



# An innovation in curriculum content and delivery of cancer education within undergraduate nurse training in the UK. What impact does this have on the knowledge, attitudes and confidence in delivering cancer care?



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## ARTICLE INFO

### Article history:

Received 19 June 2015

Received in revised form

16 November 2015

Accepted 15 December 2015

### Keywords:

Research

Cancer

Education

Nursing

Coproduction

Patient

Carer

Confidence

Knowledge

Attitudes

## ABSTRACT

**Purpose:** This was an evaluation of an innovation in curriculum content and delivery within undergraduate nursing education in the UK. Its purpose was to investigate the effect on knowledge, attitudes and confidence in delivering cancer care.

**Methods:** The study design was a pre-test post-test survey design with a comparison group. Participants were two cohorts of undergraduate nursing students ( $n_{\text{intervention}} = 84$ ,  $n_{\text{comparison}} = 91$ ). The intervention cohort were exposed to a new 3.5 day programme of cancer education, coproduced with patients, carers and health professionals, which focused on cancer as a life changing long-term condition. The comparison cohort had been exposed to a 2 day programme produced by a lecturer.

**Results:** Following exposure to the new model for the delivery of undergraduate nurse cancer education, the intervention cohort demonstrated good overall knowledge of the impact of cancer, more positive attitudes towards cancer treatment and more confidence in their ability to deliver cancer care. Attitudes were more positive and confidence in ability to support cancer patients at all stages of the cancer journey were greater than in the comparison group. Insights gained into the cancer patient and carer perspectives were highly valued.

**Conclusions:** This study has found that a new model for the delivery of cancer education focusing on survivorship and delivered in partnership with patients, carers and clinicians, may improve knowledge, attitudes and confidence in the delivery of cancer care. Further work is now needed, using a more robust experimental design, to investigate the generalisability of the results to other education programs.

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## 1. Introduction

Over the past 25 years, research has shown that qualified nurses and undergraduate nursing students have pessimistic attitudes towards cancer and associate cancer with suffering and death (Corner, 1993; Corner and Wilson-Barnett, 1992; McCaughan and Parahoo, 2000a/b; Cunningham et al., 2006; Ifanti et al., 2009; Sanford et al., 2011; Kav et al., 2013; King-Okoye and Arber, 2014). As a consequence, it can be difficult for nurses to see the value of active treatment (O’Baugh et al., 2003). However, the number of people living with or beyond cancer is increasing (World

Health Organisation 2013; Department of Health, 2013; Macmillan Cancer Support, 2015a). Increasingly nurses will meet people living with and managing cancer as a chronic condition. In the UK, over the last 40 years cancer survival has doubled and of those adult cancer patients diagnosed in England and Wales in 2010–2011 it is predicted that 50% will survive 10 years or more (Cancer Research UK, 2015). As a result, services are being developed that will enable cancer survivors to live well with and beyond cancer (Department of Health, 2013).

The aim of this study was to evaluate the impact of an innovation in curriculum content and delivery within undergraduate nurse training in the UK. The specific objectives were to determine whether there was an effect on students’ knowledge, attitudes and confidence of delivering cancer care. The delivery of cancer

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education within the undergraduate nurse programme was strengthened by the introduction a new practitioner-lecturer role which focused on cancer as a life changing long term condition and supported the development and delivery of undergraduate nurse cancer education. A particular innovation involved people affected by cancer (patients and carers) and health care professionals sharing their experiences and addressing students' questions, as part of a three and a half day cancer theme programme.

## 2. Background

A number of different initiatives that have sought to strengthen the focus and delivery of cancer care within undergraduate nurse education have been described across the international literature (Coakley and Ghiloni, 2009; Coyne and Needham, 2012; Dean et al., 2013; Fitch et al., 2011; Hermann et al., 2008; Loerzel, 2013; Post-White et al., 1993; Purnell et al., 2004; Trocky et al., 2011). These included specialist clinical experiences where undergraduate nursing students learnt first-hand what it was like to work on an oncology unit (Purnell et al., 2004; Coakley and Ghiloni, 2009; Coyne and Needham, 2012; Dean et al., 2013). Others have described initiatives that sought to strengthen different aspects of the cancer care curriculum within undergraduate programmes. These have ranged from one day educational workshops involving lectures, discussion and self-learning activities (Post-White et al., 1993) or lectures and presentations by cancer survivors (Loerzel, 2013); development of cancer-specific educational web-based modules (Trocky et al., 2011) and improving the nurse educator's ability to deliver the cancer component of the curriculum (Hermann et al., 2008). Initiatives that have involved working with cancer survivors as an adjunct to academic studies for nursing students have also been described (Fitch et al., 2011; Loerzel, 2013; Purnell et al., 2004). Two initiatives focused on knowledge and awareness of ovarian cancer and consisted of presentations from a variety of women who discussed their personal experiences from diagnosis to survivorship, followed by a question and answer session (Fitch et al., 2011; Loerzel, 2013). Undergraduate students in one initiative also received an evidence based lecture before the presentations (Loerzel, 2013). Another initiative involved asking undergraduate nursing students to interview a cancer survivor as part of an assignment and then feedback their experiences in a classroom discussion (Purnell et al., 2004).

A recent review demonstrated that initiatives to strengthen education in cancer care have showed little influence on changing negative attitudes but can enable nursing students to i) master clinical skills and ii) improve knowledge which enhances confidence (Komprood, 2013). Studies that have evaluated cancer education programmes have been cancer-site specific; for example, breast (Trocky et al., 2011) and ovarian (Fitch et al., 2011; Loerzel, 2013). Other studies have focused on a particular aspect of cancer education; for example, cancer prevention and early detection (Post-White et al., 1993). It is important that, after undergraduate training, nurses are competent to deliver care to all patients with cancer across their whole journey. The UK regulatory body for nursing, the Nursing and Midwifery Council, defines competency as 'the combination of skills, knowledge and attitudes, values and technical abilities that underpin safe and effective nursing practice and interventions' (Nursing and Midwifery Council, 2010, pg 145).

There is a lack of literature that evaluates general cancer education for undergraduate nursing students across a broad range of outcomes that encompass competency, to include knowledge, attitudes and confidence. This study therefore assesses undergraduate nursing students' level of cancer knowledge, attitudes towards cancer and measures their level of confidence in cancer care before and after the delivery of cancer education.

## 3. Methods

### 3.1. Design

The study design was a pre-test post-test survey design with a comparison group. The intervention cohort were exposed to a new programme of cancer education which was conducted over 3.5 days and led by a new practitioner-lecturer, and coproduced with patients, carers and professionals who focused on cancer as a life changing long-term condition. The comparison cohort had been exposed to an existing programme of cancer education over 2 days produced by a lecturer and focussing on the impact of cancer on people's lives. A purpose designed questionnaire was distributed to both cohorts. The comparison cohort were at the end of their nurse training and therefore completed the survey on one occasion only, post-education.

### 3.2. Sample

The study participants were undergraduate nursing students undertaking a three year degree course. The students in the comparison cohort commenced their training in September 2011 and were studying an existing programme of cancer education (September 2007 programme) and completed their questionnaire survey at the end of the third year. The students in the intervention cohort commenced their training in September 2012 and were studying the new programme of cancer education (a component of the Cardiff Nursing Futures (CNF) programme). They completed their questionnaire survey in their second year and again 6 months later when they were in their third year.

### 3.3. Intervention cohort

The practitioner-lecturer had 5 years oncology nursing experience (hospital ward based) and 15 years palliative care experience (hospital team and community team based). The first day was delivered in the second year of the students' training and the remaining 2½ days were delivered at the beginning of the third year.

- **Day One:** consisted of a series of lectures covering all aspects of cancer and treatments and was underpinned by a patient scenario.
- **Day two:** a cancer patient day in which, after preparation, the students were split into small groups and worked with people affected by cancer asking questions in a safe environment to gain valuable insight into the patient perspective. This was an opportunity for them to hear the patients' voice, find out about their experiences, identify their needs and learn how they had been met, to inform their care for those diagnosed with cancer in the future.
- **Day three:** A professional day in which the students met with health professionals and those from the third sector, involved in cancer services and support. After Day two, they were armed with the 'cancer patient's experience' and used this to question professionals as to how they meet patient and carers needs, focussing on cancer as a long term condition.
- **Final half day:** consisted of lectures that explored issues of knowledge transfer – exploring how their learning about the experience of people affected by cancer can impact on their understanding and the care of people with other complex health conditions. These lectures were all taught by a specialist lecturer in cancer and end of life care and the newly appointed practitioner-lecturer.

3.4. Comparison cohort

The participants in the comparison cohort had followed the September 2007 programme that delivered cancer education over 2 days and focused on the impact of cancer on people lives and how life changing it is. The first day and a half was delivered in the second year of the students' training and the final half day session was delivered in the third year.

- **Day One:** consisted of a series of lectures. The topics covered included an introduction to cancer (half day session) and living with cancer (half day session). This was taught by a specialist lecturer in cancer and end of life care.
- **Half Day:** a lecture by a nurse consultant focused on breast surgery (for both cancer and benign disease), followed by a presentation/informal discussion with a breast cancer patient.
- **Half Day:** consisted of a series of lectures. The topics covered included cancer treatments and management of side effects associated with chemotherapy treatment. This was taught by a specialist lecturer in cancer and end of life care and the chemotherapy component was taught by a clinical nurse specialist.

3.5. Questionnaire development

The literature was searched for questionnaires that had been developed to measure undergraduate nursing students' cancer knowledge, attitudes and confidence and published in the past 10 years. In light of recent and rapid changes in the understanding and management of cancer, we deemed that tools developed before this time would be inappropriate for use now. We found no validated measures despite extending the search to qualified nurses or healthcare professionals.

A questionnaire was therefore developed to assess the level of knowledge and attitudes and to measure the level of confidence of delivering cancer care. To assure face and content validity, the items included on the questionnaire were generated from a number of sources and included consultation with experts in the field, proposed respondents and a review of the associated literature (Ratray and Jones, 2007), in particular the work of Wyatt and Talbot 2003 and questionnaires developed by Macmillan Cancer Support 2015b. The draft questionnaire was then further refined with the help of a steering group (a student from the CNF 2012 cohort, associate lecturer, lecturers, researchers, a cancer carer and the Macmillan Senior Learning and Development Manager for

Wales) taking into account the nine Macmillan target outcomes for UK cancer services (see Fig. 1). The questionnaire was then piloted with undergraduate nursing students from a separate cohort (n = 47). The pilot work found the questionnaire took too long to complete, so questions that students found difficult to understand were removed and some questions where students were asked to list up to five possible answers was limited to four. Preliminary data analysis checks were conducted on both quantitative and qualitative data to ensure that the responses were fit for purpose. The final questionnaire (31 questions) covered the respondents' own cancer experiences, general cancer knowledge, knowledge of self-management, attitudes towards cancer, knowledge of the impact and consequences of a cancer diagnosis, confidence and their opinion of nurse cancer education.

3.6. Ethical considerations

The study was approved by the local Research Ethics Committee. All students in both cohorts were invited to participate. Any student not wishing to take part was asked to return a blank questionnaire. Confidentiality was assured.

3.7. Data analysis

All data was entered into and analysed using SPSS TM Version 20. Descriptive data was analysed using frequencies, means and ranges and where applicable counts and percentages. When analysing responses to attitudes about cancer where respondents were asked to list up to 5 words associated with cancer, the answers were treated in the same way as by Wyatt and Talbot 2003. This involved categorising the responses into four groups to reflect negative, positive, both positive and negative or neutral associations (words which did not carry emotional content). Categorical data was entered into contingency tables (2x2) and analysed using the Chi-square test of association and the fisher exact probability test. The one-Sample Kolmogorov–Smirnov test procedure was computed for the interval data (all confidence questions and one attitude question) and was normally distributed so parametric tests were conducted specifically independent sample t-tests to investigate differences in mean scores across the two time points. An inductive approach was used to analyse the data from the open ended and free text questions. Responses were coded, counted and percentages generated.

4. Results

4.1. Sample description

For undergraduate nursing students in the intervention cohort, the pre-cancer education questionnaire survey was distributed to those in attendance at the start of the first day of the 3.5 day education programme (May 2014). The post cancer-education survey was distributed to those in attendance at the end of the final teaching session in the third year (October 2014). The number completing data collection at this final teaching session was lower than previous, as undergraduate nursing students had a numeracy examination the next day and some chose not to stay to complete the survey. For those in the comparison cohort the post-cancer education survey was distributed to undergraduate nursing in attendance during a lecture at the end of their programme in May 2014. For further details see Fig. 2.

Table 1 presents the demographic characteristics of the study population who completed questionnaires. The majority of the respondents were female and had experience of caring for a patient with cancer in hospital or community whilst in their practice

I was diagnosed early	I understand, so I make good decisions	I get the treatment and care which are best for my cancer, and my life
Those around me are well supported	I am treated with dignity and respect	I know what I can do to help myself, and who else can help me
I can enjoy life	I feel part of a community and I'm inspired to give something back	I want to die well

Fig. 1. Macmillan's nine target outcomes.

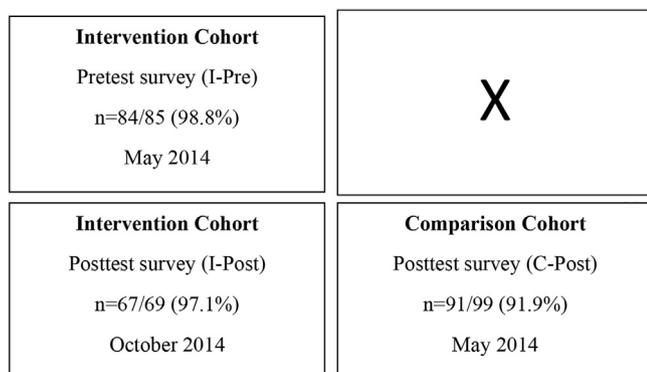


Fig. 2. Included participants and response rates.

learning environment. The age range was between 19 and 45 years.

## 4.2. Knowledge improvement

### 4.2.1. General cancer knowledge

The questionnaire assessed cancer knowledge. Over 90% of respondents pre and post test in the intervention cohort and in the comparison cohort knew the answer to the question “There is something that all cancers have in common at the start. But what is it?” and over 85% correctly identified the most common cancer for females. Knowledge of the most common cancer in men improved in the intervention cohort between the beginning and end of their cancer education training ((Pre-test 52.4%, Post-test 89.1%:  $p < 0.00$ ,  $\chi^2 = 19.15$ , Odds Ratio = 0.14 95% CI = 0.06–0.35). Knowledge of age group most likely to be diagnosed with cancer also improved (Pre-test 29.8%, Post-test 93.8%:  $p < 0.00$ ,  $\chi^2 = 23.81$ , Odds Ratio = 0.17, 95% CI = 0.08–0.34).

### 4.2.2. Self-management knowledge

Over 70% of respondents in the pre- and post-test groups and the comparison group agreed with statements presented regarding self-management, with the exception of the statement “self-management is “overcoming the physical effects of some treatments” (Comparison 58.9%, Intervention Pre-test 66.7%, Post-test 77.6%) and in the intervention group there was change in agreement to one statement “Self-management is accessing relevant information and integrating that information to their lives” (Pre-test 72.6%, Post-test 88.1%:  $p = 0.03$ ,  $\chi^2 = 4.54$ , Odds Ratio = 0.36, 95% CI = 0.14–0.87).

Table 1  
Sample description.

	Intervention pre-test n = 84	Intervention post-test n = 67	Comparison n = 91
Age range in years	19–43 24.88 (5.75)	20–44 25.06 (5.86)	20–45 24.97 (5.90)
Mean (SD)			
	n (%)	n (%)	n (%)
Female	77 (91.7%)	58 (87.9%)	81 (90%)
I have experience of working with cancer patients prior to my nursing degree	28 (33.3%)	26 (38.8%)	19 (20.9%)
I have experience of volunteering with cancer patients prior to starting my nursing degree	7 (8.3%)	11 (16.4%)	8 (8.8%)
I have cared for a patient with cancer in hospital or community whilst on my PLE	67 (79.8%)	50 (74.8%)	81 (89.0%)
I have cared for/supported a family member with cancer	51 (60.7%)	37 (55.2%)	47 (51.6%)
I have cared for/supported a friend with cancer	16 (19.0%)	49 (73.1%)	17 (18.7%)
I have had a cancer diagnosis	1 (1.2%)	2 (3%)	–

PLE – Practice learning environment.

### 4.2.3. Knowledge about emotional and social effects

The most commonly identified social consequences of cancer were related to social withdrawal and isolation (see Table 2). Relationship issues with family and friends were also frequently identified as a possible consequence and by the end of their cancer education respondents from the intervention cohort were more aware of this issue. For the emotional consequences, responses were similar pre- and post-test for the intervention cohort. A larger proportion of responses in the comparison cohort compared to the intervention cohort identified grief and loss as a possible consequence (grief, intervention post-test 2.7% versus comparison 7.3%; loss, intervention post-test 5.5% versus comparison 10.1%).

## 4.3. Knowledge that did not change

There was no observed difference in knowledge about risk/screening, treatments or information sources either pre- or post-test for the intervention group or between the intervention and comparison cohorts.

### 4.3.1. Knowledge about risk, risk reduction and screening

All respondents were able to correctly identify ways of helping to reduce risk of cancer, ways of detecting early signs or symptoms of cancer and methods of early detection by health services.

### 4.3.2. Knowledge about treatments

Few respondents were able to identify treatments for cancers other than chemotherapy, radiotherapy and surgery with only a small minority naming hormone treatments, biological or stem cell treatments. Similarly, few could list four treatment side-effects. Prior to their cancer education, respondents in the intervention cohort identified few alternative/complementary therapies that might be used by patients.

### 4.3.3. Knowledge about information sources and resources

All respondents were able to identify a wide range of information sources and resources. However, a larger proportion of respondents from the comparison cohort identified hospices or palliative care services.

## 4.4. Attitudes about cancer

Cancer attitudes were determined by the students' responses to two questions. The first was an open ended question where the respondents were asked to list five words that they associated with cancer (see Table 3).

It was observed that those students from the intervention

**Table 2**  
Emotional and social consequences of cancer and its treatment most frequently identified by respondents.

	Intervention pre-test n = 84	Intervention post-test n = 67	Comparison n = 91
<b>Emotional consequences of cancer</b>			
Total consequences identified	282 (100%)	257 (100%)	328 (100%)
Anxiety	45 (15.7%)	30 (11.7%)	55 (16.8%)
Depression	55 (19.2%)	43 (16.2%)	56 (17.1%)
Anger	14 (4.9%)	9 (3.5%)	11 (3.4%)
Grief	8 (2.8%)	7 (2.7%)	24 (7.3%)
Loss	19 (6.6%)	13 (5.5%)	33 (10.1%)
<b>Social consequences of cancer</b>			
Total consequences identified	231 (100%)	230 (100%)	272 (100%)
Family, friends and relationship issues	40 (17.3%)	61 (26.5%)	61 (22.4%)
Social withdrawal/Isolation	124 (53.7%)	93 (40.4%)	118 (43.4%)
Financial issues	12 (5.2%)	13 (5.7%)	20 (7.4%)
Employment issues	22 (9.5%)	21 (9.1%)	30 (11.0%)

**Table 3**  
Responses for types of words associated with cancer.

Categories	Intervention pre-test n = 84	Intervention post-test n = 67	Comparison n = 91
	n (%)	n (%)	n (%)
Negative associations	256 (64.0%)	110 (33.3%)	265 (60.9%)
Positive associations	28 (7.0%)	80 (24.2%)	38 (8.7%)
Neutral associations	100 (25.8%)	112 (33.9%)	120 (27.6%)
Positive/Negative associations	13 (3.3%)	28 (8.5%)	12 (2.8%)
Total number of responses	400 (100%)	330 (100%)	435 (100%)

cohort changed their attitudes to cancer as the course progressed. The proportion of positive responses increased from 28 (7.0%) to 80 (24.2%). In contrast, in students from the comparison cohort the majority of words 265 (60.9%) conveyed negative associations with cancer in terms of outcome (e.g. death, dying, grief, and terminal), emotion (e.g. anxiety, fear, sadness, depression) or symptoms (e.g. hair loss, pain, weight loss). In this cohort, there were few words conveying positive associations (8.7%), nearly a third of words (27.6%) were neutral, describing interventions (e.g. radiotherapy, chemotherapy, surgery, treatment) and different words for cancer (e.g. tumour, malignant, growths) and (2.8%) could be interpreted as being either positive and negative (e.g. life changing, adjustments). When looking at the responses for the comparison cohort and intervention cohort post-test it was observed that students from the intervention cohort had a greater number of positive responses (intervention post-test, 80 (24.2%) versus comparison 38 (8.7%)) and fewer negative responses (post-test, 110 (33.3%) versus comparison 265 (60.9%)). For the comparison cohort positive words were related to benefits of treatment (e.g. remission, recovery, survival) for those in intervention cohort they were related also to support, character and life with cancer.

For the second question concerning attitudes, respondents were asked to rate on a Likert scale (0 being strongly agree to 10 being strongly disagree) a response to the question "It is possible for someone to live well beyond cancer". By the end of their cancer education training, respondents from the intervention cohort were significantly more likely to agree with this statement, showing that attitudes had improved. (Intervention cohort: Post-test: Mean (S.D) = 9.65 (0.67), Intervention cohort: Pre-test: Mean (S.D) = 8.44 (1.99),  $p = 0.00$ , Mean Difference = 1.21, 95% CI 0.71 to 1.71,  $t = 4.78$ ).

#### 4.5. Confidence to care

By the end of their cancer education, respondents from the intervention cohort showed statistically significantly increased levels of confidence that they knew about cancer risks, signs and

symptoms of cancer, cancer treatments and all measured aspects of cancer nursing care (see Table 4). Levels of confidence were also observed to be higher than for those respondents in the comparison cohort (see Table 4).

#### 4.6. Experience of nurse education and cancer

The respondents were asked to think about what was important for the research team to know about their experience of nurse education and cancer.

Thirty eight respondents from the comparison cohort provided free text answers. The majority of respondents made requests for more education on specific topics ( $n = 25$ ) or for more lectures on cancer care in general ( $n = 19$ ). Others reported enjoyment of lectures ( $n = 3$ ) and the importance of nurse education in cancer ( $n = 2$ ). Both an improvement in confidence in cancer care ( $n = 2$ ) and lack of confidence in cancer care ( $n = 2$ ) was reported for example; one respondent said "It is often a lack of confidence about how individuals like me can help patients not a lack of education" (Student 51, Comparison). A number expressed the benefit of being able to work with cancer patients ( $n = 4$ ), for example one respondent said "It was not until I worked with cancer patients that I saw how all the theory we had been taught actually affected everyday life for a person. I think no amount of lecture learning can compare to practical experience" (Student 24, Comparison), and another said "I feel I learnt more about cancer care with my one day community placement with a Hospice nurse than in University ..." (Student 74, Comparison).

Twenty four respondents from the intervention cohort provided free text answers at the end of the education programme. The importance of involving people living with cancer in nurse education was clearly demonstrated ( $n = 13$ ). For example one respondent said; "I think it was beneficial to speak to people who have lived with cancer and think this was vital in developing the skills I need to listen and support those living with cancer" (Student 44, Intervention post-test) and another said, "Patient experiences has been really important as it has highlighted many issues that may not have

**Table 4**  
Comparison of mean scores for levels of confidence.

	Intervention Pre-test n = 84 mean (SD)	Intervention post-test n = 67 mean (SD)	Comparison n = 91 mean (SD)	Significance levels Independent sample t-test
How confident are you that you know about: Cancer risks?	4.01 (1.97)	7.23 (1.34)	5.63 (1.82)	Intervention Post-test > Intervention Pre-test p = 0.00, MD = 3.22, 95% CI = 2.66 to 3.78, t = 11.44
Signs and symptoms of cancer?	3.89 (1.88)	7.37 (1.27)	5.25 (1.70)	Intervention Post-test > Intervention Pre-test p = 0.01, MD = 3.48, 95% CI = 2.95 to 4.01, t = 12.97
About cancer treatments?	3.75 (1.90)	7.60 (1.25)	4.58 (1.84)	Intervention Post-test > Intervention Pre-test p = 0.00, MD = 3.85, 95% CI 3.31 to 4.39, t = 14.29
How confident are you that with support you can: Listen to the concerns of patients living with cancer?	6.21 (2.04)	8.75 (1.03)	6.53 (2.10)	Intervention Post-test > Intervention Pre-test p = 0.00, MD = 2.54, 95% CI 2.00 to 3.08, t = 9.30
Listen to the concerns of family members/carers affected by cancer?	6.30 (1.97)	8.86 (1.00)	6.56 (1.85)	Intervention Post-test > Intervention Pre-test p = 0.00, MD = 2.56, 95% CI 2.04 to 3.09, t = 9.94
Respond to patient's questions about cancer?	4.13 (2.18)	7.59 (1.41)	5.00 (1.84)	Intervention Post-test > Intervention Pre-test p = 0.00, MD = 3.46, 95% CI 2.84 to 4.07, t = 11.23
Respond to family members/carer's questions about cancer?	4.03 (2.27)	7.51 (1.36)	4.92 (1.92)	Intervention Post-test > Intervention Pre-test p = 0.00, MD = 3.48, 95% CI 2.86 to 4.10, t = 11.06
Assess the needs of patients living with cancer?	4.81 (2.18)	7.96 (1.39)	5.79 (1.85)	Intervention Post-test > Intervention Pre-test p = 0.00, MD = 3.15, 95% CI 2.55 to 3.76, t = 10.27
Assess the needs of family members/carers of patients living with cancer?	4.81 (2.17)	7.92 (1.31)	5.59 (2.00)	Intervention Post-test > Intervention Pre-test p = 0.00, MD = 3.11, 95% CI 2.52 to 3.71, t = 10.33
Give patients living with cancer appropriate information in order to help them with making decisions about their care?	4.24 (2.18)	7.82 (1.21)	5.41 (1.87)	Intervention Post-test > Intervention Pre-test p = 0.00, MD = 3.57, 95% CI 2.98 to 4.16, t = 11.99
Give the families/carers affected by cancer appropriate information in order to help them with making decisions about their care?	4.18 (2.21)	7.80 (1.30)	5.18 (1.92)	Intervention Post-test > Intervention Pre-test p = 0.00, MD = 3.62, 95% CI 3.01 to 4.22, t = 11.87
Signpost patients living with cancer to other services and resources?	5.20 (2.2)	8.16 (1.20)	5.95 (1.90)	Intervention Post-test > Intervention Pre-test p = 0.00, MD = 2.96, 95% CI 2.37 to 3.54, t = 10.02

Key: MD = Mean Difference, CI = Confidence Interval, t = t statistic/Footnote: 0 = not at all confident, 10 = totally confident.

been picked up from hearing a nursing point of view" (Student 62, Intervention post-test). Respondents reported (n = 2) that the more they know then the better equipped they feel to help and offer support and care to patients and their family; for example one respondent said "The more we know and better educated we are, the better we will be able to offer support and care to patients and their family" (Student 30, Intervention post-test). Another said "The more nurses know about cancer the more we can do to help" (Student 31, Intervention post-test). Other categories included enjoyment of lectures (n = 3) and the request for earlier delivery of cancer education (n = 2).

## 5. Discussion

The innovation in undergraduate curriculum content and

delivery resulted in measured improvement in undergraduate nursing students' attitudes, knowledge and confidence in delivering cancer care. Following exposure to the new model for the delivery of undergraduate nurse cancer education, the intervention cohort had good overall knowledge of the impact and consequences of a cancer diagnosis, more positive attitudes towards cancer treatment and cancer care, and greater confidence in their ability to support cancer patients at all stages of the cancer journey from pre-diagnosis to survivorship. They also valued gaining insight into the patient and carer perspectives.

### 5.1. Knowledge

Patients feel safe and secure when they receive care from nurses who they judge to be knowledgeable (Charalambous et al., 2008;

Kvåle and Bondevik, 2010; Wood and Ward, 2000). All nurses will at some point during their working life meet patients diagnosed with cancer (Gill and Duffy, 2010; Mohan et al., 2005; Wood and Ward, 2000). Nursing staff working across non specialist wards report a lack of education and training with regard to cancer care and cancer treatments and feel that this lack of knowledge can hinder them from being able to provide the care they would like to cancer patients and their families (Gill and Duffy, 2010; McCaughan and Parahoo, 2000b; Mohan et al., 2005).

The more undergraduate nursing students know, the better equipped they feel to help and offer support and care to patients and their family. All undergraduate nursing students in the current study demonstrated a high level of general cancer knowledge, but there was potential for improvement in the area of self-management, treatment side effects and newer cancer treatments. Previously, educational interventions for undergraduate nursing students have shown that cancer knowledge can be improved with education but often fail to maintain this at follow up (Croner and Wilson-Barnett, 1992, Fitch et al., 2011; Loerzel, 2003; Post-White et al., 1993). This study has demonstrated that after exposure to the new model of the delivery of undergraduate nurse cancer education there were improvements in general cancer knowledge and increased awareness of impact on relationships with family and friends. Further work is needed to investigate if this knowledge is sustained over time and informs students' subsequent practice as qualified nurses.

## 5.2. Attitudes

Educational initiatives that have sought to strengthen the focus and delivery of cancer care for undergraduate nurse education have not previously been able to demonstrate an improvement in positive attitudes (Komprood, 2013). The only studies we found in this area were conducted in the USA 30 years ago with medical students and indicated that attitudes can be positively influenced when medical students participated in specific oncology courses (Blanchard et al., 1981; Lebovits et al., 1984). This current study is the first to demonstrate such a finding in undergraduate nursing students. It was observed that following exposure to the new model for the delivery of undergraduate nurse cancer education, nursing students from the intervention cohort changed their attitudes about cancer as the course progressed. This claim is based on the finding that the majority of words that the undergraduate nursing students associated with cancer became mostly positive or neutral post intervention. It was also observed that, when looking at the responses, for the intervention and comparison at the same time points (post cancer education) that undergraduate nursing students from the intervention cohort recorded a greater proportion of positive responses. For the comparison cohort the positive words were related to benefits of treatment for example remission, recovery and survival. For those in the intervention cohort they were also related to character for example being empowered, overcoming obstacles, resilience, strength, courage, perseverance, as well as being positive and receiving support. Other responses also appeared to support the argument that the education promoted positive attitudes. For example, significantly more undergraduate nursing students agreed that it is possible for someone to live well beyond cancer following exposure to the new model for the delivery of undergraduate nurse cancer education compared to pre-intervention.

The effect on nurse attitudes found in this study is potentially of great importance. It is well documented within the psychological field that attitudes have an influence on behaviour (see, for example, Ajzen 1988). A literature review on cancer attitudes of health professionals found that studies support the idea that

attitudes to cancer can have impact on behaviour and consequently patient care (Miller et al., 2000). If attitudes towards cancer and the treatment of cancer are overly negative then patient outcomes may be affected (Komprood, 2013). The only other piece of work examining nurse attitudes was conducted in 1993 (Corner, 1993) with newly qualified nurses, where a relationship was found between negative attitudes and experiences and the confidence of the nurse in caring for patients with cancer. The findings showed that nurses with negative experience would try to avoid caring for cancer patients. It was suggested by the authors that negative early professional experiences reinforced already held negative attitudes and, in some cases, exacerbated them. More appropriate education and clinical support for training nurses is recommended (Corner, 1993).

One possible explanation for the findings from our study could be personal positive experiences of cancer (Elkind, 1982). Undergraduate nursing students who had previous personal experience of caring for family or friends with cancer may have more positive attitudes to cancer patients (Cunningham et al., 2006). A greater proportion of the respondents in the intervention cohort had prior experience of either working with cancer patients or supporting someone with cancer, as compared to the comparison cohort. Whilst this may, in part, explain the difference between the groups, it cannot explain the observed improvement in attitude in the intervention cohort. Nor can it explain the relatively low scores for positive attitude prior to exposure to the training programme.

Another possible explanation is positive experiences of cancer in clinical practice. Over 75% of undergraduate nursing students from both cohorts in this study had cared for a patient with cancer whilst in their practice learning environment. This is higher than that reported across previous studies by 68% (Copp et al., 2007) and 63% (Cunningham et al., 2006). In the intervention cohort, there was little change in the proportion of respondents reporting experience of caring for a cancer patient in a clinical environment. The nature of this experience and whether the student nurses perceived this to be positive or negative was not investigated. It is plausible that the change in attitudes observed are secondary to positive encounters with cancer patients in clinical practice. However, the free-text comments indicate it was exposure to patients and carers during the educational programme that had impacted positively. These free text comments demonstrated that there needs to be a strong focus on cancer in the undergraduate nursing curriculum, as cancer patients can be present across all services regardless of speciality.

## 5.3. Confidence

After exposure to the new model for the delivery of undergraduate nurse cancer education, students felt confident that they would be able to give patients living with cancer and their families or carers appropriate information in order to help them with making decisions about their care. They also felt confident that with support they would be able to signpost patients living with cancer to other services and resources. This was reinforced by their ability to identify a wide variety of information sources and resources.

All undergraduate nursing students demonstrated some level of confidence that they knew about cancer risk, signs and symptoms of cancer and cancer treatments. They all had similar knowledge. However, those following the new model for the delivery of undergraduate nurse cancer education demonstrated significantly more confidence in this knowledge. It is important that undergraduate nursing students feel able to develop confidence in their ability to care for patients with cancer (Komprood, 2012). For someone to have the motivation to perform an activity they must have belief in their ability to do so; confidence, an expectation of

success, is an important component of self-efficacy (Bandura, 1977). For nurses to have the self-efficacy to deliver cancer care they need not only knowledge, but confidence. This study demonstrated that undergraduate nursing students following the new model for the delivery of undergraduate nurse cancer education felt confident that, with support, they could assess the needs of patients living with cancer and those of their family members/carers and listen to concerns and respond to questions about their cancer. This is important, as it is not just knowledge, but the application of knowledge in practice that can benefit patients.

Undergraduate nursing students often report feeling unprepared or inadequate when working with cancer patients, especially when dealing with the psychological aspects of cancer care (Cunningham et al., 2006; Hjørleifsdottir and Carter, 2000; King-Okoye and Arber, 2014). Being able to meet the emotional and psychosocial needs of patients and families can be challenging, particularly for newly qualified nurses (Copp et al., 2007; McCaughan and Parahoo, 2000b; Mohan et al., 2005). Students in the current study were able to identify a number of social and emotional consequences of cancer and its treatment. With regard to emotional consequences the majority of responses were similar for all respondents and included for example; fear, anxiety and depression. The exception was the number of responses related to grief and loss, which were observed to be greater in the comparison cohort. The comparison cohort were taught about palliative and end of life care during their education about cancer. The finding suggests it is important for education in cancer care to be independent of education in end of life care, if students are to develop positive attitudes to cancer care and cancer survivorship. The results of this study lead to the proposition that, if student nurses are to be adequately prepared to deliver cancer care, then their undergraduate cancer education should include focus on survivorship and should be delivered in partnership with patients and clinicians.

#### 5.4. Limitations

This study was conducted with undergraduate nursing students from one UK University. Generalisability of the positive results needs to be tested in other institutions and countries.

At the time that the research was conducted, the programme of undergraduate nursing education was transitioning from September 2007 programme to the CNF 2012 Programme. As a consequence, the final cohort of students following the September 2007 programme were already at the end of their nurse training, making a pre-test survey for that group impractical. A pre-test post-test intervention and control would have been a stronger study design, enabling comparison of change in educational outcomes from two alternative cancer education programmes.

This was a pragmatic study. Although the research team were independent of the team delivering the education, which is a design strength, the nursing students could not be randomised or blinded to the intervention. The analysis was of two naturally occurring groups exposed to different educational programme, which limits the rigour of the experimental design. Furthermore, we were unable to find any validated measures of attitude, knowledge and confidence in cancer care developed for use either with undergraduate nurses or any other professional group. The measures used in the study were thus developed by the research team. Whilst work was done on face and content validity, the questionnaire should be tested for construct validity and reliability prior to any replica work in other institutions.

## 6. Conclusion

Worldwide, an increasing number of people are living with

cancer. There has been only limited and no recent investigation of the preparation of nurses in the provision of cancer care. This study has found that a new model for the delivery of undergraduate nurse cancer education, focusing on survivorship and delivered in partnership with patients, carers and clinicians, was observed to improve attitudes, knowledge and confidence in the delivery of cancer care. This suggests patient, carer and clinician involvement in undergraduate nurse education is important to the delivery of high quality cancer care. However, studies of weak experimental design are known to yield unreliable results. Further work is now needed, using a more robust experimental design, to investigate the generalisability of the results to other education programmes. The impact on patient experience and outcomes should also be examined.

## Conflict of interest

Jane Hopkinson is a member of the Scientific Board, Cachexia Hub, Helsinn Healthcare.

## Acknowledgements

This study was funded by Macmillan Cancer Support.

## Appendix A. Supplementary data

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.ejon.2015.12.003>.

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