

# Novel Approaches To Undergraduate Oncology Education

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**Abstract** With the increasing incidence of cancer and related survival, junior doctors are more commonly involved the management of oncology patients. A comprehensive oncology curriculum has been developed and adopted across medical schools in Australia. However, it was not designed to inform how medical students should be taught, and whether curriculum content translates to knowledge and competency can depend on its implementation. We have conducted a literature review of PubMed, Embase and Cochrane databases to identify and summarise the evidence for novel approaches to delivering the undergraduate oncology curriculum. Numerous effective approaches have been developed across areas of prevention, clinical examination through simulation, the multidisciplinary team, psycho-oncology, palliative care and even research. There is growing focus on a holistic and multidisciplinary approach to cancer education although direct clinical exposure and interactions with cancer patients is still crucial. Medical schools may also have an under-recognised role in promoting positive health behaviour if their graduates are to convey these preventative measures to their patients. Application of such methods relies upon clinicians and

medical educators to consider the practicability and relevance of specific implementation in their local context.

**Keywords** Undergraduate medical education · Interdisciplinary communication · Medical oncology · Palliative care · Medical students

## Introduction

Over the past decade, there have been significant improvements in the quality of life and overall survival of cancer patients. This can be attributed to various factors including increased understanding of cancer biology, advancements in cancer treatment and implementation of effective preventative measures such as screening programmes and vaccine development. Despite advances in the field, oncology education traditionally has not adequately prepared junior doctors in appropriately managing oncology patients. A survey of newly qualified doctors in the UK found that only 15 % felt they had adequate knowledge about chemotherapy and radiotherapy and only one in ten doctors felt prepared to manage oncological emergencies [1]. Similar findings are reflected in a survey of interns across Australia and New Zealand, in which two thirds of participants did not know the prognosis of various cancers and up to one third felt they could not competently identify a melanoma [2]. Interns described reduced exposure to cancer patients compared to those who trained a decade earlier, and many perceived the quality of training in areas such as incurable cancers and palliative care as poor [2]. This sense of inadequate training experienced could be attributed to the previous lack of a dedicated oncology curriculum, variable teaching practices during clinical placements and limited exposure to palliative care education [3].

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In view of the lack of uniformity, the Oncology Education Committee (OEC) of the Cancer Council Australia published a comprehensive curriculum covering all aspects of oncology in 1999 with subsequent revision in 2007 [4]. The curriculum was developed with the aim of providing ‘a template for improved medical student cancer education’. However, it was not designed to prescribe how these objectives should be fulfilled and instead encourages medical schools to adapt the implementation of the curriculum according to local conditions [5]. Nevertheless, whether the curriculum content translates to knowledge and competency can depend on its implementation.

Approaches to teaching oncology have progressed significantly in the recent years. As such, we conducted a review of current literature to identify and summarise the evidence for novel approaches to delivering the undergraduate oncology curriculum.

### Literature Search and Information Sources

We conducted a literature search using MeSH terms through PubMed, MEDLINE, Embase and Cochrane library databases. MeSH terms used were ‘undergraduate medical education’, ‘medical students’, ‘clinical oncology’ and ‘medical oncology’. Titles and abstracts found through the searches were screened for relevance, and a further search through bibliographies of included studies was undertaken.

### Evidence-Based Approach to Oncology Education

The search identified current evidence for how certain subject areas in oncology can be effectively taught within medical schools. Consistent with the OEC curriculum, we broadly discuss areas of study with novel approaches to teaching. These topics are prevention, clinical examination, multidisciplinary team, psycho-oncology and palliative care. Furthermore, we discuss the increasing role of research within the undergraduate medical school curriculum as a vital form of education.

### Prevention

Preventative measures are fundamental in the fight against cancer. In 2010, about one third of all cancers diagnosed in Australia (37,000 of 117,000) were attributable to 13 risk factors, of which 90 % of preventable cancers were associated with smoking, UV radiation, body weight, poor appetite and alcohol consumption [6]. Beyond traditional didactic teaching, gaining experience in counselling patients on preventative measures through practice has been a key predictor of future performance in counselling [7]. This is reaffirmed by studies suggesting students with greater clinical exposure have

increased perceived competency in prevention counselling [8]. Furthermore, experience positively affects confidence, a factor shown to be important particularly when counselling patients about breast cancer screening and tobacco [9]. While students describe the best avenue of learning being clinical exposure, particularly when following a senior clinician [10], confidence can be increased by developing awareness and knowledge through watching recorded interactions of counselling and role-playing with peer feedback [11]. Similar teaching methods can be applied when addressing other risk factors such as excessive sun exposure, poor dietary habits and lack of exercise. Medical schools also have an under-recognised role in encouraging positive health behaviour amongst their students. Studies in Australian and overseas medical students have found that those attending medical schools which promote healthy behaviour were more likely to counsel future patients about similar preventative measures [12, 13]. Furthermore, physicians describe greater confidence in counselling on exercise when they personally exercised in their daily lives, and when they disclose these healthy behaviours, patients also perceive their physician as more credible and are more motivated in adopting similar health behaviours [14, 15]. Thus, medical schools play an essential role in early promotion of positive health behaviour which can affect both their students and in the long term, even respective patients.

### Clinical Examination Through Simulation

Acquiring proficient clinical skills are the key to producing capable clinicians. How these are acquired depend on the nature of the skill itself. In relation to oncology, the ability to conduct a thorough and systematic physical examination that enables the detection of lumps, masses or other abnormalities is essential. The use of silicone breast models for medical education have been particularly useful in teaching students these practical skills, and a dynamic model with varying lump characteristics may further improve clinical acumen [16–18]. The clinical breast examination taught in the context of a focused workshop that includes mammogram and ultrasound interpretation and workup of breast lumps found students developed higher confidence in breast examination than those taught in the traditional settings of an outpatient clinic [19]. Prostate models [20] and testicular models [21] have also proved effective in improving digital rectal examination technique including prostate size measurement and testicular examination, respectively. Given that breast examination skills often diminishes as students’ progress through medical school, such examination models should be implemented throughout multiple years of medical school for regular practice [20, 22]. Practice, however, should be supplemented with real person interactions where possible, with demonstrated effectiveness in learning the urogenital, rectal, gynaecological

and breast examination in simulated patients [23, 24]. These clinical skills form the basic competencies of medical students, and such teaching methods provide a foundation for continued practice as junior doctors.

## Multidisciplinary Team

The role of a multidisciplinary team (MDT) in the management of patients with cancer is well-established although how to teach this approach to medical students is less clear [25]. The primary objective of a MDT is to focus on a patient-centred approach and enable clinicians to understand and manage the patient in a more holistic manner. This is achieved through consolidating a plan with recommendations from each relevant discipline and improving communication within the treating teams. Yet, the focus on basic science, particularly during the pre-clinical term, may unintentionally mislead medical students solely towards the management of a disease rather than a patient-centred approach [26]. Role-playing activities is one approach which appears effective in emphasising the MDT and involves assigning students to the role of a patient or member of a treating team involved in the patient's care [27]. In the context of breast cancer, for example, various specialist roles within the MDT will include the medical oncologist, surgeons and radiation oncologist. Additionally, other non-cancer-related issues such as concurrent comorbidities, cardiovascular risk factors and general health habits may need to be addressed, thus requiring further input from other disciplines [28]. Such role-playing activities enable students to be part of the decision-making process from various aspects of patient care, although it is important that adequate discussion and realistic scenarios are developed as a lack of realism can be viewed as unhelpful [29]. Other approaches to teaching a multidisciplinary approach include panel discussions involving various disciplines and using interactive board games where students determine which speciality clinic (surgical, medical, radiation oncology) is relevant at various time points for patient cases [30]. The role of the MDT is crucial in providing the best possible care to oncology patients and this collaborative approach should be reinforced and promoted throughout medical school.

## Psycho-oncology

Psycho-oncology recognises the patient's psychosocial environment and forms a crucial aspect of the patient-centred approach to cancer management. Anxiety and depression are common in oncology patients irrespective of cancer stage or treatment and have a negative impact on quality of life and prognosis [31–33]. Yet, studies of medical students have shown empathy scores of students in the pre-clinical years

were higher than in the clinical years [34–37], and this may further decline following graduation and with increasing years of experience [34, 35, 38]. Reasons for this decline in empathy included burnout, family factors, short patient follow-up and type of medical specialty enrolled in. A programme involving a range of activities from role-playing with guided discussions to communication skills training with an experienced counsellor appears beneficial in refining the ability of students to respond to the psychological and social impact of cancer on patients [39]. Furthermore, providing opportunities for students to follow a cancer patient through their care and encouraging rotations in oncology and palliative care will increase exposure to patients and their families, providing insight into multidisciplinary cancer care [40–42]. It also enables students to observe clinicians as potential role models and ideally, shift any preconceived misconceptions. Follow-up questionnaires regarding changing attitudes will help assess the efficacy of such a programme and can also help students who underwent emotional distress to reflect on their experiences [40, 43]. The ability to convey bad news to patients is crucial in oncology and multiple encounters with standardised patients, preferably videotaped to allow subsequent self-assessment, and small group discussion with feedback have been effective in enhancing student confidence and ability [44–46]. This is particularly important in the context of disease progression where the transition to palliative care and end-of-life discussions may be necessary.

## Palliative Care

End-of-life discussions can often be challenging and medical students consistently describe low confidence in managing palliative care needs and discussing death with a dying patient [2, 47]. Since the federal government initiated a formalised end-of-life-care (EOLC) curriculum, palliative care teaching is becoming increasingly uniform across Australia [48]. However, adequate exposure to patients and their families through inpatient services and home hospice care as well as bedside teaching is needed to build student knowledge and confidence [49, 50]. Such learning can be reinforced through a component of reflective practice which enables students to consider how the rotation has shaped them and informs aspects of the *informal curriculum*. This refers to qualities which are not necessarily taught in a formalised setting and include empathy, communication, collaborative decision-making and professionalism. Additionally, a short introductory clinical oncology course focused on a holistic approach during the pre-clinical term of medical school can further develop confidence for EOLC discussions and relevant ethical issues [51]. Consistent with evidence advocating teaching the MDT, there may be a role of interdisciplinary learning in palliative care, where students from disciplines such as medicine, clinical

nutrition, nursing, occupational therapy, pharmacy and social work gather, discuss and collaborate in a single learning environment [52].

## Research

As Australian medical schools move towards graduate medical degree programmes, there is a greater emphasis on developing research skills. This usually involves an allocated period of time (e.g. 6 months to 1 year) to undertake a research project within a field of interest, often occurring towards the final year of medical school. Such a shift opens new opportunities for learning, where students are intended to ascertain detailed knowledge in their research area, critically appraise the relevant evidence and hopefully offer new insights into the field. Oncology is well-placed to engage students in not only developing research capabilities but also to refine their knowledge and understanding of cancer, particularly in expanding areas such as immunotherapy and cancer genomics [53]. Given the integration of research as a key component of medical degrees, students should be encouraged to consider the opportunity as an avenue of detailed learning within a field in addition to acquiring research skills.

## Conclusion

Novel approaches to implementing an oncology curriculum have arisen in the current literature. The application of such approaches relies upon individual medical schools and clinicians to consider the practicability and relevance of specific implementation in their local context. Overall, the trend in new approaches to teaching oncology focuses on a holistic, patient-centred approach with multidisciplinary involvement, although clinical exposure with relevant bedside teaching is still very much necessary. Yet, the desire to learn and acquire skills relevant to the oncology discipline still rests upon each individual student and the notion of lifelong learning will ultimately produce capable clinicians regardless of one's field of specialty.

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## Compliance with Ethical Standards

**Conflict of Interest** The authors declare that they have no conflict of interest.

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## References

1. Cave J, Woolf K, Dacre J, Potts HW, Jones A (2007) Medical student teaching in the UK: how well are newly qualified doctors prepared for their role caring for patients with cancer in hospital? *Br J Cancer* 97(4):472–478
2. Barton MB, Tattersall MH, Butow PN, Crossing S, Jamrozik K, Jalaludin B, Atkinson CH, Miles SE (2003) Cancer knowledge and skills of interns in Australia and New Zealand in 2001: comparison with 1990, and between course types. *Med J Aust* 178(6):285–289
3. Barton MB, Simons RG (1999) A survey of cancer curricula in Australian and New Zealand medical schools in 1997. *Oncology Education Committee of the Australian Cancer Society. Med J Aust* 170(5):225–227
4. Oncology Education Committee. Ideal oncology curriculum: cancer council Australia; 2007 [cited 2016 11 April]. Available from: [http://wiki.cancer.org.au/oncologyformedicalstudents/Ideal\\_Oncology\\_Curriculum](http://wiki.cancer.org.au/oncologyformedicalstudents/Ideal_Oncology_Curriculum).
5. Koczwara B, Barton MB (2006) The ideal oncology curriculum for medical students. *J Clin Oncol* 24(33):5334
6. Whiteman DC, Webb PM, Green AC, Neale RE, Fritschi L, Bain CJ, Parkin DM, Wilson LF, Olsen CM, Nagle CM, Pandeya N, Jordan SJ, Antonsson A, Kendall BJ, Hughes MC, Ibiebele TI, Miura K, Peters S, Carey RN (2015) Cancers in Australia in 2010 attributable to modifiable factors: summary and conclusions. *Aust N Z J Public Health* 39(5):477–484
7. Hauer KE, Wilkerson L, Teherani A (2008) The relationship between medical students' knowledge, confidence, experience, and skills related to colorectal cancer screening. *J Cancer Educ* 23(4): 209–213
8. Wilkerson L, Lee M, Hodgson CS (2002) Evaluating curricular effects on medical students' knowledge and self-perceived skills in cancer prevention. *Acad Med* 77(10 Suppl):S51–S53
9. Barrett SV, Zapka JG, Mazor KM, Luckmann RS (2002) Assessing third-year medical students' breast cancer screening skills. *Acad Med* 77(9):905–910
10. Wisniewski WR, Fournier KF, Ling YK, Slack RS, Babiera G, Grubbs EG, Moore LJ, Fleming JB, You YN (2013) A focused curriculum in surgical oncology for the third-year medical students. *J Surg Res* 185(2):555–560
11. Roche AM, Eccleston P, Jordan D (1996) Smoking-related knowledge and attitudes of senior Australian medical students. *Tob Control* 5(4):271–279
12. Yu Y, Yang Y, Li Z, Zhou B, Zhao Y, Yuan S, Zhang R, Sebranek M, Veerman L, Li M, Gong E, Chen S, Ma W, Huang L, Cho K, Leeder S, Yan L (2015) The association between medical students' lifestyles and their attitudes towards preventive counseling in different countries. *BMC Public Health* 15:1124
13. Frank E, Carrera JS, Elon L, Hertzberg VS (2007) Predictors of US medical students' prevention counseling practices. *Prev Med* 44(1): 76–81
14. Frank E, Breyan J, Elon L (2000) Physician disclosure of healthy personal behaviors improves credibility and ability to motivate. *Arch Fam Med* 9(3):287–290
15. Howe M, Leidel A, Krishnan SM, Weber A, Rubenfire M, Jackson EA (2010) Patient-related diet and exercise counseling: do providers' own lifestyle habits matter? *Prev Cardiol* 13(4):180–185
16. Madan AK, Aliabadi-Wahle S, Babbo AM, Posner M, Beech DJ (2002) Education of medical students in clinical breast examination during surgical clerkship. *Am J Surg* 184(6):637–640, discussion 641
17. Campbell HS, McBean M, Mandin H, Bryant H (1994) Teaching medical students how to perform a clinical breast examination. *Acad Med* 69(12):993–995

18. Gerling GJ, Weissman AM, Thomas GW, Dove EL (2003) Effectiveness of a dynamic breast examination training model to improve clinical breast examination (CBE) skills. *Cancer Detect Prev* 27(6):451–456
19. Ault GT, Sullivan M, Chalabian J, Skinner KA (2002) A focused breast skills workshop improves the clinical skills of medical students. *J Surg Res* 106(2):303–307
20. Yanoshak SJ, Roehrborn CG, Girman CJ, Jaffe JS, Ginsberg PC, Harkaway RC (2000) Use of a prostate model to assist in training for digital rectal examination. *Urology* 55(5):690–693
21. Taylor JS, Dube CE, Pipas CF, Fuller BK, Lavallee LK, Rosen R (2004) Teaching the testicular exam: a model curriculum from “A” to “Zack”. *Fam Med* 36(3):209–213
22. Lee KC, Dunlop D, Dolan NC (1998) Do clinical breast examination skills improve during medical school? *Acad Med* 73(9):1013–1019
23. Wanggren K, Pettersson G, Gemzell-Danielsson K (2010) Medical students learning the pelvic examination: evaluation of a clinical patient model. *Acta Obstet Gynecol Scand* 89(10):1304–1309
24. Hendrickx K, De Winter B, Tjalma W, Avonts D, Peeraer G, Wyndaele JJ (2009) Learning intimate examinations with simulated patients: the evaluation of medical students’ performance. *Med Teach* 31(4):e139–e147
25. Horvath LE, Yordan E, Malhotra D, Leyva I, Bortel K, Schalk D, Mellinger P, Huml M, Kesslering C, Huml J (2010) Multidisciplinary care in the oncology setting: historical perspective and data from lung and gynecology multidisciplinary clinics. *J Oncol Pract* 6(6):e21–e26
26. Shapiro J (2011) Perspective: does medical education promote professional alexithymia? A call for attending to the emotions of patients and self in medical training. *Acad Med* 86(3):326–332
27. Mann BD, Sachdeva AK, Nieman LZ, Nielan BA, Rovito MA, Damsker JI (1996) Teaching medical students by role playing: a model for integrating psychosocial issues with disease management. *J Cancer Educ* 11(2):65–72
28. Ko C, Chaudhry S (2002) The need for a multidisciplinary approach to cancer care. *J Surg Res* 105(1):53–57
29. Nestel D, Tierney T (2007) Role-play for medical students learning about communication: guidelines for maximising benefits. *BMC Med Educ* 7:3
30. Fukuchi SG, Offutt LA, Sacks J, Mann BD (2000) Teaching a multidisciplinary approach to cancer treatment during surgical clerkship via an interactive board game. *Am J Surg* 179(4):337–340
31. Massie MJ (2004) Prevalence of depression in patients with cancer. *J Natl Cancer Inst Monogr* 32:57–71
32. Allart-Vorelli P, Porro B, Baguet F, Michel A, Cousson-Gelie F (2015) Haematological cancer and quality of life: a systematic literature review. *Blood Cancer J* 5:e305
33. Satin JR, Linden W, Phillips MJ (2009) Depression as a predictor of disease progression and mortality in cancer patients: a meta-analysis. *Cancer* 115(22):5349–5361
34. Hojat M, Vergare MJ, Maxwell K, Brainard G, Herrine SK, Isenberg GA, Veloski J, Gonnella JS (2009) The devil is in the third year: a longitudinal study of erosion of empathy in medical school. *Acad Med* 84(9):1182–1191
35. Chen D, Lew R, Hershman W, Orlander J (2007) A cross-sectional measurement of medical student empathy. *J Gen Intern Med* 22(10):1434–1438
36. Park C, Lee YJ, Hong M, Jung C-H, Synn Y, Kwack Y-S, Ryu J-S, Park TW, Lee S, Bahn GH (2016) A multicenter study investigating empathy and burnout characteristics in medical residents with various specialties. *J Korean Med Sci* 31(4):590–597
37. Santos MA, Grosseman S, Morelli TC, Giuliano IC, Erdmann TR (2016) Empathy differences by gender and specialty preference in medical students: a study in Brazil. *Int J Med Educ* 7:149
38. Bellini LM, Shea JA (2005) Mood change and empathy decline persist during three years of internal medicine training. *Acad Med* 80(2):164–167
39. Dignan M, McQuellon R, Michielutte R, Brewer C, Atwell B, Cruz J (1989) Helping students respond to stressful interactions with cancer patients and their families: a pilot program. *J Cancer Educ* 4(3):179–183
40. Kearsley JH, Lobb EA (2013) “It is not a disease we treat, but a person”: medical students’ reflections on their first rotations to an oncology and palliative care unit. *J Palliat Care* 29(4):232–236
41. Lefresne S, Nielsen D, Fairchild A (2011) The cross cancer institute multidisciplinary summer studentship in palliative and supportive care in oncology: teaching students to see through patients’ eyes. *Support Care Cancer* 19(3):403–408
42. Henry-Tillman R, Deloney LA, Savidge M, Graham CJ, Klimberg VS (2002) The medical student as patient navigator as an approach to teaching empathy. *Am J Surg* 183(6):659–662
43. Hoerni B, Maree D (1989) Value of attitude questionnaires for assessing oncology teaching of medical students: experience of Fondation Bergonie, Bordeaux. *J Cancer Educ* 4(2):91–95
44. Kiluk JV, Dessureault S, Quinn G (2012) Teaching medical students how to break bad news with standardized patients. *J Cancer Educ* 27(2):277–280
45. Rosenbaum ME, Ferguson KJ, Lobas JG (2004) Teaching medical students and residents skills for delivering bad news: a review of strategies. *Acad Med* 79(2):107–117
46. Rosenbaum ME, Kreiter C (2002) Teaching delivery of bad news using experiential sessions with standardized patients. *Teach Learn Med* 14(3):144–149
47. Weber M, Schmiedel S, Nauck F, Alt-Epping B (2011) Knowledge and attitude of final-year medical students in Germany towards palliative care—an interinstitutional questionnaire-based study. *BMC Palliat Care* 10(1):1–7
48. Cheng DR, Teh A (2014) Palliative care in Australian medical student education. *Med Teach* 36(1):82–83
49. von Gunten CF, Mullan P, Nelesen RA, Soskins M, Savoia M, Buckholz G, Weissman DE (2012) Development and evaluation of a palliative medicine curriculum for third-year medical students. *J Palliat Med* 15(11):1198–1217
50. Crawford GB, Zambrano SC (2015) Junior doctors’ views of how their undergraduate clinical electives in palliative care influenced their current practice of medicine. *Acad Med* 90(3):338–344
51. Granek L, Lazarev I, Birstock-Cohen S, Geffen DB, Riesenberg K, Ariad S (2015) Early exposure to a clinical oncology course during the preclinical second year of medical school. *Acad Med* 90(4):454–457
52. Fairchild A, Watanabe S, Chambers C, Yurick J, Lem L, Tachynski P (2012) Initiation of a multidisciplinary summer studentship in palliative and supportive care in oncology. *J Multidiscip Healthc* 5:231–239
53. Haspel RL, Saffitz JE (2014) Genomic oncology education: an urgent need, a new approach. *Cancer J (Sudbury, Mass)* 20:91–95