The status of radiation oncology teaching in Australian and New Zealand medical schools

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Abstract

Introduction: Radiation therapy is a core component of curative and palliative cancer treatment; however, its indications and benefits remain poorly understood across the medical profession.

Methods: An electronic survey focusing on curriculum content, teaching and assessment in radiation oncology and plans for curriculum change was developed. The Faculty of Radiation Oncology, Royal Australian and New Zealand College of Radiology (RANZCR) distributed the survey to all 24 Australian and New Zealand medical schools. The survey was conducted from November 2017 to January 2018 following ethics approval.

Results: Sixteen of the 24 (67%) medical Faculties in Australia and New Zealand responded. Ninety-four percent of Faculties had no formal radiation oncology curriculum. Most Faculties (87%) dedicated <15% of the total medical course to oncology, of which the majority (63%) dedicated <10% to radiation oncology. At least 50% of Faculties did not offer formal radiation oncology teaching to all students. When offered, students’ exposure to radiation oncology was often <5 days over the entire course (44%). The majority of medical schools (73%) are planning curriculum changes in the next 5 years; however, most have no intention of changing radiation oncology teaching.

Conclusion: Radiation oncology continues to be underrepresented in medical curricula throughout Australia and New Zealand with no plans for improvement by Faculties. This study supports the need for formal advocacy for improving radiation oncology education in medical schools and will form the basis of new national recommendations for radiation oncology curriculum development.

Key words: curriculum; medical schools; postgraduate education; radiation therapy; survey.
actual utilisation rates in Australia are 26–38%.\textsuperscript{4,5} This discrepancy has been shown to result in over 200 deaths in New South Wales annually.\textsuperscript{6} The indications and benefits of radiation therapy remain poorly understood amongst the broader medical profession due to lack of formal teaching at undergraduate and postgraduate levels.\textsuperscript{7} To correct this, an Oncology Education Committee was formed by the Australian Cancer Council. The Committee undertook extensive consultation with academic, professional and consumer bodies to produce the Ideal Oncology Curriculum (IOC) which was last updated in 2007.\textsuperscript{8} Unfortunately, this Committee no longer exists and the IOC is not maintained. The aim of our study was to assess the status of radiation oncology teaching by medical Faculties across Australia and New Zealand. This will form the basis of new national recommendations for radiation oncology curriculum development.

Methods
A core working group was formed consisting of radiation oncologists, trainees, junior doctors, medical students and RANZCR administrative staff. Following ethics approval, a 32-question electronic survey was created focussing on demographics, current curriculum content, teaching and assessment methods in radiation oncology and plans for curriculum change in radiation oncology (Appendix 1). The survey was sent to the Dean of each Faculty (or an appropriate delegate) for completion between November 2017 and January 2018 using SurveyMonkey (SurveyMonkey Inc., San Mateo, CA, USA). The survey was completed anonymously and voluntarily; no data identifying individual Faculties were collected. Responses were collated and analysed 31 January 2018.

Results
Demographics
All 24 Australian and New Zealand medical schools were approached to participate in the survey. Two Australian Faculties declined as their programs were in the initial stages of development and enrolment. Sixteen (73%) eligible Faculties responded, representing the majority of Australian states and territories and New Zealand. Responding Faculty characteristics are outlined in Table 1.

Curriculum content
Just over half of Faculties (56%) follow a uniform oncology curriculum, 90% of which cover aspects of public health, cancer biology, cancer diagnosis and management, communication and ethics in cancer care. Almost all Faculties (94%) had no specific radiation oncology curriculum and 33% involved a radiation oncologist in curriculum development. Most Faculties (87%) dedicated <15% of the total medical course to oncology, of which the majority (63%) dedicated <10% to radiation oncology.

Teaching of radiation oncology content
At least 50% of Faculties did not offer formal radiation oncology teaching to all students with up to 81% of students across surveyed Faculties not receiving dedicated clinical exposure in radiation oncology. When offered, clinical exposure to radiation oncology was often <5 days during the entire course (44%) (Fig. 1). In two institutions, radiation oncology exposure is limited to general practice or surgical rotations. In one institution, palliative care is the only clinical attachment that all students must attend and all other patient exposure is opportunistic. Almost half of surveyed Faculties (44%) teach oncology in a dedicated education block that incorporates medical and radiation oncology, haematology and palliative care. This block was as little as 2 weeks. Oncology was most often taught across multiple years (81%) as students rotate through clinical placements such as general practice and surgery.

Radiation oncology is a compulsory subject in 31% and an elective term in 56% of surveyed Faculties. Formal teaching is often delivered through a mixture of tutorials and lectures (Fig. 2). Nine schools delivered lectures or tutorials for <3 h in total or were unsure. Less than half of schools (44%) employ a radiation oncologist or registrar to deliver these. A radiation oncology term is not offered in 44% of institutions.

Table 1. Demographics of surveyed medical schools (n = 16)

<table>
<thead>
<tr>
<th>Demographic</th>
<th>n (%)</th>
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<tbody>
<tr>
<td>Total medical student number</td>
<td></td>
</tr>
<tr>
<td>&lt;100</td>
<td>1 (6)</td>
</tr>
<tr>
<td>100–200</td>
<td>1 (6)</td>
</tr>
<tr>
<td>201–300</td>
<td>2 (13)</td>
</tr>
<tr>
<td>&gt;300</td>
<td>12 (75)</td>
</tr>
<tr>
<td>Entry level</td>
<td></td>
</tr>
<tr>
<td>Undergraduate</td>
<td>3 (19)</td>
</tr>
<tr>
<td>Postgraduate</td>
<td>9 (56)</td>
</tr>
<tr>
<td>Both</td>
<td>4 (25)</td>
</tr>
<tr>
<td>Degree offered</td>
<td></td>
</tr>
<tr>
<td>MBBS</td>
<td>4 (26)</td>
</tr>
<tr>
<td>MD</td>
<td>7 (43)</td>
</tr>
<tr>
<td>Transition from MBBS to MD</td>
<td>5 (31)</td>
</tr>
<tr>
<td>Degree length (years)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>11 (69)</td>
</tr>
<tr>
<td>5</td>
<td>5 (31)</td>
</tr>
<tr>
<td>Attached hospital campuses</td>
<td></td>
</tr>
<tr>
<td>1–3</td>
<td>2 (13)</td>
</tr>
<tr>
<td>4–5</td>
<td>3 (19)</td>
</tr>
<tr>
<td>&gt;5</td>
<td>11 (68)</td>
</tr>
</tbody>
</table>

MBBS, Bachelor of Medicine, Bachelor of Surgery; MD, Doctor of Medicine.
Assessment of radiation oncology knowledge and competencies

The core principles of radiation therapy are often not completely taught (Table 2). This knowledge is often not formally assessed (56%). Radiation oncology forms a component of written examinations in five Faculties (31%). No school requires the demonstration of clinical competence or knowledge. If radiation oncology is included in examinations, the majority of schools (75%) cover <25% of set learning objectives.

Curriculum development and change

Over the past 5 years, the majority of Faculties (81%) have not changed the time dedicated to radiation oncology exposure and teaching. Whilst 73% of Faculties intend to change their curricula over the next 5 years, the majority (80%) had no intention of changing current content, time dedicated to radiation oncology (87% of Faculties) or method of teaching and assessment in radiation oncology (80% of Faculties).

Discussion

Cancer is an increasing public health burden and radiation oncology plays a fundamental role in the cure and palliation of cancer patients. Unfortunately, physicians outside of oncology report a significant discomfort and little training in oncological and survivorship management, which can eventually impede multidisciplinary oncologic care. In the past few decades, medical education has undergone significant changes including growth in graduate-entry medical degrees, problem-based curricula and the widespread transition to Doctor of Medicine (MD) programmes. Greater emphasis is now placed on communication, ethics, clinical research, self-motivated learning and a multidisciplinary approach to illness. Despite these new teaching models, graduating doctors are consistently exhibiting poor oncology knowledge and skills. This issue is not unique to oncology as many other disciplines, including surgical anatomy, psychiatry and ophthalmology, have recently reported fundamental gaps in conceptual knowledge...
which is not preparing junior doctors for current practice.14-17

This is the first study to assess the extent of radiation oncology teaching in Australian and New Zealand medical schools. Our survey highlights deep heterogeneity across radiation oncology content, structure and teaching methods. This may be attributed to different degree types and course length offered; however, almost all surveyed Faculties had no specific radiation oncology curriculum. Our results demonstrate a lack of consistent consultation with radiation oncologists or oncology guidelines in curriculum development, minimal time allocation to purposeful radiation oncology teaching and lack of standard assessment of radiation oncology competencies. These results are alarming because large numbers of student may be graduating with very little knowledge of a primary cancer treatment modality, leading to underutilisation of radiotherapy and increased morbidity and mortality of patients.6

In 1999, a survey of the 12 Australian and New Zealand medical schools found considerable variation in oncology teaching practice and curriculum implementation.18 Radiation oncology and palliative care were the subjects covered least often and oncology exposure in general varied considerably. Pleasingly, our data suggest that the quantity of palliative care teaching has increased, particularly in terms of clinical placements. Radiation oncology is still the subject covered least often, comprising <10% of oncology teaching in most medical schools. The recent rise in the number of undergraduate medical students19 may also be contributing. There is an increased pressure on medical student placements at peripheral hospitals with variable access to a radiation oncology department; more than two-thirds of surveyed Faculties have >5 attached clinical schools.

Inadequate oncology teaching is not unique to Australia and New Zealand, with similar results published internationally. A large survey of European medical schools20 reported diverse content and structure of oncology curricula. Undergraduate teaching of radiation oncology was reasonably uniform with 6–30 h of dedicated teaching. Twenty percent of countries surveyed, however, did not have dedicated radiation therapy teaching included in undergraduate medical programmes, slightly less than Australian and New Zealand exposure. In the United States of America, large knowledge gaps exist among students and a minority of respondents were found to hold basic misconceptions.21 A recent survey of senior medical school students in the United States revealed that only 1% had mandatory clinical experience in radiation oncology and only 30% of students had encountered a lecture in radiation oncology in their preclinical years.22 In Canada, cancer constitutes <10% of the curriculum for more than 70% of undergraduate schools23; many programmes did not have a dedicated oncology curriculum. It is well established that a lack of oncology teaching translates into poor oncological knowledge and confidence among graduating doctors. In 2003, a survey was conducted of 443 interns from a sample of Australian and New Zealand hospitals.7 While reporting reasonable communication skills and greater awareness of multidisciplinary cancer management, interns had less exposure to patients with cancer. Approximately 20% respondents had never attended a clinic in medical oncology, radiation oncology or palliative care.

To combat student unfamiliarity in radiation oncology, there has been an increasing emphasis on integrating preclinical courses into the medical school curriculum. Multiple studies have shown that dedicated courses in radiation oncology improve knowledge of the field24-26 and clinical exposure is favoured over didactic lectures.27 Student perceptions of such courses are favourable and most agree that courses of this nature are effective in contributing to their overall medical education.28 A recent randomised trial26 found that an interactive contouring module was superior to traditional didactic lectures for teaching medical students. Students engaged in the contouring module had improved knowledge of radiation side effects and greater interest in radiation oncology as a career. Greater medical student exposure can also be achieved through mentorship opportunities and research projects, although this is university specific and student motivated.

In order to improve the current status of radiation oncology teaching, strong advocacy is required from radiation oncology as a profession.29 In addition to formal advocacy through professional bodies such as RANZCR and the Targeting Cancer campaign,30 radiation oncologists and trainees can initiate change at institutional and university levels. This could involve increased engagement in curriculum development at their local medical school, greater facilitation of lectures and tutorials, development of novel education initiatives such as contouring modules, fostering a culture of departmental research to attract more student projects, allowing greater numbers of clinical rotations through departments and hosting promotional events for local healthcare practitioners.

Our study had several limitations. Medical teaching is integrated in most modern curricula and estimating the proportion given to one clinical subspecialty can be misleading. A further difficulty in accurately assessing student oncology exposure is large variability in oncology teaching across clinical schools, despite being linked to the same institution with a centralised curriculum.

An updated radiation oncology curriculum

Most Faculties acknowledged that curriculum development is an ongoing, dynamic process and welcomed any input from stakeholders. Others, however, maintain the
belief that radiation oncology is a postgraduate subject and no change is required. This attitude, albeit rare, reinforces the need for greater advocacy. The majority of surveyed Faculties indicated that they will be changing curriculum in the next 5 years, but only 20% will be assessing radiation oncology content. This presents a critical window in which to highlight the deficiency in radiation oncology education and its impact on patient care. This survey is a component of a larger RANZCR project to develop an updated foundational radiation oncology curriculum. Concurrent surveys are assessing radiation oncology knowledge and competency among medical students and junior doctors, along with planned assessments of other health professionals.

Radiation oncology continues to be underrepresented in most medical schools in Australia and New Zealand, with no plans for improvement by the majority of Faculties. This places graduating doctors and their future patients at a significant disadvantage, especially given the vast and increasing burden of cancer in the community. This study supports the need for formal advocacy to improve radiation oncology education in medical schools and will contribute to new national recommendations for radiation oncology curriculum development.

References


Appendix 1

Survey Questions

General demographics

1. Name of Medical School (optional)
2. How many medical students are currently enrolled at your institution?
3. What entry level is your medical degree?
4. What medical degree/s do you offer?
5. What is your degree length?
6. How many hospital campuses are attached to your medical school?

Current curriculum content

7. Is oncology teaching provided in a single year or through multiple years within the course?
8. How much time is dedicated to oncology teaching (days per entire course), including haematology, medical oncology, radiation oncology, palliative care?
9. How much time (as a % of whole course) is dedicated to all oncology?
10. Do all hospital campuses/clinical schools follow a uniform curriculum in oncology and/or radiation oncology?
11. How much time is dedicated to radiation oncology learning (as a % of oncology teaching)?
12. Does the curriculum cover the following aspects of oncology? (tick all that apply):
   a) Public health and cancer prevention
   b) Cancer biology
   c) Patient management
   d) Fundamentals of Cancer Diagnosis
   e) Fundamentals of Cancer management
   f) Communication in Cancer Care
   g) Ethics in Cancer Care
   h) Fundamentals in Clinical Experiences
13. Do you have a specific radiation oncology curriculum?
14. Do you specifically incorporate Radiation Oncology at your medical school?
15. Does the curriculum at your faculty cover the following aspects of radiation oncology?
   a) Principles of radiobiology
   b) Principles of radiation therapy
   c) How radiation therapy is delivered
   d) Clinical indications for radiation therapy
   e) Side effects and their management

Teaching of Radiation Oncology content

16. With regard to formal teaching in radiation oncology, how many hours are dedicated to:
   a) Lectures
   b) Tutorials/Workshops
17. Is formal teaching delivered by a Radiation Oncologist or Registrar?
18. Is radiation oncology taught within a dedicated oncology block or is it taught separately to the other oncology specialties?
19. Is radiation oncology a compulsory or elective term?
20. Do students have dedicated clinical exposure to radiation oncology? Please quantify.
21. What proportion of students have dedicated clinical exposure in radiation oncology?
22. Are there specific skills or learning outcomes outlined for students during their clinical rotations in oncology?
23. Is radiation oncology knowledge assessed formally?
24. What proportion of oncology learning objectives are assessed formally?

Curriculum development and change

25. Are you aware of the Ideal Oncology Curriculum published by the Cancer Council Australia?
26 Was the Ideal Oncology Curriculum utilised in designing your faculty’s oncology curriculum?

27 In developing your oncology curriculum, did your institution refer to any national or international guidelines?

28 Has the oncology curriculum changed in the past 5 years?

29 Was a Radiation Oncologist involved in the developing of your oncology curriculum?

30 Are there planned changes to:
   a) The medical degree being offered
   b) Curriculum change
   c) The Radiation Oncology content
   d) Time dedicated to Radiation Oncology teaching
   e) Method of Radiation Oncology teaching
   f) Radiation Oncology assessment

31 If required, do you agree for us to contact you to discuss the information you have provided?

32 Do you have any further comments about oncology training medical students? For example, are there any challenges in curriculum implementation?