a checklist for a PDCO competency is shown in Figure 4.

Chambers (28) offers a definition of competency:

...the behaviour expected of beginning independent practitioners. This behaviour incorporates understanding, skills and values in an integrated response to the full range of circumstances encountered in general professional practice. This level of performance requires some degree of speed and accuracy consistent with patient well-being but not performance at the highest level possible. It also requires an awareness of what constitutes acceptable performance under the circumstances and desire for self-improvement.

This definition underpins the ethos behind the development of the Structured Clinical Operative Test (SCOT) for invasive, real-life, clinical procedures in Newcastle. These assessments were first devised by dental teachers in Dundee as a formative assessment but it is accepted that they are sufficiently objective to be used in a summative way (23). Objectivity is obtained by choosing appropriate clinical tasks and designing a checklist of associated subtasks which can be assessed “binominally” ie “yes” or “no”. In order to complete the task with clinical and professional success, the student should perform all critical subtasks and the vast majority of non-critical subtasks successfully. The perpetual formative and ipsative feedback within the clinical environment allows learner and teacher to decide jointly when a student is ‘ready’ to undertake the competency test. If competency is not reached then immediate feedback is given by the assessor and the student is required to take the competency again at an appropriate time. In theory, this should be allowed to occur until competency is attained; however, in practice students tend to only attempt a competency when they are confident in their abilities. Students therefore rarely need more than two attempts at a competency (with ‘real-life’ practice in between). Following an initial two-year pilot of PDCO clinical competencies, these have been included as part of the summative assessment for the Stage 5 Final BDS examination matrix.

Portfolio Review

Within the PDCO course this occurs within a structured timetable, in-line with the School-wide timetable for portfolio reviews **and is undertaken for each**

student by their own primary care teacher. These reviews occur throughout the clinical years, but specifically for senior years in the second term of 4th year and the first term of fifth year. The student prepares beforehand by collating the types of clinical experience and what grades have been achieved in the prescribed timeframe. The students are also asked to document any issue(s) which they feel may have helped or hindered their progress. They then grade their specific clinical skills, communication skills and knowledge base on a proforma using specific questions in readiness for a confidential interview with staff. During the portfolio review meeting an overall grade is documented and recorded in the students' main school-based records. This process provides an ideal opportunity to encourage and challenge those students demonstrating satisfactory or meritorious performance and coordinate remedial help for those who show borderline or unsatisfactory attainment/progress within the clinical environment. Portfolio review is a powerful tool for guiding student learning despite its formative nature. The results of these reviews do not offer any contribution towards the examination matrix, but are used to inform the school's annual review of student progress.

Summary of the Summative Assessment Strategy

Figure 5 identifies the different topics involved within the 4 themes of the BDS course, and their relevant summative assessment within the BDS Course.

Quality Control

It was the intention during course design, to ensure integration of the primary care teachers into the relevant areas of the school. Teaching and learning physically outside the school is subject to scrutiny ensuring the quality of the

teaching and learning experience for learners and teachers alike. The approach taken to provide quality assurance is multifactorial, some of which are outlined below:

Outreach Administrative Structure

Several groups were convened before the course was designed: an outreach Executive committee, working party and education group were developed. These groups included representation from the school, the community dental services (as they were named at the time), hospital trust and strategic Health Authority. Each group had its own remit and development of all aspects of the course from educational to financial planning was steered by the regular meetings. After the course started, the working party devolved back into the Executive and Education committees, which have continued to meet on a termly basis.

Outreach support officer

An outreach support officer was appointed before the outreach course started to facilitate good communication between academics and outreach teaching staff. The administrative role of this position is large, involving collating clinical activity, competency data, portfolio data and coordinating and analysing student and staff course evaluations. This crucial member of staff links the University teachers to the outreach teachers and coordinates all meetings and professional development opportunities.

Honorary teachers

All primary care teaching staff involved in teaching for the PDCO course hold honorary clinical lectureships with Newcastle University and are included in all school based teaching development meetings, staff training days. Overall Course Leadership is shared between two clinical academics and one senior member of the primary care teaching team.

Induction of existing and new teachers

All staff involved in teaching students within the outreach clinic attend induction sessions within the dental school to observe clinical teaching sessions and small group teaching sessions led by experienced clinical academics. A specifically designed induction pack is provided for each new member of staff. Existing staff also revisit the school periodically for 'refresher' clinical teaching sessions. All teachers are issued with a personal teaching portfolio to encourage reflective teaching practices.

Peer review

As PDCO is a new course within the University, all outreach teaching staff are required to take part in regular peer review. This involves peer review of one type of teaching once per academic year (clinical, seminar based teaching). The outreach teachers were involved in the design of the peer review forms and the process informs their own personal development planning. The outreach support officer keeps a log of who has been reviewed, but the content of each review remains confidential to the reviewer and reviewee.

Regular teaching meetings

The outreach teaching group is open to all teachers involved in outreach and is chaired by an academic course leader. The group meets termly, but may also meet at short notice to discuss particular issues. This allows potential problems to be dealt with quickly.

Involvement of teachers in school meetings

The outreach based course leader attends (together with the academic course leaders) the curriculum coordinating committee for the clinical phase of BDS and also the Staff Student Committees for Stages 4 and 5. Academic course leaders provide a written report on outreach for each Curriculum Coordinating Committee meeting. Proposed course developments and internal reviews are presented through a similar route.

Clinical activity data and database

Clinical activity is monitored daily with staff and students recording anonymised patient age and clinical activity on specifically designed record collection forms. These data are entered into a database by the outreach support officer who generates reports for relevant staff and meetings. This allows the course leaders to assess how many patients and what types of treatments are being provided by individual students or groups of students. It also allows comparison between different clinics. These data are discussed within the dental school via Outreach Executive and Curriculum Coordinating Committees.

Completion of clinical competencies

This is monitored closely by the support officer and fed back to both students and their teachers to encourage completion, which is logged by the student within their clinical portfolio.

Portfolio reviews in line with school

Review of a student's portfolio takes place at strategic times of the clinical course involving the student and their primary care teacher. The student and teacher will agree an overall grade for their progress which is recorded centrally within the school.

Annual review of student progress

The annual review allows opportunity to consider each students progress on a school-wide scale involving the leads for all clinical disciplines. During this review students who are 'cause for concern' or 'gifted and talented' are identified alongside those who are making satisfactory progress. Each course leader must liaise with relevant teachers to provide structured feedback on each student prior to the meeting. The students receive feedback from this process with appropriate help and advice where necessary.

Student and staff evaluation of the course

Outreach is a new course and, as such it is a requirement of the University to undertake annual course evaluation for a period of 5 years. A series of student and staff evaluations have been completed and have been useful in 'fine-tuning' the course. They are discussed with the students via staff student

committees. Course evaluation will be used as the basis for a future publication.

Conclusions

Within an already well-established undergraduate dental course, it was a useful and rare opportunity to develop an innovative new course *de novo*. The Primary Dental Care Outreach course has now completed its first two academic years; the first cohort of students having undergone the full outreach course. It is an evolving course which has been designed to meet specific areas of the undergraduate dental curriculum by providing a continual allocation in primary care based clinical teaching facilities for the final 5 terms of the BDS programme. **Initially, only paediatric dental patients were treated by undergraduates, however as the course evolves adult and special needs patients are also now being provided with dental care.**

The course has been subjected to vigorous internal evaluation by both students and staff in line with the University's requirements for new course probation. In addition, the course design and associated documentation were collectively reviewed by the General Dental Council before outreach teaching began in 2004. **Quality assurance was assessed by the General Dental Council in 2006.** Results of the internal evaluations will form the basis of a subsequent publication. However, from student based evaluations of the course it is being shown to deliver key learning outcomes for example, the ability to work in a team. From its initial good start within two primary care teaching facilities within Newcastle; there are now plans to open further

facilities with the capacity to teach both undergraduates and student Dental Care Professionals together. This will provide in total, up to 15 primary care placements for undergraduates per clinical session and will involve the treatment of both paediatric and adult patients.

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