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Original Article

Engaging Future Clinical Oncology Researchers: An Initiative to Integrate Teaching of Biostatistics and Research Methodology into Specialty Training

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Abstract

Aims: To evaluate the learner's perspectives on a novel workshop programme designed to improve skills in biostatistics, research methodology and critical appraisal in oncology.

Materials and methods: Trainees were surveyed anonymously at the completion of each annual workshop from 2012 to 2015. In total, 103 trainees in years 2–4 of training in radiation oncology responded, giving a 94% survey response rate. A 1 day workshop, designed by biostatisticians and radiation oncologist facilitators, is the central component of a programme teaching skills in biostatistics, research methods and critical appraisal. This links short didactic lectures about statistical concepts to interactive trainee discussions around discipline-related publications.

Results: The workshop was run in conjunction with the major radiation oncology clinical trials group meeting with alternating programmes (A and B). Most of the participants (44–47/47 for A and 48–55/56 for B), reported that their understanding of one or more individual topics improved as a result of teaching. Refinement of the workshop over time led to a more favourable perception of the 'optimal' balance between didactic/interactive teaching: nine of 27 (33%) 'optimal' responses seen in 2013 compared with 23 of 29 (79%) in 2015 ($P < 0.001$). Commonly reported themes were: clinician facilitators and access to biostatisticians helped contextualise learning and small group, structured discussions provided an environment conducive to learning.

Conclusions: Overall, radiation oncology trainees reported positive perceptions of the educational value of this programme, with feedback identifying areas where this resource might be improved. This model could readily be adapted to suit other medical disciplines and/or other training environments, using specialty-specific research to illuminate key statistical concepts.

Key words: Biostatistics; medical education; oncology; research; training

Introduction

Applying an evidence-based approach to the care of patients is a central tenet of oncology practice. Modern training programmes in clinical oncology and radiation oncology around the world emphasise the importance of being familiar with clinical, biological and/or technical research, reflecting the philosophy strongly underpinning these specialties. One common objective is to instil in trainees the ability, and enthusiasm, to take an active part in on-going research over their careers [1]. However, there is evidence that attainment of the knowledge and skills required to take part in research is not universal at the completion of medical speciality training. Several factors have been implicated, including a failure to grasp foundation concepts in medical school [2], ineffective or *ad hoc* teaching in these subjects [3–5] and the variable 'research cultures' within individual training centres [6,7].

With the advent of modern specialty training programmes designed around competency-based curricula,

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there has come formal articulation of the knowledge, skills and attitudes relating to biostatistics, research methodology and critical literature appraisal, that are expected of qualified specialists. These competencies are encompassed by the 'Scholar' Domain in the Canadian Medical Education of Specialists Directive (CanMEDS) curriculum framework [8–10], which is the most commonly used structure for specialty training worldwide. As for other 'non-medical expert' roles within the CanMEDS model, integrating attainment of these competencies into typical clinically orientated training programmes can be challenging [11].

Other competency-based curricula, such as the Royal College of Radiologists UK (RCR) clinical oncology curriculum [12], which is built around the Good Medical Practice framework, likewise address these learning requirements in statistics and research. In the Good Medical Practice model, developed by the General Medical Council, four domains are defined for the purposes of appraisal and assessment of trainee competencies. The clinical oncology syllabus articulates more specific knowledge items, skills and professional behaviours. Most of those relating to biostatistics and research learning are encompassed within Domain 1, although several cross into other domains [13].

Numerous live, in-print and online resources exist to guide and supplement local teaching in these subjects [14–17]. However, these types of external physical or online course do not integrate learning requirements into training programmes in a standardised manner, and most resources have not been evaluated as to learner-rated value or effectiveness. Lack of relevance to concurrent clinical learning and inability to contextualise unfamiliar concepts may also contribute to the wide variability in grasping these skills seen among trainees, both between and within different training programmes [7].

In the RANZCR Radiation Oncology Training Programme [10], there has been a systematic attempt to reduce the variation in trainees' knowledge and skill-set across these subject areas and to increase research engagement through a number of means. The approach in relation to trainee-driven research activities within the programme, and publication output, as well as barriers to the conduct of research, are described elsewhere [7]. This article describes and evaluates another part of this strategy from the perspective of learners. The component reported here is a centralised bi-national workshop in Statistical Methods, Evidence Appraisal and Research for Trainees (SMART), run annually with the major radiation oncology annual trials group meeting of the Trans-Tasman Radiation Oncology Group (TROG) [18].

Materials and Methods

As an initiative of the RANZCR Radiation Oncology Trainee Committee, a pilot Statistics and Research Methods Workshop was developed in conjunction with the National Health and Medical Research Council Clinical Trials Centre at Sydney University. This took place in 2009 and was attended by 33 trainees. Based on strong positive feedback, and coinciding with a major revision of the radiation oncology curriculum [19], it was determined that such a workshop would become the central component of the new SMART programme. The other part of the SMART programme is completed through trainees accumulating a designated number of 'SMART points' by undertaking a number of learning activities through training. These are chosen from an elective suite of self-directed options, ranging from online statistics modules, courses focused on research skills (e.g. protocol development or scientific writing), to observing an ethics committee in action, or doing a formal Good Clinical Practice module or course [20]. Examples of these learning activities, the points 'earned' and their link to curriculum competencies are shown in The SMART Learning Guide found in Appendix A.

The SMART workshop structure and content was developed based on feedback from the pilot by a working group of biostatisticians and radiation oncologists who became the facilitator panel for the ensuing workshops. An annual 1 day workshop was preferred as it could be run in conjunction with the annual scientific meeting of TROG, providing an opportunity for trainees to stay on to see their new knowledge 'in action' in subsequent clinical trials sessions and to allow facilitators (all members of TROG) to assist trainees' integration into the TROG meeting proper.

Given the number of topics for inclusion, the workshop content was divided into two main themes to be covered in separate workshops run on alternate years: Study Design Concepts (workshop A) and Evidence Appraisal Skills (workshop B). Example programmes for these workshops are shown in Appendix B. The SMART workshop is designed around eight (four each year), 25–35 min didactic presentations by biostatisticians each dealing with key content areas, each broken into three to six brief explanations of related concepts. Each approximately 30 min talk is followed by interactive sessions, during which groups of five to seven trainees are guided by radiation oncologist facilitators. Each small group session links back to the mini-lectures, prompting discussion of the related statistics and research methods concepts through structured question sets relating to (mostly radiation) oncology trial publications.

Pre-readings including the manuscripts and protocols for discussion, and other related statistics articles, are provided. The clinical trials used are varied each year for interest, while maintaining relevance to the core topics to be learned. Each year the programme and balance of didactic versus interactive teaching is slightly modified based on the previous year's feedback. In particular, the didactic sections were shortened slightly in successive years, broken down into mini-talks around one specific learning point/concept at a time, and with one clear cancer-related example included by the lecturer before moving to the next concept. A 'motivational' talk by an international guest researcher in attendance for the TROG scientific meeting is incorporated. This person acts as a 'guest' facilitator and commentator, as do the biostatisticians, moving between the groups to enhance discussion. Where possible, one of the trials under examination will have been led by the international facilitator.

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