



# Investigating the self-perceived educational priorities of haematology nurses

Sarah Liptrott<sup>a,\*</sup>, Mairéad NíChonghaile<sup>b</sup>, Erik Aerts<sup>c</sup>, on behalf of the Haematology Nurses and Healthcare Professionals Group (HNHCP)

<sup>a</sup> IEO, European Institute of Oncology IRCCS, via Ripamonti 435, 20141, Milan, Italy

<sup>b</sup> HOPE Directorate, St James's Hospital, Dublin 8, Ireland

<sup>c</sup> Department of Internal Medicine, Haematology, University Hospital Zurich, Rämistrasse 100, CH-8091, Zurich, Switzerland

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## ABSTRACT

**Purpose:** To identify the educational priorities of haematology nurses in relation to nursing care of patients with haematological conditions. **Method:** We used an online survey questionnaire to identify educational priorities and preferences for learning in haematology nurses across a European setting. Frequencies and descriptive statistics were calculated for demographic variables and chi-square tests to examine relationships between educational needs and demographic variables.

**Results:** 265 nurses from 21 countries responded, the majority being Staff Nurses (37.7%), with > 5 years experience in haematology (77.3%) and educated to degree level or above (66.0%). The top 5 educational priorities were disease specific information for lymphoma, disease specific information for leukaemia, management of long-term side effects, understanding the immune system and new treatments in haematology. Demographic variables such as length of experience and patient group cared for influenced some educational priorities. Attending educational conferences was the preferred learning method.

**Conclusions:** This study provides insight into self-perceived educational priorities for haematology nurses and priorities to inform development of educational initiatives.

## 1. Introduction

The International Agency for Research on Cancer estimate approximately 1.2 million new cases of the most frequent occurring haematological malignancies (lymphoma, leukaemia, myeloma) in 2018 (IARC, 2018a), and a 5 year prevalence of approximately 3.2 million cases (IARC, 2018b). Considering the addition of other non-malignant diseases including anaemias, haemoglobinopathies and bleeding and clotting disorders, this would suggest that haematological conditions are significant contributors to overall global morbidity. Developments in treatment and management of side effects related to disease and its treatment have led to increasing numbers of survivors. The care of patients with haematological conditions is often complex and requires healthcare professionals with the appropriate knowledge and skills in order to address individual's needs.

The nursing profession is the largest workforce within the European Union (Keighley, 2016) and the evolution of nursing implies increasing responsibilities in a context of diverse therapies and advances in technology (Directive, 2013/55/EU of the European Parliament and of the Council). Nurse education is determined by the World Health

Organisation guidelines, European law and individual member states laws, with standards for minimum training requirements in terms of hours and clinical and theoretical components (TEMPUS, 2013). Variation exists however in training programs for the professional qualification of nurse, which may or may not be university based and where European standards do not provide detail regarding content related to disease specific processes (Directive, 2005/36/EC of the European Parliament and of the Council; Lahtinen et al., 2014). Pre-registration experience in the oncology setting is often limited due to a focus on generalised content within nursing programs (Komprood, 2013) and whilst there is evidence of attempts integrate cancer care into the pre-registration curriculum (Coyne et al., 2012; Dean et al., 2013; Edwards et al., 2016) no literature is available regarding care of patients with haematological conditions. As haematological malignancies represent less than 7% of all cancers (IARC, 2018a) pre-registration experience in the care of patients with malignant or non-malignant hematological conditions may be limited.

Haematology nursing is seen as a specialization in several countries with the development of specific competencies and proposed education and training (Association of Haematology Nurses in Sweden – HEMSIS

\* Corresponding author.

E-mail addresses: [sarah.liptrott@ieo.it](mailto:sarah.liptrott@ieo.it) (S. Liptrott), [mairleadnichonghaile@eircom.net](mailto:mairleadnichonghaile@eircom.net) (M. NíChonghaile), [erik.aerts@usz.ch](mailto:erik.aerts@usz.ch) (E. Aerts).

**Table 1**  
Post registration academic courses in haematology nursing (Authors personal communication, January 10, 2019).

Contacts	Respondents	Academic course availability
Oncology/general nursing associations/ nurse contacts emailed in 33 countries: Andorra, Austria, Belgium, Bulgaria, Croatia, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Lithuania, Luxembourg, Malta, Monaco, Montenegro, The Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovenia, Spain, Sweden, Switzerland, Turkey, UK	Finland	No
	France	No
	Germany	No
	Greece	No (CME accredited course available)
	Ireland	Yes
	Italy	Yes (1 centre)
	The Netherlands	Yes
	Portugal	No
	Spain	Yes
	Sweden	Yes (1 centre)
	Switzerland	Yes
	UK	Yes

CME – Continuing Medical Accreditation.

& Swedish Society of Nursing, 2009; Special Interest Group Hematology, V&VN Oncology, 2013). Investigation has highlighted that post-registration academic courses in haematology nursing are available in some countries, whilst in others these are combined haematology/oncology/bone marrow transplantation courses. Some courses are only available in a limited number of centres and not nationwide, and the availability of accredited non-academic haematology nursing education remains unclear (Authors personal communication, January 1, 2019) (Table 1). This would suggest significant variation in availability of and access to specialised education.

Continuing professional development is an important component in safe and effective practice, where better educated nurses are associated with better patient outcomes (Zander et al., 2016) and a reduction in patient mortality (Aiken et al., 2014). The Haematology Nurses and Healthcare Professionals Group (HNHCP) was established to support nurses and other health care professionals caring for patients and families affected by haematological conditions. Part of its remit is the promotion and development of specialist educational programs (HNHCP, 2016) that are accessible to nurses across the globe and consider international differences. Volker et al. (2011) endorse evidence-based educational opportunities to promote competency, advocating for a data-driven approach through a self-identified needs assessment and prioritisation in order to highlight gaps in existing knowledge and practice. To date, self-perceived and prioritised education needs of haematology nurses have not been evaluated. A survey was therefore conducted to identify educational priorities for haematology nurses reflecting individual's needs.

## 2. Methods

### 2.1. Aims

The aims of this study were i) to identify the educational priorities of haematology nurses in relation to the care of patients with haematological conditions and examine if relationships exist according to years of clinical experience, work setting and educational qualification, ii) to identify learning preferences of nurses, and iii) investigate nurses need for educational initiatives to be formally accredited events.

### 2.2. Design, sample and setting

A cross-sectional survey design was used. Potential participants were all nurses and healthcare professionals registered on the HNHCP Group electronic mailing list of 1869 individuals. Researchers were

members of the HNHCP Board with access to the mailing list. An email was sent explaining the purpose of the survey and inviting professionals to forward the survey on to other colleagues. A link to an online survey (Survey Monkey<sup>®</sup>, San Mateo, CA, USA), was included and a pdf version of the survey that could be completed and returned by email. Participation was completely voluntary and consent was assumed upon completion of the questionnaire. Data was collected anonymously without directly identifying information. Data was not collected in order to identify non-respondents, rather a reminder was sent out to all email addresses. Results were only available to researchers via password restricted access.

### 2.3. Questionnaire

The survey questionnaire consisted of 3 sections:

- 1) respondents' demographic details,
- 2) educational needs and priorities (75 items covering background to haematology/disease specific information/tests integral to haematology patient care/safe handling and administration of treatments/symptoms and conditions resulting from haematological diseases or their treatments/identifying and managing acute medical complications/other components of nursing care/issues in nursing practice - respondents were asked to rate the topics provided in terms of priority according to a 5 point Likert scale - strongly disagree to strongly agree. Respondents were asked to propose other educational priorities not listed,
- 3) learning preferences – learning methods/need for formal accreditation.

The items for the questionnaire were informed through a variety of resources: haematology nursing competences (Association of Haematology Nurses in Sweden – HEMSIS & Swedish Society of Nursing, 2009), course curriculums (Brown and Faltus, 2011; Martina et al., 2016; Special Interest Group Hematology, V&VN Oncology, 2013), and key nursing texts (Brown and Cutler, 2012; Ezzone, 2013). Three expert nurses each with 20 + years experience in haematology and 2 having haematology nursing and teaching qualifications, reviewed the resources and agreed the questionnaire content. The survey was available in English language only.

### 2.4. Data analysis

Statistical Package for Social Sciences (SPSS) version 23.0 (IBM Corp., Armonk, NY) was used for quantitative data analysis. Frequencies and descriptive statistics were calculated for each variable. Respondents country of origin, current nursing role, patient group(s) cared for and patient age group(s) were categorised to facilitate analysis. Other test variables were dichotomised - nursing education level, haematology academic qualification, haematology in-house training, time working in haematology, current clinical setting, and responses to educational priority of the items provided (Table 2). Chi-square and Fisher's exact tests were employed to examine relationships between self-reported education needs and the following variables: country, nursing role, nursing education level, time working in haematology, patient group(s) cared for, patient age group and current clinical setting. p-values less than 0.05 were considered to be significant. Qualitative comments regarding additional education topics were collected and summarised within each category.

## 3. Results

### 3.1. Sample

A total of 280 respondents completed the survey between January and April 2018. Respondents from non-nursing posts were excluded

**Table 2**  
Categories used for variable analysis.

	Categories refined
Country of origin (5 categories)	North Europe Central & Eastern Europe Southern Europe Western Europe other
Current nursing role (5 categories)	Staff Nurse Senior Nurse or Ward Manager Research Nurse Clinical Nurse Specialist Advanced Nurse Practitioner Diploma or other
Nurse education level (2 categories)	Degree level education or above
Haematology academic qualification (2 categories)	Yes No
Haematology in-house training (2 categories)	Yes No
Time working in haematology (2 categories)	≤ 5 years > 5 years
Current clinical setting (2 categories)	Inpatient Outpatient
Patient group(s) cared for (6 categories)	Malignant haematology ± SCT Non-malignant haematology ± SCT Malignant + non-malignant haematology SCT alone Malignant + non-malignant haematology + SCT Other
Patient age group(s) (3 categories)	Adults ± AYA's Paediatrics ± AYA's Adults, Paediatrics and AYA's
Educational priority of each item (2 categories)	Strongly agree + agree Neutral + disagree + strongly disagree

AYA's – Adolescents and Young Adults, SCT – Stem Cell Transplantation.

(n = 15) and 265 were included in the analysis. Participants' characteristics are summarised in Table 3. Respondents came from 21 countries, primarily Western European and in particular Switzerland, UK and Ireland (25.3%; n = 67, 16.6%; n = 44, and 10.6%; n = 28 respectively). The majority were female (88.7%; n = 235), aged > 50 yrs (32.5%; n = 86), mostly working as Staff Nurses (37.7%; n = 100), while Clinical Nurse Specialists (CNS) and Advanced Nurse Practitioners (ANP) accounted for 35.4% of respondents (n = 94) mainly working in Western European countries (41.5%). A significant number of respondents worked within haematology > 5 years (77.3%; n = 194), and many for over 20 years (25.5%; n = 64).

Almost two-thirds of respondents were educated to degree level or above (66.0%; n = 175), in particular nurses coming from Northern, Southern and Western European countries (85.0%, 76.5% and 63.8% respectively) and nurses working at advanced levels (CNS/ANP) (p < 0.001). Less than a quarter of respondents (24.9%; n = 66) had an academic qualification in haematology, being primarily nurses from Western European countries (27.0%) or nurses working at advanced levels (42.0% CNS, 36.0% ANP, p = 0.001). The majority of nurses had received some form of in-house training (79.2%; n = 210), however duration varied significantly most frequent being 'more than 1 week but less than 1 month' (24.9%; n = 66). The majority of respondents cared for patients with haematological malignancies ± patients undergoing Stem Cell Transplant (SCT) (51.0%; n = 128). Only six respondents (2.4%) cared only for patients with non-haematological malignancies. The majority of nurses worked with adult patients only (58.6%; n = 147) or adult and Adolescent/Young Adult (AYA) patients (30.3%; n = 76). The remaining nurses worked with paediatric ± AYA patients (8.0%; n = 20). Only one respondent worked solely with paediatric patients (0.4%).

Inpatient care settings were the most frequently reported place of work (53.4%; n = 134) however 75 respondents were working across in- and outpatient settings – the majority being from Western European countries (78.7%; n = 59).

**Table 3**  
Respondents demographic data.

	Responses	Number (%)
Gender n = 265	Male Female	30 (11.3%) 235 (88.7%)
Age n = 265	< 25 26–30 31–40 41–50 > 50	12 (4.5%) 31 (11.7%) 59 (22.3%) 77 (29.1%) 86 (32.5%)
Geographical area* n = 265	Northern Europe (Denmark, Estonia, Finland, Iceland, Sweden) Central + Eastern Europe (Romania, Slovenia) Southern Europe (Greece, Italy, Portugal, Spain) Western Europe (Belgium, France, Germany, Ireland, Netherlands, Switzerland, United Kingdom) Other (2Turkey, Saudi Arabia, USA, 1NR)	20 (7.5%) 10 (3.8%) 34 (12.8%) 196 (74.0%) 5 (1.9%)
Role n = 265	Senior Nurse/Ward manager Staff Nurse Research Nurse Clinical Nurse Specialist Advanced Nurse Practitioner Other (Cancer information Nurse, Quality Manager, 2Academic/research, 1NR)	56 (21.1%) 100 (37.7%) 10 (3.8%) 69 (26.0%) 25 (9.4%) 5 (1.4%)
Highest Academic Qualification n = 265	Diploma Bachelors Degree Masters Degree PhD Other (Health + childcare, 3NR)	86 (32.5%) 84 (31.7%) 85 (32.1%) 6 (2.3%) 4 (1.5%)
Academic qualification in haematology n = 265	Yes No	66 (24.9%) 199 (75.1%)
In house training in haematology n = 265	Yes Less than 1 week More than 1 week but less than 1 month More than 1 month but less than 1 year 1 year 2–5 years On-going training NR No	210 (79.2%) 45 (17.0%) 66 (24.9%) 64 (24.2%) 7 (2.6%) 4 (1.5%) 9 (3.4%) 14 (5.3%) 55 (20.8%)
Years experience in haematology nursing n = 251	< 1 year 1–5 years 6–10 years 11–15 years 16–20 years > 20 years	6 (2.4%) 51 (20.3%) 52 (20.7%) 34 (13.5%) 44 (17.5%) 64 (25.5%)
Patient conditions n = 251 (more than 1 response possible)	Coagulation disorders Haemato-oncological diseases Haemoglobinopathies Undergoing Stem Cell Transplant Other (RT, Immunology, Iron metabolism disorders, SC donors, 3-Blood donors, 2- NR)	78 (31.1%) 218 (86.9%) 93 (37.1%) 183 (72.9%) 10 (4.0%)
Patient age group n = 251	Adults (+/- AYA's) Paediatrics (+/- AYA's) Both	223 (88.8%) 20 (8.0%) 8 (3.2%)
Care setting n = 251	Hospital Inpatient Outpatient (hospital/community) Both hospital inpatient and outpatient Other (3 blood donation centre, 1NR)	134 (53.4%) 38 (15.5%) 75 (29.9%) 4 (1.6%)

\*geographical area according to Eurovoc

AYA's – Adolescents/Young Adults, NR – No further Response, RT – radiotherapy patients.

**Table 4**  
Educational Priority – haematology specific.

	Agree/Strongly Agree n = 265 (%)
<b>Background to haematology</b>	
Hemopoiesis	158 (59.6%)
Erythropoiesis	144 (54.3%)
The immune system	194 (73.2%)
Platelets and blood coagulation	167 (63.0%)
Genetic disorders	138 (52.1%)
<b>Disease specific information</b>	
Aplastic Anaemia	154 (58.1%)
Haemolytic Anaemia	130 (49.1%)
Sickle Cell Disease	92 (34.7%)
Thalassemia	71 (26.8%)
Hemochromatosis	74 (27.9%)
Polycythaemia	94 (35.5%)
Myelodysplastic syndromes	191 (72.1%)
Leukaemia's	206 (77.7%)
Lymphomas	198 (74.7%)
Myeloma	174 (65.7%)
Coagulation disorders	113 (42.6%)
Bleeding disorders of vascular and platelet abnormalities	112 (42.3%)
ITP	126 (47.5%)
Thrombosis and antithrombotic tx	110 (41.5%)
<b>Tests integral to patient care – meanings and reference values</b>	
Blood tests	182 (68.7%)
Tissue biopsies	135 (50.9%)
Bone marrow aspiration and biopsy	174 (65.7%)
Lumbar puncture	136 (51.3%)
<b>Safe handling and administration of treatments</b>	
Transfusion of blood components	172 (64.9%)
Management of transfusion complications	175 (66.0%)
Safe handling of anti-tumour agents	179 (67.5%)
Management of extravasation	164 (61.9%)
Administration of hematopoietic growth factors	149 (56.2%)
Administration of anti-infective agents	159 (60.0%)
Knowledge of new agents	194 (73.2%)
Central venous access devices – types and management of complications	163 (61.5%)
Stem cell transplantation	184 (69.4%)
<b>Symptoms/conditions resulting from haematological diseases or their treatments – measures in assessment, and prevention or management</b>	
Fatigue	177 (67.8%)
Mucositis	177 (67.8%)
Nausea/vomiting	180 (67.9%)
Elimination (diarrhoea/constipation/faecal incontinence)	176 (66.4%)
Respiratory problems	187 (70.6%)
Alopecia	119 (44.9%)
Peripheral neuropathy	180 (67.9%)
Neutropenia – minimising risk of infections i.e. protective isolation	185 (69.8%)
Anaemia	173 (65.3%)
Pain control	190 (71.7%)
Nutrition/diet	180 (67.9%)
Hygiene routines	156 (58.9%)
Infection	189 (71.3%)
Sleep	149 (56.2%)
Long term effects of treatment	196 (74.0%)
Providing psychological/emotional support	185 (69.8%)
Sexuality and sexual problems	165 (62.2%)
Fertility	157 (59.2%)
Altered body image	155 (58.5%)
Coping	167 (63.0%)
Survivorship	170 (64.2%)
Return to work	152 (57.4%)
Palliative care in haematology	186 (70.2%)
Rehabilitation in haematology	172 (64.9%)
End of life care for haematology patients	179 (67.5%)
<b>Identifying and managing acute medical complications</b>	
Sepsis	190 (71.7%)
Bleeding	189 (71.3%)
Anaphylaxis	176 (66.4%)
Medullary compression	141 (53.2%)
Graft-versus-host disease (GVHD)	173 (65.3%)
VOD	164 (61.9%)

**Table 5**  
Educational Priority – General nursing issues.

	Agree/Strongly Agree n = 265 (%)
<b>Other components of nursing care</b>	
Methods for patient information and patient education	190 (71.7%)
Communication skills	179 (67.5%)
Breaking bad news	167 (63.0%)
Motivational interviewing	161 (60.8%)
Health promotion	165 (62.3%)
Care of the caregiver	174 (65.7%)
Promoting social support systems	165 (62.3%)
<b>Nursing Practice</b>	
Understanding evidence-based practice	180 (67.9%)
Integrating research into practice	175 (66.0%)
Training to perform nurse-led research	167 (63.0%)
Risk assessment in nursing practice (i.e. allergy, cytotoxic risks.)	173 (65.3%)
Presenting and public speaking	126 (47.5%)

### 3.2. Educational priorities

There was general agreement that topics relating to a 'background in haematology' were an educational priority for all respondents (Table 4), in particular the immune system (73.2%; n = 194). Staff nurses within direct clinical roles and respondents with ≤ 5 years' experience working in haematology prioritised these topics however findings were not statistically significant with the exception of 'platelets and blood coagulation' (p = 0.025) (Table 6).

The majority of respondents agreed/strongly agreed that malignant disease specific conditions were an educational priority (myeloma 65.7%, lymphoma 74.7%, leukaemia 77.7%, myelodysplastic syndromes 72.1%) (Table 4), especially where working within malignant haematology ± SCT patients (p = 0.023, p = 0.004, p = 0.012, and p = 0.014 respectively). Non-malignant haematological conditions were a priority for fewer respondents but included those working within transfusion centres (aplastic anaemia 58.1%, haemolytic anaemia 49.1%, coagulation disorders 42.6%). For Staff Nurses however, coagulation and bleeding disorders were a particular priority (p < 0.001 and p = 0.024 respectively). Genetic disorders such as sickle cell disease, thalassemia and hemochromatosis were less frequently cited as an educational priority (34.7%, 26.8%, 27.9% respectively). Greater interest in sickle cell disease and thalassemia were seen in respondents from Southern European countries (55.9%, 32.4% respectively) however, findings were not statistically significant.

Understanding tests integral to patient care (Table 4) were an educational priority for over half of respondents, in particular blood tests (68.7%; n = 182). Blood tests and tissue biopsies were of importance for those with ≤ 5 years working in haematology (p = 0.010 and p = 0.043 respectively) (Table 6), and lumbar puncture for those working in the inpatient setting (p = 0.028).

Over half of respondents agreed/strongly agreed that topics surrounding safe handling and administration of treatments were an educational priority (Table 4). The top three in this topic were - knowledge of new agents (73.2%; n = 194), SCT (69.4%; n = 184) and safe handling of anti-tumour agents (67.5%; n = 179). These topics were particularly important where respondents worked within malignant haematology ± SCT setting (p = 0.020, p = 0.010, and p = 0.003 respectively). Central Venous Access Device (CVAD) management and SCT were an educational priority for respondents in direct clinical roles such as Ward Manager and Staff Nurse (p = 0.049 and p = 0.022 respectively). Nurses educated to degree level or above prioritised several topics (safe handling of antitumor agents; p = 0.001, administration of hematopoietic growth factors; p = 0.006, anti-infective agents; p = 0.008, knowledge of new agents; p < 0.001, CVAD management; p = 0.026, and SCT; p = 0.008). Similar topics were

**Table 6**  
Agree/Strongly agree with the topic as an educational priority and years experience in haematology nursing.

	Years experience in haematology nursing			p value
	Up to 5 years (n = 57)	More than 5 years (n = 194)	Total (n = 251)	
<b>Background to haematology</b>				
Hemopoiesis	42 (73.7%)	116 (59.8%)	158 (62.9%)	p = 0.126
Erythropoiesis	40 (70.2%)	104 (53.6%)	144 (57.4%)	p = 0.065
The immune system	45 (78.9%)	149 (76.8%)	194 (77.3%)	P = 0.757
Platelets and blood coagulation	45 (78.9%)	122 (62.9%)	167 (66.5%)	p = 0.025*
Genetic disorders	32 (56.1%)	106 (54.6%)	138 (55.0%)	p = 0.853
<b>Disease specific information</b>				
Aplastic Anaemia	35 (61.4%)	119 (61.3%)	154 (61.4%)	p = 0.779
Haemolytic Anaemia	36 (63.2%)	94 (48.5%)	130 (51.8%)	p = 0.111
Sickle Cell Disease	25 (43.9%)	67 (34.5%)	92 (36.7%)	p = 0.281
Thalassemia	21 (36.8%)	50 (25.8%)	71 (28.3%)	p = 0.166
Hemochromatosis	23 (40.4%)	51 (26.3%)	74 (29.5%)	p = 0.115
Polycythaemia	26 (45.6%)	68 (35.1%)	94 (37.5%)	p = 0.252
Myelodysplastic syndromes	48 (84.2%)	143 (73.7%)	191 (76.1%)	p = 0.173
Leukaemia's	49 (86.0%)	157 (80.9%)	206 (82.1%)	p = 0.530
Lymphomas	47 (82.5%)	151 (77.8%)	198 (78.9%)	p = 1.000
Myeloma	46 (80.7%)	128 (66.0%)	174 (69.3%)	p = 0.091
Coagulation disorders	34 (59.6%)	79 (40.7%)	113 (45.0%)	p = 0.028*
Bleeding disorders of vascular and platelet abnormalities	31 (54.4%)	81 (41.8%)	112 (44.6%)	p = 0.152
ITP	28 (49.1%)	98 (50.5%)	126 (50.2%)	p = 0.447
Thrombosis and antithrombotic treatment	32 (56.1%)	78 (40.2%)	110 (43.8%)	p = 0.077
<b>Tests integral to haematology patient care – meanings and reference values</b>				
Blood tests	48 (84.2%)	134 (69.1%)	182 (72.5%)	p = 0.010*
Tissue biopsies	38 (66.7%)	97 (50.0%)	135 (53.8%)	p = 0.043*
Bone marrow aspiration and biopsy	45 (78.9%)	129 (66.5%)	174 (69.3%)	p = 0.067
Lumbar puncture	34 (59.6%)	102 (52.6%)	136 (54.2%)	p = 0.217
<b>Safe handling and administration of treatments</b>				
Transfusion of blood components	44 (77.2%)	128 (66.0%)	172 (68.5%)	p = 0.109
Management of transfusion complications	41 (71.9%)	134 (69.1%)	175 (69.7%)	p = 0.680
Safe handling of anti-tumour agents	45 (78.9%)	134 (69.1%)	179 (71.3%)	p = 0.147
Management of extravasation	41 (71.9%)	123 (63.4%)	164 (65.3%)	p = 0.234
Administration of haematopoietic growth factors	41 (71.9%)	108 (55.7%)	149 (59.4%)	p = 0.028*
Administration of anti-infective agents	37 (64.9%)	122 (62.9%)	159 (63.3%)	p = 0.780
Knowledge of new agents	44 (77.2%)	150 (77.3%)	194 (77.3%)	p = 0.984
Central venous access devices – types and management of complications	38 (66.7%)	125 (64.4%)	163 (64.9%)	p = 0.756
Stem cell transplantation	45 (78.9%)	138 (71.1%)	183 (72.9%)	p = 0.243
<b>Symptoms/conditions resulting from haematological diseases or their treatments - measures in assessment, and prevention or management</b>				
Fatigue	43 (75.4%)	134 (69.1%)	177 (70.5%)	p = 0.354
Mucositis	44 (77.2%)	133 (68.6%)	177 (70.5%)	p = 0.209
Nausea/vomiting	41 (71.9%)	139 (71.6%)	180 (71.7%)	p = 0.967
Elimination (diarrhoea/constipation/faecal incontinence)	45 (78.9%)	131 (67.5%)	176 (70.1%)	p = 0.098
Respiratory problems	47 (82.5%)	140 (72.2%)	187 (74.5%)	p = 0.117
Alopecia	33 (57.9%)	86 (44.3%)	119 (47.4%)	p = 0.071
Peripheral neuropathy	45 (78.9%)	135 (69.6%)	180 (71.7%)	p = 0.168
Neutropenia – minimising risk of infections i.e. protective isolation	45 (78.9%)	140 (72.2%)	185 (73.7%)	p = 0.307
Anaemia	40 (70.2%)	133 (68.6%)	173 (68.9%)	p = 0.856
Pain control	46 (80.7%)	144 (74.2%)	190 (75.7%)	p = 0.316
Nutrition/diet	44 (77.2%)	136 (70.1%)	180 (71.7%)	p = 0.296
Hygiene routines	39 (68.4%)	116 (59.8%)	155 (61.8%)	p = 0.239
Infection	44 (77.2%)	145 (74.7%)	189 (75.3%)	p = 0.706
Sleep	34 (59.6%)	115 (59.3%)	149 (59.4%)	p = 0.960
Long term effects of treatment	43 (75.4%)	153 (78.9%)	196 (78.1%)	p = 0.582
Providing psychological/emotional support	44 (77.2%)	141 (72.7%)	185 (73.7%)	p = 0.496
Sexuality and sexual problems	35 (61.4%)	130 (67.0%)	165 (65.7%)	p = 0.433
Fertility	35 (61.4%)	122 (62.9%)	157 (62.5%)	p = 0.839
Altered body image	34 (59.6%)	121 (62.4%)	155 (61.8%)	p = 0.710
Coping	39 (68.4%)	128 (66.0%)	167 (66.5%)	p = 0.731
Survivorship	36 (63.2%)	134 (69.1%)	170 (67.7%)	p = 0.401
Return to work	34 (59.6%)	118 (60.8%)	152 (60.6%)	p = 0.873
Palliative care in haematology	46 (80.7%)	140 (72.2%)	186 (74.1%)	p = 0.196
Rehabilitation in haematology	39 (68.4%)	133 (68.6%)	172 (68.5%)	p = 0.985
End of life care for haematology patients	43 (75.4%)	136 (70.1%)	179 (71.3%)	p = 0.434
<b>Identifying and managing acute medical complications</b>				
Sepsis	41 (71.9%)	149 (76.8%)	190 (75.7%)	p = 0.451
Bleeding	44 (77.2%)	145 (74.7%)	189 (75.3%)	p = 0.706
Anaphylaxis	39 (68.4%)	137 (70.6%)	176 (70.1%)	p = 0.750
Medullary compression	35 (61.4%)	106 (54.6%)	141 (56.2%)	p = 0.366
Graft-versus-host disease (GvHD)	44 (77.2%)	128 (66.0%)	172 (68.5%)	p = 0.109
VOD	40 (70.2%)	124 (63.9%)	164 (65.3%)	p = 0.383
<b>Other components of nursing care</b>				
Methods for patient information and patient education	46 (80.7%)	144 (74.2%)	190 (75.7%)	p = 0.316

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Table 6 (continued)

	Years experience in haematology nursing			p value
	Up to 5 years (n = 57)	More than 5 years (n = 194)	Total (n = 251)	
Communication skills	38 (66.7%)	141 (72.7%)	179 (71.3%)	p = 0.377
Breaking bad news	39 (68.4%)	128 (66.0%)	167 (66.5%)	p = 0.608
Motivational interviewing	39 (68.4%)	122 (62.9%)	161 (64.1%)	p = 0.444
Health promotion	39 (68.4%)	126 (64.9%)	165 (65.7%)	p = 0.627
Care of the caregiver	38 (66.7%)	136 (70.1%)	174 (69.3%)	p = 0.621
Promoting social support systems	39 (68.4%)	126 (64.9%)	165 (65.7%)	p = 0.627
<b>Nursing practice</b>				
Understanding evidence-based practice	44 (77.2%)	136 (70.1%)	180 (71.7%)	p = 0.296
Integrating research into practice	39 (68.4%)	136 (70.1%)	175 (69.7%)	p = 0.870
Training to perform nurse-led research	41 (71.9%)	126 (64.9%)	167 (66.5%)	p = 0.326
Risk assessment in nursing practice (i.e. allergy, cytotoxic risks.)	37 (64.9%)	136 (70.1%)	173 (68.9%)	p = 0.457
Presenting and public speaking	26 (45.6%)	100 (51.5%)	126 (50.2%)	p = 0.431

SCT – Stem Cell Transplantation, VOD – Veno-Occlusive Disease.

\* Significant at  $p < .05$ .

more frequently prioritised by nurses with  $\leq 5$  years' experience in haematology, with an additional interest in transfusion of blood components and management of complications and management of extravasation. Other educational priorities suggested in qualitative comments by nurses working in SCT were apheresis and its indications, and extracorporeal photopheresis.

Assessment and management of physical symptoms and conditions relating to disease and treatment were an educational priority for the majority of respondents (Table 4). Key priorities were long-term effects of treatment (74.0%;  $n = 196$ ), infection (71.3%;  $n = 189$ ), pain control (71.7%;  $n = 190$ ), respiratory problems (70.6%;  $n = 187$ ), and palliative care (70.2%;  $n = 186$ ). There was greater agreement with topics as educational priorities where nurses were educated to degree level or above, results being statistically significant ( $p < 0.05$ ) with the exception of alopecia which was regarded by all respondents as having being of a lower educational priority (44.9%;  $n = 119$ ). Higher rates of educational priority regarding physical symptom management were reported by respondents working with patients affected by malignant haematology  $\pm$  undergoing SCT, a statistically significant finding ( $p < 0.05$ ). Similarly, respondents with  $\leq 5$  years' experience in haematology reported more frequently than physical symptoms and management were an educational priority although this was not statistically significant (Table 6). In contrast, psychosocial issues (including provision of psychological/emotional support, altered body image, coping, survivorship and return to work) were seen as equally important independent of years of experience in haematology. Interestingly both coping and end of life care for haematology patients were given high rates of educational priority by respondents working with paediatric and AYA patients ( $p = 0.010$ , and  $p = 0.019$  respectively) and end of life care was also seen as an educational priority particularly for Staff Nurses and ANP's ( $p = 0.025$ ). Return to work was more important for Southern European countries ( $p = 0.021$ ). Other topics proposed in qualitative comments were care management (no further detail provided), colitis and food/nourishment, community management of haematology patients, complementary medicine strategies, and living with a chronic illness and how to help patients manage this.

Almost two thirds of respondents agreed/strongly agreed that topics provided relating to acute medical complications were an educational priority (Table 4), with medullary compression a priority for fewer respondents (53.2%;  $n = 141$ ). Topics within this section were given an overall lower educational priority by Western European countries compared to the other regions, findings that were statistically significant (sepsis;  $p = 0.005$ , bleeding;  $p = 0.006$ , anaphylaxis;  $p = 0.010$ , Graft versus Host Disease (GvHD);  $p = 0.001$ ) with the exception of Veno-Occlusive Disease (VOD). Acute complications such as sepsis, bleeding, GvHD and VOD were particularly prioritised by those

working in malignant haematology settings  $\pm$  SCT and inpatient settings, a statistically significant finding. GvHD was an educational priority for a greater number of respondents caring for paediatric and adolescent/young adult patients ( $p = 0.037$ ). Other educational priorities recommended through qualitative comments were cytokine release syndrome and endothelial diseases.

There was significant agreement with 'other components of nursing care' as educational priorities (Table 5). The most highly rated were methods for patient information and education (71.7%;  $n = 190$ ) and communication skills (67.5%;  $n = 179$ ) however all topics were of a higher educational priority for respondents educated to degree level or above – a statistically significant finding. Of interest, promoting social support systems was more frequently reported as an educational priority by those caring for paediatrics and/or adolescents and young adults ( $p = 0.046$ ).

Approximately two thirds of the respondents agreed/strongly agreed that general nursing practice issues were an educational priority (Table 5). Only 'presenting and public speaking' was less frequently prioritised (47.5%;  $n = 126$ ). The understanding of evidence based practice (EBP) and training to perform nurse led research was less frequently cited as an educational priority by respondents from Western European countries ( $p = 0.006$  and  $p = 0.016$  respectively). Findings within this category were independent of length of experience in haematology or nurses being in more advance roles (CNS/ANP), however all topics were seen as having a higher educational priority by respondents educated to degree level or above (EBP;  $p = 0.002$ , integrating research into practice;  $p = 0.004$ , training for nurse led research;  $p < 0.001$ , risk assessment;  $p = 0.001$ ).

### 3.3. Learning methods

Respondents had multiple preferences for learning methods (Table 8). The majority prioritised attending educational conferences (70.6%;  $n = 187$ ) or small group educational events (49.8%;  $n = 132$ ). Traditional methods such as having materials to read were still favoured by almost half of respondents (44.5%;  $n = 118$ ) and similarly preference for online modules (41.9%;  $n = 111$ ), whilst the use of more recent technological formats such as webcasts were less frequently preferred (17.0%,  $n = 45$ ) with one other suggestion being the use of a telephone app for education.

For the majority of respondents, formal accreditation was also an important aspect (69.8%;  $n = 185$ ). Whilst formal accreditation did not necessarily have to be via a nursing body for all respondents (28.1%;  $n = 63$ ), the majority did not know whether it was important that accreditation was from a nursing body or not (48.7%;  $n = 109$ ).

**Table 7**  
 Agree/ Strongly agree with the topic as an educational priority and academic qualification in haematology nursing.

	Academic qualification in haematology nursing			P value
	Yes (n = 66)	No (n = 199)	Total (n = 265)	
<b>Background to haematology</b>				
Hemopoiesis	37 (56.1%)	105 (57.8%)	158 (59.6%)	p = 0.760
Erythropoiesis	37 (56.1%)	107 (53.8%)	144 (54.3%)	p = 0.417
The immune system	47 (71.2%)	147 (73.9%)	194 (73.2%)	p = 0.792
Platelets and blood coagulation	39 (59.1%)	128 (64.3%)	167 (63.0%)	p = 0.578
Genetic disorders	34 (51.5%)	104 (52.3%)	138 (52.1%)	p = 0.960
<b>Disease specific information</b>				
Aplastic Anaemia	38 (57.6%)	116 (58.3%)	154 (58.1%)	p = 0.778
Haemolytic Anaemia	24 (36.4%)	106 (53.3%)	130 (49.1%)	p = 0.015*
Sickle Cell Disease	16 (24.2%)	76 (38.2%)	92 (36.1%)	p = 0.130
Thalassemia	13 (19.7%)	58 (29.1%)	71 (26.8%)	p = 0.302
Hemochromatosis	17 (25.8%)	57 (28.6%)	74 (27.9%)	p = 0.837
Polycythaemia	24 (36.4%)	70 (35.2%)	94 (35.5%)	p = 0.622
Myelodysplastic syndromes	46 (69.7%)	145 (72.9%)	191 (72.1%)	p = 0.650
Leukaemia's	47 (71.2%)	159 (79.9%)	206 (77.7%)	p = 0.328
Lymphomas	43 (65.2%)	155 (77.9%)	198 (74.7%)	p = 0.093
Myeloma	39 (59.1%)	135 (67.8%)	174 (65.7%)	p = 0.147
Coagulation disorders	20 (30.3%)	93 (46.7%)	113 (42.6%)	p = 0.040*
Bleeding disorders of vascular and platelet abnormalities	22 (33.3%)	90 (45.2%)	112 (42.3%)	p = 0.236
ITP	30 (45.5%)	96 (48.2%)	126 (47.5%)	p = 0.768
Thrombosis and antithrombotic treatment	23 (34.8%)	87 (53.7%)	110 (41.5%)	p = 0.319
<b>Tests integral to haematology patient care – meanings and reference values</b>				
Blood tests	44 (66.7%)	138 (69.3%)	182 (68.7%)	p = 0.822
Tissue biopsies	36 (54.5%)	99 (49.7%)	135 (50.9%)	p = 0.364
Bone marrow aspiration and biopsy	39 (59.1%)	135 (67.8%)	174 (65.7%)	p = 0.258
Lumbar puncture	30 (45.5%)	106 (53.3%)	136 (51.3%)	p = 0.419
<b>Safe handling and administration of treatments</b>				
Transfusion of blood components	43 (65.2%)	129 (64.8%)	172 (64.9%)	p = 0.961
Management of transfusion complications	43 (65.2%)	132 (66.3%)	175 (66.0%)	p = 0.861
Safe handling of anti-tumour agents	40 (60.6%)	139 (69.8%)	179 (67.5%)	p = 0.165
Management of extravasation	34 (51.5%)	130 (65.3%)	164 (61.9%)	p = 0.045*
Administration of haematopoietic growth factors	37 (56.1%)	112 (56.3%)	149 (56.2%)	p = 0.975
Administration of anti-infective agents	40 (60.6%)	119 (59.8%)	159 (60.0%)	p = 0.908
Knowledge of new agents	50 (75.8%)	144 (72.4%)	194 (73.2%)	p = 0.589
Central venous access devices – types and management of complications	40 (60.6%)	123 (61.8%)	163 (61.5%)	p = 0.862
Stem cell transplantation	41 (62.1%)	143 (71.9%)	184 (69.4%)	p = 0.137
<b>Symptoms/conditions resulting from haematological diseases or their treatments - measures in assessment, and prevention or management</b>				
Fatigue	41 (62.1%)	136 (68.3%)	177 (67.8%)	p = 0.352
Mucositis	40 (60.6%)	137 (68.8%)	177 (67.8%)	p = 0.218
Nausea/vomiting	42 (63.6%)	138 (69.3%)	180 (67.9%)	p = 0.389
Elimination (diarrhoea/constipation/faecal incontinence)	39 (59.1%)	137 (68.8%)	176 (66.4%)	p = 0.146
Respiratory problems	46 (69.7%)	141 (70.9%)	187 (70.6%)	p = 0.858
Alopecia	26 (43.9%)	93 (46.7%)	119 (44.9%)	p = 0.299
Peripheral neuropathy	40 (60.6%)	140 (70.4%)	180 (67.9%)	p = 0.142
Neutropenia – minimising risk of infections i.e. protective isolation	45 (68.1%)	140 (70.4%)	185 (69.8%)	p = 0.739
Anaemia	42 (63.6%)	131 (65.8%)	173 (65.3%)	p = 0.858
Pain control	42 (63.6%)	148 (74.4%)	190 (71.7%)	p = 0.093
Nutrition/diet	42 (63.6%)	138 (69.3%)	180 (67.9%)	p = 0.389
Hygiene routines	35 (53.0%)	121 (60.4%)	156 (58.9%)	p = 0.266
Infection	47 (71.2%)	142 (71.4%)	189 (71.3%)	p = 0.982
Sleep	36 (54.5%)	113 (56.8%)	149 (56.2%)	p = 0.751
Long term effects of treatment	49 (74.2%)	147 (73.9%)	196 (74.0%)	p = 0.952
Providing psychological/emotional support	47 (71.2%)	138 (69.3%)	185 (69.8%)	p = 0.775
Sexuality and sexual problems	45 (68.1%)	120 (60.3%)	165 (62.2%)	p = 0.252
Fertility	42 (63.6%)	115 (57.8%)	157 (59.2%)	p = 0.402
Altered body image	40 (60.6%)	115 (57.8%)	155 (58.5%)	p = 0.687
Coping	42 (63.6%)	125 (62.8%)	167 (63.0%)	p = 0.905
Survivorship	42 (63.6%)	128 (64.3%)	170 (64.2%)	p = 0.920
Return to work	37 (56.1%)	115 (57.8%)	152 (57.4%)	p = 0.806
Palliative care in haematology	47 (71.2%)	139 (69.8%)	186 (70.2%)	p = 0.834
Rehabilitation in haematology	39 (59.1%)	133 (66.8%)	172 (64.9%)	p = 0.253
End of life care for haematology patients	46 (69.7%)	133 (66.8%)	179 (67.5%)	p = 0.667
<b>Identifying and managing acute medical complications</b>				
Sepsis	45 (68.1%)	145 (72.9%)	190 (71.7%)	p = 0.464
Bleeding	46 (69.7%)	143 (71.9%)	189 (71.3%)	p = 0.736
Anaphylaxis	43 (65.2%)	133 (66.8%)	176 (66.4%)	p = 0.802
Medullary compression	35 (53.0%)	106 (53.2%)	141 (53.2%)	p = 0.973
Graft-versus-host disease (GvHD)	38 (57.6%)	135 (67.8%)	173 (65.3%)	p = 0.129
VOD	35 (53.0%)	129 (64.8%)	164 (61.9%)	p = 0.087
<b>Other components of nursing care</b>				
Methods for patient information and patient education	45 (68.1%)	145 (72.9%)	190 (71.7%)	p = 0.464

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Table 7 (continued)

	Academic qualification in haematology nursing			P value
	Yes (n = 66)	No (n = 199)	Total (n = 265)	
Communication skills	45 (68.1%)	134 (67.3%)	179 (67.5%)	p = 0.899
Breaking bad news	39 (59.1%)	128 (64.3%)	167 (63.0%)	p = 0.418
Motivational interviewing	33 (50.0%)	128 (64.3%)	161 (60.8%)	p = 0.039*
Health promotion	42 (63.6%)	123 (61.8%)	165 (62.3%)	p = 0.791
Care of the caregiver	42 (63.6%)	132 (66.3%)	174 (65.7%)	p = 0.689
Promoting social support systems	41 (62.1%)	124 (62.3%)	165 (62.3%)	p = 0.978
<b>Nursing practice</b>				
Understanding evidence-based practice	45 (68.1%)	135 (67.8%)	180 (67.9%)	p = 0.959
Integrating research into practice	43 (65.2%)	132 (66.3%)	175 (66.0%)	p = 0.861
Training to perform nurse-led research	40 (60.6%)	127 (63.8%)	167 (63.0%)	p = 0.639
Risk assessment in nursing practice (i.e. allergy, cytotoxic risks.)	44 (66.7%)	129 (64.8%)	173 (65.3%)	p = 0.785
Presenting and public speaking	32 (48.5%)	94 (47.2%)	126 (47.5%)	p = 0.860

SCT – Stem Cell Transplantation, VOD – Veno-Occlusive Disease.

\* Significant at  $p < .05$ .

#### 4. Discussion

This study provides insight into the self-perceived education priorities of haematology nurses, across a variety of countries. Respondent's general agreement with the educational priority of items within the questionnaire would suggest validity of its content in capturing issues of pertinence to haematology nurses.

Despite the minority of respondents in this study having an academic qualification in haematology nursing, the majority had undertaken some form of specialised in-house training, highlighting differences in specialist education received across those surveyed. The presence or absence of an academic qualification in haematology did not appear to have a significant influence on educational priorities (Table 7) which suggests continuing education is fundamental. The development of educational initiatives is one method of supporting specialist education, and through self-assessment and prioritisation, relevant content can be identified which responds to nurses' exigencies. Previous learning needs surveys involving haemato-oncology nurses have highlighted knowledge gaps but a desire to improve and learn more (Foubert et al., 2005). Similarly, in this study respondents agreed with the importance of topics provided implying a desire for further education however in both studies, nurses responding were already known to be attenders at educational events which may influence positively on responses given.

The highest rated educational priorities for nurses in this study were disease specific topics, in particular leukaemia and lymphoma. This reflects both the study sample where the majority of participants work within a malignant haematology and SCT setting, and also developments in genetic and molecular understanding of these malignancies (Pileri, 2017; Swerdlow et al., 2016) and the implications for patient care. Management of symptoms/conditions resulting from diseases or their treatments were also perceived as educational priorities, a finding echoed within biennial surveys of oncology nurses learning needs

Table 8

What are your preferred learning methods (more than one choice available).

	Agree/Strongly Agree n = 265 (%)
Attending an educational conference	187 (70.6%)
Small group educational events (< 10 people)	132 (49.8%)
Webcasts	45 (17.0%)
On line modules	111 (41.9%)
Having materials to read (es. Booklet)	118 (44.5%)
Others (2 NR, 1 telephone app)	3 (1.1%)

NR - no further response.

(Cannon et al., 2014), however this study provided greater detail of which symptoms were of greater priority. Symptoms given higher priority were correlated to the clinical field in which respondents were working. One example being GvHD - a cause of significant morbidity and mortality post allogeneic SCT in children. Identification of this topic as an educational priority for respondents working with paediatric and AYA patients may also reflect the diversity of strategies in GvHD management as optimal therapies are not yet established (Carpenter and MacMillan, 2010). Given the increasing number of survivors, it is not surprising that one of the top 5 educational priorities was that of long-term side effects. This is a finding also reported in previous surveys of haematology nurses working predominantly in SCT units (Aerts et al., 2010) where long-term effects of treatment can be protracted and debilitating. Whilst physical issues were important for those with  $\leq 5$  years' experience, psychosocial issues were equally an education priority for more experienced staff. Coping and end of life were also statistically significant areas of interest for those involved in paediatric and AYA care. These results confirm that educational initiatives must address a spectrum of educational needs, from basic to advanced practice issues, and within different haematology nursing specialities.

Knowledge of new agents was also one of the top 5 educational priorities – a finding independent of nurses' length of experience within the haematology setting. A recent survey identified 69% of nurses caring for myeloma patients reporting 'low' to 'acceptable' knowledge levels regarding mechanisms of action and side effect profiles of new therapies (Murray et al., 2018), despite the majority of nurses having 11–20 years of practice. Evidence would suggest that some nurses perceive they lack state-of-the-art knowledge and skills to care for such complex patient groups in an ever-changing clinical setting. Only in the last 2 years 28 drugs have been approved by the U.S. Food and Drug Administration within the haematology setting (CenterWatch, 2019). The Accelerated Approval Program to expedite the approval of drugs and biologics permits earlier access to treatments however safety data may be lacking at the time of approval (Beaver et al., 2018). Keeping up to date with new agents and their side effects is a challenge for all healthcare professionals and mechanisms should be in place to educate and support diffusion of experience.

Cytokine release syndrome was recommended as an additional educational priority. This is a recognised toxicity of CAR T-cell therapy (Bonifant et al., 2016), a rapidly expanding field of immunotherapy where nurse's knowledge and their role in patient education is seen as critical for patient safety and wellbeing (McConville et al., 2017). Additionally, the immune system was seen as a top 5 priority, again independent of nurses' length of experience within the haematology setting. This follows significant developments in antigen discovery and immunotherapy for the treatment of haematological cancers and the

needed to extend knowledge when dealing with unique complications related to such treatments (Im and Pavletic, 2017).

As expected respondents with < 5 years' experience in haematology more frequently agreed that a background to haematology and tests integral to patient care were a priority, being pre-requisites for the understanding and treatment of haematological conditions. Interestingly fewer Western European nurses reported that management of acute complications was an educational priority, however these were more often nurses with > 5 years' experience in haematology. Recommendations within the UK require nurses caring for patients with haematological cancers to be competent in caring for those with a severe and unpredictable clinical status (NICE, 2016) and as such educational initiatives in this country may already be in place to meet the recommendation. Greater experience and prior exposure to acute clinical situations may be another reason for the observed responses as experienced nurses are often the point of reference for ward nurses requiring support in recognition and response to patient deterioration (Massey et al., 2016), and acute clinical situations.

In order to reflect a holistic approach, this study also investigated general issues relating to patient care and nursing practice. This study highlighted respondents desire for education surrounding methods for providing information and education for patients. Although this survey did not provide further detail, Survivorship care for patients with haematological cancers has been said to be compromised where resources are lacking (Wallace et al., 2015). Further investigation is required to identify potential barriers and facilitators.

Another general nursing topic is that of communication - an essential component of quality care (Moore et al., 2013). Communication skills training was an educational priority for most respondents however more frequent agreement was observed where nurses were caring for paediatric and adolescent young adults and their families, which may reflect communication difficulties, ineffective communication and conflict with families reported by nurses within paediatric oncology care (Citak et al., 2013).

Educational priority for general nursing practice topics was not shown to be directly related to respondent's role or length of experience in haematology. Interestingly, fewer Western European nurses saw understanding of EBP as an educational priority - the majority being nurses working in senior roles and more often educated to degree level or above. Clinical Nurse Specialists and nurse educators are suggested to be those with training and expertise in EBP (Eaton et al., 2015) and higher levels of education are seen to have more facilitating factors for EBP (McCloskey, 2008), which may highlight contributing factors to explain a perceived lower educational priority if nurses have already received training or are actively involved in EBP implementation.

Attending educational conferences permits interaction and networking to share experiences, and was the preferred approach to learning for respondents. This has also been documented in a previous study where survey distribution was performed both during conferences and online (Aerts et al., 2010), potentially incurring a bias in response. Nurses identify barriers to education as being limited availability of courses and training programs dedicated to haematology nursing practice and a lack of support and time to attend such events (Aerts et al., 2010). Newer technological methods such as e-learning reduce costs, increase accessibility of materials and distribution, and permit the individual to learn at their own pace (Šumak et al., 2011), but it is unclear if e-learning improves patient outcomes or healthcare professionals knowledge in comparison to traditional education methods (Vanoa et al., 2018). It should be noted however that respondents in this survey showed less interest for such approaches, which may be influenced by factors such as computer or internet accessibility. Although preferences may be influenced by availability, results from this study would argue that multiple methods to facilitate learning are desirable and necessary.

There was a greater requirement for Continuing Medical Education (CME) accreditation within this survey, with almost twice as many

respondents recognising its importance compared with previous results from haematology nurses (Aerts et al., 2010). Initiatives with CME accreditation are more attractive, being necessary in many countries for re-registration and so where possible it should be available.

Whilst providing key information regarding educational priorities for haematology nurses, it is acknowledged however that the study has some limitations. The total sample of respondents is small when considering the numbers of nurses working with haematology patients. This and the fact that the majority of respondents were from Western European countries and working within a malignant haematology ± SCT setting caring for adult and AYA patients implies that findings cannot be generalised or representative of all countries, nursing roles or practice areas. Nurses invited to participate in the study were a convenience sample, being part of an organisations mailing list and individuals choosing to respond with their educational priorities – respondents may therefore be biased in favour of continuing professional education. The questionnaire being in English language only may have been a barrier to completion for some nurses. Further work should be undertaken to access a wider range of nurses working across countries and in different clinical settings through links with haematology associations, haematology/oncology nursing or general nursing associations. A survey approach to identify educational priorities whilst giving an important overview, does not provide an in-depth understanding of rationale for prioritisation and potential gaps in knowledge or skills. Investigation could be further enhanced with qualitative research.

## 5. Conclusions

Alongside such positive advances in the treatment and management of side effects of haematological conditions is the increasing need for competent healthcare professionals to care for patients and carers. Education is a contributing factor in competency and this study has enriched understanding of the educational priorities of nurses working with patients and carers affected by haematological conditions. Many of the topics identified relate to nurses areas of clinical care and the patient group being cared for, often reflecting the rapid changes faced in diagnostic and treatment developments that are seen in the haematology setting. Findings from this study can be used to inform educational initiatives based on topics identified within the survey which reflect self-perceived needs and similarities/differences identified between nursing groups. Further investigation should be undertaken to map availability of academic courses and accredited education for haematology nursing. Methods to deliver such educational programs should reflect learner's preferences and this study indicates the need to consider innovative and multi-modal approaches alongside traditional methods.

## Declaration of interest statement

Declarations of interest: None.

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