Clinical audit in the final year of undergraduate medical education: Towards better care of future generations

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Abstract

Background: In Australia, in an environment undergoing rapidly changing requirements for health services, there is an urgent need for future practitioners to be knowledgeable, skilful and self-motivated in ensuring the quality and safety of their practice. Postgraduate medical education and vocational programs have responded by incorporating training in quality improvement into continuing professional development requirements, but undergraduate medical education has been slower to respond.

Aims: This article describes the clinical audit programme undertaken by all students in the final year of the medical course at the University of Notre Dame, Fremantle, Australia, and examines the educational worth of this approach.

Methods: Data were obtained from curricular documents, including the clinical audit handbook, and from evaluation questionnaires administered to students and supervisors.

Results: The clinical audit programme is based on sound educational principles, including situated and participatory learning and reflective practice. It has demonstrated multi-dimensional benefits for students in terms of learning the complexities of conducting an effective audit in professional practice, and for health services in terms of facilitating quality improvement.

Conclusion: Although this programme was developed in a medical course, the concept is readily transferable to a variety of other health professional curricula in which students undertake clinical placements.

Introduction

The climate in which medicine is practised in Australia is changing rapidly. The change has been stimulated by the expansion of health services to a larger, more culturally diverse and ageing population, as well as heightened awareness of the need for better health provision to Indigenous Australians. There is increasing concern about environmental quality, the growing costs of health care to individuals and the continuing shortages and maldistribution of health care professionals (Armstrong et al. 2007). There is also increasing concern for the quality of support, monitoring and continuing professional development opportunities for overseas-trained doctors who now constitute 25% of the medical workforce and practise generally in outer metropolitan, rural and remote areas.

Recognition of quality and safety issues and the potential for an increase in adverse events in health services as a result of the changing climate have led to the establishment of several government committees over the past decade (Runciman 2010). In 2006, the Australian Commission on Safety and Quality in Health Care (ACSQHC) was established. In November 2010, Australian Health Ministers endorsed the National Safety and Quality Service Standards developed by the ACSQHC. The standards are to be the criteria used by the Australian Health Service Safety and Quality Accreditation Scheme which plans to complete its review and accreditation of health services throughout the country by December 2012. The Standard relevant to initial credentialing and re-credentialing of medical practitioners includes a requirement for the performance of regular clinical audits (ACSQHC 2010).

The heightened concern with quality and safety has impacted on postgraduate training. Medical colleges responsible for specialist vocational training and accreditation have been subject to increasing government oversight and regulation since the mid-1990s. Fellows are required to participate in programmes of continuing professional development (CPD) in order to retain Fellowship. Audit of clinical practice is...
considered part of CPD. Indeed, the Royal Australasian College of Surgeons and the Royal Australian and New Zealand College of Obstetricians and Gynaecologists make clinical audit/practice review a mandatory part of their CPD (Lawson et al. 2005). It is a mandatory requirement of vocational training in general practice/primary care (Royal Australian College of General Practitioners 2007). In addition, the Australian Curriculum Framework for Junior Doctors makes clinical audit a core element of all prevocational training (Graham et al. 2007).

To prepare graduates appropriately for this changing environment, the medical curriculum at the School of Medicine of the University of Notre Dame, Fremantle, Australia (Notre Dame), addresses the issues of quality and safety in medical practice throughout the 4-year undergraduate curriculum.

This article describes the culmination of teaching/learning in regard to these issues in the clinical audit programme undertaken by all students in the final year of the course, and examines the educational worth of this approach.

The clinical audit programme

Notre Dame offers a 4-year graduate entry medical course. The first 2 years have a problem-based learning curriculum during which students learn, *inter alia*, the concepts of evidence-based medicine and quality improvement, including the nature and characteristics of clinical audits.

During Year 3 of the course, students rotate through four clinical placements of 8/9 weeks. In Year 4 (final year), they rotate through four 8-week clinical placements. The clinical audit programme is undertaken by all students concurrently with their clinical rotations through Year 4. The programme is the major component of teaching/learning in the Population and Preventive Health (PPH) Domain of the curriculum for Year 4. (For the purposes of allocating teaching/learning time and assessment throughout the 4 years of the integrated curriculum, responsibilities are divided among four domains, the other three being Basic Sciences, Clinical and Communication Skills, and Ethics, Personal and Professional Development. In practice, the four domains often work seamlessly together, as in the case of the audit where the objectives of the clinical, population health and professional domains overlap.)

Aims

The clinical audit is designed to help students to achieve the following goals of the MBBS Course (Mak & Murray 2011):

1. **Graduates will be knowledgeable**
   - An understanding of the power of the scientific method in establishing the causation of disease and efficacy of traditional and non-traditional therapies.

2. **Graduates will be skilful**
   - The ability to communicate effectively, both orally and in writing, with patients, patients’ families, colleagues and others with whom physicians must exchange information in carrying out their responsibilities.

3. **Graduates will be dutiful**
   - The ability to identify factors that place individuals at risk of disease or injury, to select appropriate tests for detecting patients at risk for specific diseases or in the early stage of disease, and to determine strategies for responding appropriately.
   - The ability to retrieve (from electronic databases and other resources), manage, and utilise biomedical information for solving problems and making decisions that are relevant to the care of individuals and populations.
   - A commitment to advocate for, and to facilitate, access to health care for members of underserved and marginalised populations.

4. **Graduates will be ethical**
   - An understanding of, and respect for, the roles of other health care professionals, and of the need to collaborate with others in caring for individual patients and in promoting the health of defined populations.
   - An understanding of the threats to medical professionalism posed by the conflicts of interest inherent in various financial and organisational arrangements for the practise of medicine.
   - The capacity to recognise and accept limitations in one’s knowledge and clinical skills, a commitment to continuously improve one’s knowledge and ability, and to contribute to the expansion and application of medical knowledge.
   - The ability to tolerate the uncertainty inherent in medical practice and the ability to recognise and admit error.

As well, all students at Notre Dame are encouraged to give service in return for learning. Conducting a clinical audit on behalf of preceptors and/or health services that provide teaching for them in the clinical years allows students to support the commitment of other health professionals to ongoing learning and quality improvement.

The programme

Clinical audit is defined as ‘an evaluation of care provided followed by a quality improvement process, comparing actual clinical practice against established standards of practice’ (Royal Australian College of General Practitioners 2007).

Students are required to complete an audit using 20–30 patient cases. The topic may be chosen from any clinical discipline. However, most students select their topics from a list of quality improvement priorities identified by participating health services. Audits undertaken by students have included diabetes management in general practice, turn-around times of inpatients and legibility of hospital medical records.
In keeping with giving service in return for learning, audits must be conducted at health services (public or private) that teach Notre Dame medical students, may only be conducted with the approval of the health service's clinical quality and safety (or equivalent) committee, and in consultation with a clinician (medical, nursing or allied health) who acts as supervisor of the audit. Given the limitation on the number of cases, the audit is intended to target the areas of structure or process of care rather than outcomes of care.

Students wishing to undertake larger audits may do so by working in a group of up to three or use data that have already been entered into a database. Students choosing the first option must collect and analyse their own sub-set of data while working collaboratively on other components of the audit. Those choosing the latter option must conduct a validation study using 20–30 patient cases if the database is not a primary data source. The majority of students undertake individual audits.

Students are provided with a clinical audit handbook (Mak & Murray 2011) which provides a comprehensive guide to topic selection, audit approval, consultation with stakeholders, planning, selection of standards and sample, developing the audit tool, testing the method and the tool, conducting the audit, analysing data, reviewing results, developing solutions and disseminating results, ethical, confidentiality, privacy and legal issues, advice on extra resources, the role of supervisors, writing the clinical audit proposal and the final report, and assessment. The handbook contains a two page appendix ‘What your supervisor needs to know about the MED400 clinical audit’ which students are required to give to their supervisor.

Students are advised to re-visit prior learning in regard to clinical audit from the earlier years of the curriculum. School of Medicine PPH staff provides support in the forms of lectures, web-based resources on the School portal (including de-identified clinical audit proposals and formative assessment results from previous years’ students), question-and-answer sessions, and a panel discussion with health service personnel, including representatives of Clinical Quality and Safety Committees from participating health services. Formal peer support is provided in the form of assessment of the audit proposal of one other student, and a web-based discussion forum on the portal.

After analysing the data and generating the results, students work with stakeholders to form an action plan that addresses possible improvements, including what needs to be done, who needs to do it, and a timeframe for completion. Subsequently, they disseminate audit results and recommendations to all stakeholders, and note their reflections about working with colleagues, change management, professional challenges and the like for inclusion in their report.

Students have 32 weeks to complete their clinical audit and are advised to spend an average of 3 h per week on the audit. They are encouraged to keep a reflective journal or blog about their experiences while conducting the audit as an aid to writing the proposal and the final report. The final report includes a section for students to reflect on what they learned by undertaking the audit.

While 1 academic year is insufficient time for students to implement and re-audit their recommendations, they are required to document plans for implementation and re-auditing (e.g. what will be done, when, by whom) after discussion with colleagues for inclusion in the final report.

**Assessment**

Formative assessment for the clinical audit comprises assessment of the proposal and data collection tool, and provides detailed feedback to students before they commence the audit.

Summative assessment of the final written report of the audit contributes 10% of the total Year 4 summative assessment. There are no PPH questions in the end of final year summative exams.

Assessment rubrics for both formative and summative assessments are provided to students in the clinical audit handbook. Students undertaking group audits are required to submit a final report of their sub-set of data to enable individual assessment and ensure equity.

**Evaluation of the clinical audit programme**

Notre Dame was established in 2003 and admitted its first students in 2005. The foundation cohort undertook MED400 in 2008 and the second cohort in 2009. These first two passes through MED300 and MED400 were regarded as opportunities for faculty to establish and polish processes within clinical sites, and to address any areas of concern with the implementation of the curriculum. Given that there were the expected ‘teething problems’, especially as a clinical audit by students was a novel idea, we present evaluation data for the 2010 cohort, the first cohort of students able to undertake the audit with an acceptable level of understanding, experience and stability in the clinical curriculum environment.

**Method**

The Medical Education Support Unit at the School of Medicine Notre Dame conducted an evaluation of the Clinical Audit programme in 2010 via post-experience questionnaires to both supervisors and students after students submitted their final reports for assessment.

The student evaluation questionnaire included 24 statements seeking feedback on the usefulness of the handbook and other resources, 10 statements seeking feedback on the achievement of goals, and an invitation to make further comments. Response to the statements was required on a five-point Likert scale where one (1) indicated strong disagreement and five (5) indicated strong agreement.

The supervisor evaluation questionnaire comprised 15 statements seeking feedback on the number of students undertaking audits in the supervisor’s workplace, students’ preparedness for the programme, students’ behaviour during the audit, the level of support and preparation provided for supervisors, usefulness of the audit to the students and to the health service, readiness of the supervisor to supervise again, involvement in clinical quality and safety work in the health
service and general comments on the clinical audit programme. Responses to the statements were required as a 'Yes' or 'No' with a request to comment further.

The data were analysed using Microsoft Excel. The range and median scores are presented as the data were not normally distributed.

In addition, qualitative data were obtained from Notre Dame's 2010 Curriculum Conference (Clark et al. 2010) and from the 2010 Australasian Conference on Safety and Quality in Health Care (Mak et al. 2010a,b).

Results
A total of 62 (72%) of the 86 final year students completed the student evaluation questionnaire. The results, shown in Table 1, indicate a high level of satisfaction with the resources provided and that most students felt that they were able to achieve the programme's learning objectives.

Comments such as the following indicate that most students were satisfied with the programme and understood its contribution towards their professional development:

Handbook was excellent, detailed and thorough; audit examples provided were very helpful, lectures reinforced important key points in the handbook, assessment was clearly outlined and unambiguous. The [formative assessment] was so comprehensive and assisted greatly as it provided examples of what I could think to incorporate rather than just criticize.

The clinical audit in itself is a useful process to complete, as this will be a skill that we will require further in our careers.

Overall I did quite actually enjoy the audit and found it a valuable exercise more than I had expected. It also proved to benefit the hospital as it highlighted some areas in clinical practice especially in terms of risk assessment.

However, the wide range of scores shown in Table 1 and comments such as these below, indicate that a minority of students were dissatisfied with the programme and unaware of its value:

The clinical audit program only added to the burden of completing Med 400 and did not provide any relevant clinical learning experience. It managed to take time away from actual study which contributed to the stress of completing an already high-pressure year!

| Table 1. Range and median score of students’ responses (1 = strong disagreement, 5 = strong agreement), n = 62. |
|-------------------------------------------------------------|---------|----------|
| Responses | Min–max | Median |
| The information provided in the handbook, lectures and other resources enabled me to... | | |
| identify potential clinical audit topics | 2–5 | 4 |
| select my clinical audit topic | 2–5 | 4 |
| find useful examples of published clinical audits | 1–5 | 4 |
| write aim(s) and objectives for my clinical audit | 2–5 | 4 |
| select appropriate standards for my clinical audit | 1–5 | 4 |
| select an appropriate sample for my clinical audit | 2–5 | 4 |
| develop a case definition for my clinical audit | 2–5 | 4 |
| develop an effective data collection tool for my clinical audit | 2–5 | 4 |
| develop the data dictionary for my clinical audit | 2–5 | 4 |
| find useful resources for my clinical audit | 1–5 | 4 |
| obtain clinical quality and safety committee approval for my clinical audit | 1–5 | 4 |
| comply with privacy and informed consent requirements for my clinical audit | 1–5 | 4 |
| write my clinical audit proposal | 1–5 | 4 |
| understand formative assessment requirements for my clinical audit (proposal) | 2–5 | 4 |
| enhance my clinical audit using feedback I received on my proposal | 1–5 | 4 |
| use my data collection tool to collect the data for my clinical audit | 1–5 | 4 |
| analyse the data I collected for my clinical audit | 1–5 | 4 |
| interpret the results of my data analysis for my clinical audit | 1–5 | 4 |
| present my results to all relevant stakeholders prior to writing my report | 1–5 | 4 |
| obtain feedback from stakeholders prior to writing my report | 2–5 | 4 |
| incorporate feedback from stakeholders into my clinical audit report | 1–5 | 4 |
| produce a clinical audit report following the guidelines for publication | 2–5 | 4 |
| understand summative assessment requirements for my clinical audit (report) | 2–5 | 4 |
| manage my time effectively for my clinical audit | 1–5 | 3 |
| Completing the clinical audit programme... | | |
| developed my knowledge of scientific method | 1–5 | 4 |
| enabled me to engage in learning experiences relevant to medical practice | 1–5 | 4 |
| developed my skills in life-long learning | 1–5 | 4 |
| developed my written communication skills | 1–5 | 4 |
| developed my information literacy skills | 1–5 | 4 |
| developed my abilities to advocate for/facilitate access to health care for members of the underserved and marginalised populations | 1–5 | 3 |
| enhanced my respect for the roles of other health professionals | 1–5 | 4 |
| developed my understanding of the threats to medical professionalism posed by conflicts of interest | 1–5 | 3 |
| enabled me to recognise limitations in my knowledge and skills | 1–5 | 4 |
| developed my capacity to deal with uncertainties inherent in medical practice | 1–5 | 4 |
| enabled me to achieve additional learning objectives, please specify | 1–5 | 3 |
The time-consuming nature of the clinical audit and its perceived irrelevance to medical practice were common themes in the few negative comments received.

Interestingly, Clark et al. (2010) who presented their reflections on the Notre Dame medical curriculum 2 years post-graduation reported that, with hindsight, the clinical audit was one of the most valuable parts of their medical education. They spoke about the educational benefits of undertaking the audit as well as the career advancement opportunities made available to them because of the inclusion of a clinical audit in their resume. The following comment is indicative of this view:

I think a large part of the reason why I was successful in getting the [registrar] job was because of the audit…one of the….questions for the interview was ‘what do you understand to the difference between clinical audit and clinical research’. I also gave them a copy of the audit in my interview. So THANKS! without you I would not have this awesome job.

A total of 23 (54%) of the 42 supervisors completed the supervisor evaluation questionnaire. These supervisors reported a median of two (range 1–9) Notre Dame medical students conducting a clinical audit in their workplace/practice. As shown in Table 2, >90% of supervisors reported that the students’ audits were useful to the health service and that they would like students to undertake audits in the future. This is consistent with the observations that all health services that participated in the programme in its first year have continued to do so and that several additional health services have joined over the last 3 years.

The following comments from supervisors confirm their overall satisfaction with, and support for, the clinical audit programme and students’ participation in quality improvement activities:

The contribution of the students to continuous improvement is of great value to the departments who participate.

I review all audits and in fact have included some of the outcomes in our ACHS report.

I was more than happy with [the students’] commitment to the projects.

Students often required support from their supervisor to navigate the clinical audit approval process and obtain access to medical records:

Background to clinical audit per se is of a satisfactory level-administrative/management issues [regarding health service X’s] requirements is needed.

Attendees at the 8th Australasian Conference on Safety and Quality in Health Care expressed much interest and support for the inclusion of medical students in real-life clinical audit activities. This was evident in the large number of people attending the workshop and oral presentation (about 100 in total) about Notre Dame’s clinical audit programme, and from their oral and written feedback. The majority of attendees were health service employees working in the field of quality improvement. Many of them expressed a wish to partner with a university to implement a similar clinical audit programme in their health service, not just for medical students but also for nursing, dental and allied health students, as shown by these written comments:

Engagement of students into the clinical process is fantastic…can see great benefits for both students and organisations.

Innovative way to support an organisation’s quality and safety program.

Methods can be extrapolated to other disciplines.

### Discussion

From a practical perspective, given the clear expectation that graduates of medical courses in Australia will be required to engage in clinical audit at all stages of their postgraduate training, it seems logical that practical experience in conducting audits should be an integral part of undergraduate medical education. Currently, while teaching in clinical audit has been introduced into undergraduate medical curricula in two courses in this country and a few elsewhere, it is generally limited to courses in general practice, most often theoretical and not necessarily a core element of curricula (Henley 2002; Chan 2004; Rhodes et al. 2006; personal communication from other Australian/New Zealand medical schools to author DBM).

In keeping with recommendations of the Leape Report (Leape 2010) and the WHO patient safety curriculum guide for medical schools (Walton et al. 2011), clinical audit is mandatory for Notre Dame medical students. It transcends the

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<tr>
<th>Responses</th>
<th>Yes (%)</th>
<th>No (%)</th>
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<tbody>
<tr>
<td>The medical student(s) seemed knowledgeable and well prepared to conduct a clinical audit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The medical student behaved in a professional manner while conducting the clinical audit</td>
<td>96</td>
<td>4</td>
</tr>
<tr>
<td>This clinical audit programme was useful to me and my organisation in improving patient care</td>
<td>91</td>
<td>9</td>
</tr>
<tr>
<td>This clinical audit programme prepares students to conduct clinical audits on their own practice as required by most specialist colleges</td>
<td>91</td>
<td>9</td>
</tr>
<tr>
<td>I would attend a professional development workshop on the clinical audit programme if offered</td>
<td>91</td>
<td>9</td>
</tr>
<tr>
<td>I would like Notre Dame medical students to undertake clinical audits in future years</td>
<td>78</td>
<td>22</td>
</tr>
<tr>
<td>I was informed at the beginning of the academic year that the Notre Dame medical students are required to undertake a clinical audit</td>
<td>78</td>
<td>22</td>
</tr>
<tr>
<td>I was provided with a copy of What your supervisor needs to know about the MED400 clinical audit</td>
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prevailing distinctions among disciplines by encouraging students to conduct audits in any clinical discipline and in any setting that they choose. The programme not only allows students to develop the technical skills required for future practice in self-audit but also, from an ethical perspective, it encourages students to further develop the personal and professional attributes germane to working with others in the clinical environment, including health professionals and administrative staff.

From an educational perspective, a universally acknowledged goal of contemporary medical curricula is to ensure that graduates are capable of self-audit and self-improvement within a complex health system and in collaboration with others who contribute to patient care. The question is how best to organise teaching and learning in order to achieve this goal.

Notre Dame’s clinical audit programme is a grounded approach that recognises the transformative power of learning that is situated in the community of practice into which students will graduate. Mann (2011) argues that participation in the community of practice is not only an effective means of learning knowledge and skills but also an effective means of encouraging the development of professional identity within the community because it enables understanding of norms and values, and the ways in which the community frames and solves problems and structures its view of the world.

A crucial component of the programme is the requirement for students to learn by reflecting on their activities. Reflection on learning (Schon 1987; Moon 1999) allows students to assimilate new learning with prior learning. It is especially important in regard to learning the less tangible elements of curriculum such as personal and professional development. Notre Dame requires students to reflect on the entire process of setting up and conducting their audit as well as reactions to the results of the audit. This not only contributes to student understanding of their own and others’ norms and values as well as structures and hierarchies within the clinical world, but also enhances reflection by members of the community of practice. While research shows that clinical audits in medical practice result in improvements in care provided (Jamtvedt 2006), the comments from supervisors in the evaluation data above show that changes and improvements are able to be generated by clinical audits undertaken by medical students, and that students’ contributions are valued. This consequence supports the student’s development personally and professionally in terms of giving genuine, workplace-based service in return for learning.

The clinical audit therefore meets the criteria that Mann (2011) advises are necessary for effective medical education now and in the future in that it allows for ‘the active engagement of students in meaningful tasks that contribute to patient care and activities are afforded to students to reflect their increasing skills and responsibility’ to the profession and practice community. Moreover, ‘situated learning . . . (in) clinical education . . . views the learner as more than an observer or imitator (but) as an active participant, learning from and with all community members’ (Mann 2011).

The testimonies of supervisors about the value, and the use to which they have put the results of the audits, not only demonstrates the power of audits to improve practice as noted above, but also the power of situated learning to encourage learning by others in the workplace. The interest expressed in the programme by attendees at the 8th Australasian Conference on Safety and Quality in Health Care indicates that it is feasible to implement the concept outside of Notre Dame’s medical school and Western Australian health services.

Conclusion

While the clinical audit programme discussed in this article has particular relevance to the Australian context, it may have value for others. The concept is readily transferable to a variety of other medical and other health professional curricula, as these courses traditionally have clinical immersion learning components.

The advantage of Notre Dame approach is that students are able to undertake their audits, with the approval of stakeholders, in any of the clinical disciplines. It is also conducted in the final year of their medical education when, arguably, they are more comfortable in the clinical environment, more experienced in the nuances of the clinical world, and more knowledgeable and therefore more able to target meaningful possibilities for improvement in this environment for both their own learning as well as tangible benefit for the chosen health service.

This augurs well for improving the quality of health care to the patients and communities that the graduates will serve.

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