



**Original Article**

**The Evolving Role of Haematology Nursing Practice: A Cross-Sectional Survey**

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**Abstract. Background And Objectives:** The scope of haematology nursing practice is dynamic and must respond to advances in treatment, patients' needs and service requirements. Little is known, however, about the different roles of haematology nurses across the European setting. The purpose of this study was to identify the professional practices of haematology nurses.

**Method:** A cross-sectional online survey design was used to investigate practice elements undertaken by haematology nurses. Frequencies and descriptive statistics were calculated for demographic variables and chi-square tests to examine relationships between practice elements, nursing role and country.

**Results:** Data is reported from 233 nurses across 19 countries, working as Staff Nurses (52.4%), senior nurses (12.9%) and Advanced Practice Nurses (APNs) (34.8%). Most frequently reported activities included medication administration - oral/ intravenous (90.0%), monoclonal antibodies (83.8%), chemotherapy (80.6%), and blood components (81.4%). APNs were more commonly involved in nurse-led clinics and prescribing activities ( $p < .001$ ,  $p = .001$ , respectively); however, other nursing groups also reported performing extended practice activities. Patient and carer education was a significant part of all nurses' roles; however, senior nurses and APNs were more often involved with the multidisciplinary team ( $p < .001$ ) and managerial responsibilities ( $p < .001$ ). Nurses' involvement in research was limited (36.3%) and frequently reported as an out-of-work hours activity.

**Conclusions:** This study describes haematology nursing care activities performed in various contexts and within different nursing roles. It provides further evidence of nursing activity and may contribute to a core skills framework for haematology nurses.

**Keywords:** Hematology nursing; Role; Practice development; Advanced practice.

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**Introduction.** Across the WHO European region, there are an estimated 7.3 million nurses and midwives.<sup>1</sup> They are part of progressive healthcare systems responding to the needs of changing and ageing populations,<sup>2</sup> increasingly affected by chronic diseases.<sup>3</sup> Nurses practice within a context of finite resources, where rising healthcare costs necessitate effective and efficient service provision.<sup>4</sup> The scope of nursing practice is dynamic and "*describes the competencies (knowledge, skills and judgement), professional accountabilities and responsibilities of the nurse*";<sup>5</sup> however, 'nursing practice' is delineated by government legislation and regulatory authorities, varying between countries, state and even employing institution.<sup>6,7</sup> In the UK, nurses' activities at the point of registration have broadened, including an expected proficiency in ECG performance and interpretation and chest auscultation.<sup>8</sup> Advanced practice roles have also developed in the USA initially in response to medical staff shortages.<sup>9</sup> The need for improved access to care and enhanced nurse education has facilitated their development in different settings and countries.<sup>10</sup> Policy reforms in some countries have expanded nurses' clinical practice to incorporate specialisations and activities such as independent prescribing.<sup>11,12</sup>

While long-term survival for patients affected by haematological malignancies is increasing within the haematology setting, late morbidity and mortality persist,<sup>13</sup> so survivors' healthcare needs to be addressed. As well as improved survivorship, developments in cancer nursing have seen several factors contributing to role changes, including increasing use of immune-based therapies for haematological malignancies<sup>14</sup> requiring new skills in nursing management, a shift in care delivery from the inpatient to outpatient setting,<sup>15</sup> and increasing numbers of nurse-led clinics.<sup>16</sup>

While literature exists investigating the practice of oncology nurses<sup>17</sup> and those working within advanced practice roles,<sup>11</sup> there is a paucity when exploring haematology nursing practice.

In 2010, Aerts et al.<sup>18</sup> reported the results of a European survey of 271 nurses across 25 countries. Most common professional activities include patient education regarding treatment and side effects, monitoring, and administering supportive care treatment. Differences were also observed between roles where Clinical Nurse Specialists (CNSs) were more involved in patient and nurse education and multidisciplinary team meetings compared to unit-based clinical nurses and Nurse Managers, and where unit-based clinical nurses were more active in treatment administration and side-effect management compared to CNSs. Investigation of the specialist Haemophilia Nurse role in Europe, with 94 respondents from 14 countries, identified four main areas of practice, treatment (preparation and administration),

education and support (telephone consultation), care coordination and research.<sup>19</sup> Curriculums and competencies for specialist and advanced nursing roles in haematology nursing are available;<sup>20,21</sup> however, as highlighted earlier, practice application may differ according to country and institution. Several legislation and nurse education changes have been reported and implemented since the last investigation of haematology nurses' practice performed in 2007.<sup>18</sup> Such developments and the limited knowledge regarding the roles of nurses working with patients affected by non-malignant haematological conditions warrant further investigation to map current practice in the European setting.

The purpose of this study was to identify the professional practices of haematology nurses and examine whether differences exist according to role and country of practice.

## Methods

**Design, Sample and Setting.** We used a cross-sectional survey design. All nurses registered on the HNHCP Group (Haematology Nurses and Healthcare Professionals Group) electronic mailing list (2295 individuals) were invited to participate via email. Researchers were members of the HNHCP Board with access to the mailing list. The purpose of the survey was explained, and a link to an online survey (Survey Monkey®, San Mateo, CA, USA) was included. It was stated that participation was voluntary, and consent was assumed upon completing the questionnaire. Data collection was anonymous. Results were available to researchers via password-restricted access.

**Questionnaire.** Items for the questionnaire were based on the literature about haematology nurses' educational priorities,<sup>22</sup> practice standards and competencies for paediatric non-malignant haematology care<sup>23</sup> and texts relating to advanced nursing practice.<sup>24,25</sup> The survey questionnaire consisted of 9 subtopics investigating the demographic details of respondents and asking about the activities undertaken within their roles such as clinical activities, advanced practice, education provision (for patients, informal carers and peers/ colleagues), involvement in multidisciplinary team meetings and decision-making, management responsibilities, involvement in research and any other areas included in the nurses' role. The questionnaire also explored perceptions of areas of practice nurses felt should be included in their role and barriers (including lack of time, skills, educational opportunities, funding and support) and facilitators (including protected time, educational courses, funding, managerial support and medical staff support) to incorporating these into practice. Resources were reviewed by a research team of four experienced haematology nurses to agree with the questionnaire

content. The survey was available in the English language.

**Statistical analyses.** Descriptive statistics were calculated using the Statistical Package for Social Sciences (SPSS) version 23.0 (IBM Corp., Armonk, NY), and data were reported as numbers and percentages. The chi-square test was used for differences between activities undertaken and the nursing role. Fisher's exact test was used where frequencies were valued at less than 5. Statistical significance was set at *p*-values less than 0.05.

Furthermore, to give an overview of the results, data for each subtopic has been reduced into categories, e.g. age of respondent, geographical area of practice, highest academic qualification, patient group(s) cared for and patient age group(s). Current nursing roles were grouped according to the role that was predominantly clinically based (Staff Nurse / Research Nurse), managerial roles (Senior Nurse / Ward Manager/ Managerial role) or those working at an advanced practice level (including Clinical Nurse Specialist / Advanced Nurse Practitioner).

Variables regarding academic qualification in haematology (completion of a university-recognised course in haematology), in-house training in

haematology (training by local hospital staff/ employees) and years of experience in haematology nursing were dichotomised (Supplementary File 1). Qualitative comments collected are summarised within each subtopic.

## Results

**Sample.** Two thousand two hundred ninety-five nurses were invited to respond to the survey between January and April 2020, and 238 completed responses were received. Three respondents from non-European countries were excluded from the analysis (Turkey, Iraq, and Brazil). Two respondents described their role as nurse researchers and were excluded from the statistical analysis. **Table 1** provides a summary of the 233 respondents' characteristics. Respondents came from 19 countries, principally Western Europe and in particular Italy, Switzerland and the United Kingdom 82 (35.2%), 47 (20.2%), and 26 (11.2%), respectively. The majority of respondents were female 198 (85.0%), aged 41-50 years of age 73 (31.3%), with the majority working as Staff Nurses (SN) or Research Nurses (ResN) 122 (52.4%). Over a third of respondents worked in Advanced Nursing Practice roles, 81 (34.8%), mostly from Western European countries (*p* = .000). One-third

**Table 1.** Respondent's demographic data

	Categories	Total n=233 Number (%)
Gender	Male Female	35 (15.0%) 198 (85.0%)
Age	< 30 31-40 41-50 >50	42 (18.0%) 50 (21.5%) 73 (31.3%) 68 (29.2%)
Geographical area of respondent*	Northern Europe (Denmark, Estonia, Finland, Iceland, Norway, Sweden, Lithuania) Central + Eastern Europe (Romania, Slovenia) Southern Europe (Greece, Italy, Portugal, Spain) Western Europe (Belgium, Germany, Ireland, Netherlands, Switzerland, United Kingdom)	16 (6.9%) 3 (1.3%) 95 (40.8%) 119 (51.1%)
Current Nursing Role	Staff Nurse / Research Nurse Senior Nurse / Ward Manager/ Managerial role Advanced Practice Nurse (including Clinical Nurse Specialist / Advanced Nurse Practitioner/ Nurse Consultant)	122 (52.4%) 30 (12.9%) 81 (34.8%)
Highest Academic Qualification	Diploma Bachelors Degree Masters Degree Doctor of Philosophy	76 (32.6%) 71 (30.5%) 83 (35.6%) 3 (1.3%)
Academic qualification in haematology	Yes No	51 (21.9%) 182 (78.1%)
In house training in haematology	Yes Less than 1 week More than 1 week but less than 1 month 1-6 months 1 year or more Ongoing/ periodic No reply No	180 (77.3%) 22 (9.4%) 72 (30.9%) 61 (26.2%) 6 (2.6%) 11 (4.7%) 8 (3.4%) 53 (22.7%)
Years experience in haematology nursing	≤ 5 years 6-10 years 11-15 years >15 years	56 (24.0%) 41 (17.6%) 34 (14.6%) 102 (43.8%)

Patient group cared for (more than 1 response possible)	Coagulation disorders	96 (41.2%)
	Haemato-oncological diseases	201 (86.3%)
	Non-malignant haematological conditions	136 (58.4%)
	Haemoglobinopathies	104 (44.6%)
	Undergoing Stem Cell Transplant	213 (91.4%)
	Other (Healthy Donors)	2 (0.9%)
	<b>Top 4 categories</b>	
	Working with all haematology patient groups	66 (28.3%)
	Haemato-oncology + SCT	48 (20.6%)
	Haemato-oncology + non malignant diseases + SCT	28 (12.0%)
	SCT only	23 (9.9%)
Current area of practice (more than 1 response possible)	Malignant haematology	182 (78.1%)
	Non-malignant haematology	97 (41.6%)
	Autologous Stem Cell Transplant	175 (75.1%)
	Allogeneic Stem Cell Transplant	164 (70.4%)
	Other (apheresis)	2 (0.9%)
	<b>Top 3 categories</b>	
	Working in all areas	56 (24.0%)
	Malignant haematology and Autologous / Allogeneic SCT	50 (21.5%)
	Autologous / Allogeneic SCT setting	34 (14.6%)
Patient age group (more than 1 response possible)	Paediatrics	47 (20.2%)
	Adolescents / Young adults	101 (43.3%)
	Adults	190 (81.5%)
	<b>Top 3 categories</b>	
	Adult only	124 (53.2%)
	Adults & AYA's	57 (24.5%)
	Paediatric & AYA's	31 (13.3%)
Care setting (more than 1 response possible)	Hospital Inpatient	201 (86.3%)
	Hospital Outpatient	88 (37.8%)
	Community/ home	1 (0.4%)
	Other (telephone FUP – 2yrs post SCT)	1 (0.4%)
	<b>Top 3 categories</b>	
	Inpatient only	144 (61.8%)
	In and outpatient	56 (24.0%)
	Outpatient only	32 (13.7%)

\*respondents included only geographical area according to Eurovoc. AYA – Adolescents and Young Adults, FUP – Follow-up, SCT – Stem Cell transplant.

were in managerial roles, 30 (12.9%).

Most respondents were educated to Bachelor's degree level or above 157 (67.4%), with over half of Nurse Managers (NMs) and Advanced Practice Nurses (APNs) educated to Master's degree level ( $p < .001$ ). Less than a quarter of nurses had an academic qualification in haematology 51 (21.9%), with the majority of nurses reporting this qualification, working as APNs ( $p = .000$ ). In-house training in haematology was more common across the respondents 180 (77.3%); however, the duration of in-house training varied, frequently described as being 'more than 1 week but less than 1 month' 72 (30.9%).

Most respondents worked within haematology for more than 5 years 177 (76.0%). Almost half of the respondents had worked for more than 15 years in haematology nursing 102 (43.8%); in particular, these were NMs 18 (60.0%) and APNs 48 (59.3%) ( $p < .001$ ). The majority of respondents cared for patients affected by malignant haematological conditions 201 (86.3%) or non-malignant conditions 136 (58.4%), and nurses caring for patients with coagulation disorders and hemoglobinopathies were also well represented 96 (41.2%), and 104 (44.6%). Two respondents cared for

healthy donors and worked in apheresis. Most respondents cared for patients undergoing Stem Cell Transplant 213 (91.4%), including autologous Stem Cell Transplant 175 (75.1%) and allogeneic Stem Cell Transplant 104 (70.4%), and worked in autologous and/or allogeneic stem cell transplant settings (175, 75.1%; 164, 70.4%, respectively). No significant differences in the distribution of patients cared for were seen between nursing role categories.

The majority of nurses worked with adult patients, only 124 (53.2%), or adult and adolescent/ young adult (AYA) patients, 57 (24.5%). Nurses working with paediatric and/or AYA patients represented 13.3% (39) of the sample. A greater proportion of APNs worked with adult patients 49 (60.5%); however, the finding was not statistically significant.

Inpatient care settings were the most frequently reported place of work 201 (86.3%), in particular by SN, ResN and NMs; however, 56 respondents were working across in- and outpatient settings (24.0%), in particular, APNs 37 (45.7%) ( $p < .001$ ).

*Nursing practice and procedures.* Respondents were asked to identify which activities they performed as part

**Table 2.** Reported nursing practice and procedures performed

Which procedures do you perform?	N	Yes	Staff Nurse / Research Nurse	Senior nurse / Nurse Manager	Advanced Practice Nurse	p-value
Phlebotomy (peripheral or from a central venous access device)	223	132 (59.2%)	73 (61.3%)	15 (57.7%)	44 (56.4%)	= .778
Administration of medication oral / IV etc.	229	208 (90.0%)	117 (96.7%)	29 (100.0%)	60 (75.9%)	< .001*
Administration of monoclonal antibodies	228	191 (83.8%)	112 (92.6%)	28 (92.9%)	53 (67.1%)	< .001*
Administration of chemotherapy	227	183 (80.6%)	108 (89.3%)	25 (89.3%)	50 (64.1%)	= .000
Administration of blood components	227	191 (84.1%)	112 (92.6%)	27 (96.4%)	52 (66.7%)	< .001*
Preparation of chemotherapy for injection (Subcutaneous/ IV/ IM)	225	88 (38.2%)	45 (37.5%)	12 (42.9%)	29 (37.7%)	= .864
Re-infusion of Haematopoietic cell products e.g. stem cells, DLI	226	149 (65.9%)	82 (68.3%)	23 (82.1%)	44 (58.4%)	= .035
Haematopoietic stem cell collection e.g. stem cells apheresis, lymphocytes	219	58 (25.6%)	27 (22.7%)	12 (44.4%)	17 (23.3%)	= .056
Therapeutic apheresis e.g. plasma exchange, extracorporeal photopheresis	218	28 (12.8%)	13(10.9%)	8 (30.8%)	7 (9.6%)	= .014*
Insertion of central venous catheters	218	20 (9.2%)	7 (6.0%)	3 (12.0%)	10 (13.2%)	= .198*
Insertion of peripherally Inserted venous catheters	219	60 (27.4%)	31 (28.3%)	9 (34.6%)	20 (26.7%)	= .678
Bone Marrow Aspiration / Biopsy	218	64 (29.4%)	34 (28.8%)	4 (15.4%)	28 (35.1%)	= .139
Bone marrow harvesting (for stem cell collection)	215	28 (13.0%)	14 (12.0%)	1 (3.8%)	13 (18.1%)	= .170*
Lumbar puncture	216	60 (27.8%)	35 (29.9%)	6 (22.2%)	19 (28.4%)	= .687
Biopsies	213	40 (18.8%)	22 (18.8%)	2 (8.0%)	16 (22.5%)	= .292*
Prescribe medication	229	31 (13.5%)	9 (5.5%)	2 (7.7%)	20 (25.3%)	= .001*
Run Nurse-led clinics	219	36 (16.4%)	7 (6.1%)	3 (11.1%)	26 (33.8%)	< .001*

DLI – Donor Lymphocyte Infusion, IM – Intra-muscular, IV – intravenous. \*Fisher’s Exact test.

of their nursing practice. Findings are summarised in **Table 2**. Just over half of the sample was used to perform phlebotomy procedures peripherally or centrally 132 (59.2%). The majority of nurses were involved in medication administration, including oral and intravenous (IV) treatments, monoclonal antibodies and chemotherapy 208 (90%), 191 (83.8%), and 183 (80.6%), respectively. Over half of the nurses reported having received specialist training for drug/ treatment administration 110 (46.2%), in particular chemotherapy, monoclonal antibodies and Chimeric Antigen Receptor T-cells.

Over one-third of nurses reported they prepared chemotherapy for injection 88 (38.2%), the majority being respondents from Italy 36 (43.9% of all Italian respondents) and Switzerland 17 (36.2% of all Swiss respondents), and just six (6.8%) of those preparing chemotherapy reported having received specific training in chemotherapy handling. Administration of blood components was also common practice 227 (81.4%), with fewer being APNs ( $p < .001$ ).

Many nurses were used to performing reinfusion of haematopoietic cell products 149 (65.9%), more so the SN/ ResN group and Senior/ NMs ( $p = .035$ ). Stem cell collection and therapeutic apheresis were less common practice procedures across 58 respondents (25.6%) and 28 (12.8%), respectively, more commonly performed by Senior/ NMs.

Regarding other advanced practice procedures, a few nurses were used inserting Central Venous Catheters (CVCs), 20 (9.2%), primarily APNs. Insertion of Peripherally Inserted Central Catheters (PICCs) was more common 60 (27.4%), mostly reported by the SNs / ResN group. Performance of bone marrow aspiration/biopsy was reported by almost one-third of sample 64 (29.4%) by both APNs and SNs/ ResN. In comparison, bone marrow harvesting for stem cell collection was an uncommon procedure in this sample 28 (13.0%) performed by these same nursing groups. Some nurses also reported performing lumbar punctures 60 (27.8%) and biopsies 40 (18.8%), mainly from Italy and Switzerland. Other activities that nurses reported included assisting medical staff in performing procedures such as bone marrow aspiration/ biopsy, harvesting or lumbar puncture, clinical examination of patients, Chimeric Antigen Receptor T-cell Therapy coordination, and vaccination.

Thirty-one (13.5%) nurses reported prescribing medication for their patients, the majority being from Western European Countries 20 ( $p = .406$ ) and APNs ( $p = .001$ ). Three respondents described prescribing medication for CVCs and skin problems, while the remaining covered patients with differing haematological diagnoses, treatment and supportive care areas.

Thirty-six (16.4%) nurses reported running nurse-led

clinics, the majority being from Western European Countries 26 (p = .007) and APNs (p < .001). Types of clinics reported were transplant-related (donor care, pre-Stem Cell Transplant clinics, post allogeneic Stem Cell Transplant, myelosuppression medication, late effects), supportive care (transfusion support, medical devices), disease-specific (haemophilia, immune thrombocytopenia, myeloma, myeloproliferative

neoplasms, leukaemia, lymphoma), non-disease specific (oral therapies, long term follow up, older patients).

*Roles in education.* Independent of their role, nurses widely acknowledged their role in patient education regarding disease and symptom management 216 (95.2%), treatment and side effect management 220 (96.5%), and medication training 201 (88.9%) (**Table 3**).

**Table 3.** Reported nursing roles

	N	Yes	Staff Nurse / Research Nurse	Senior nurse/ Nurse Manager	Advanced Practice Nurse	p-value
<b>Patient education</b>						
Disease and symptom management	227	216 (95.2%)	112 (93.3%)	28 (93.3%)	76 (98.7%)	= .156*
Treatment and side effect management	228	220 (96.5%)	111 (93.3%)	30 (100.0%)	79 (100.0%)	= .030*
Medication training	226	201 (88.9%)	105 (88.2%)	29 (96.7%)	67 (87.0%)	= .365*
<b>Informal carer education</b>						
Disease and symptom management	226	188 (83.2%)	92 (78.0%)	25 (86.2%)	71 (89.9%)	= .081*
Treatment and side effect management	227	188 (82.8%)	90 (76.3%)	25 (86.2%)	73 (91.3%)	= .018*
Medication training	225	178 (79.1%)	86 (72.9%)	27 (93.1%)	65 (83.3%)	= .029
<b>Peer / colleague education</b>						
Teaching student nurses in your clinical area	229	184 (80.3%)	84 (70.0%)	27 (93.1%)	73 (91.3%)	< .001
Teaching on in-house educational courses	227	118 (52.0%)	30 (25.6%)	22 (73.3%)	66 (82.5%)	< .001
Teaching on university based courses	217	52 (24.0%)	12 (10.3%)	12 (41.4%)	28 (39.4%)	< .001
Organisation of educational events in your field	223	109 (48.9%)	29 (24.8%)	22 (73.3%)	58 (76.3%)	< .001
<b>Involvement with the multidisciplinary team</b>						
Attending multidisciplinary team meetings	229	167 (72.9%)	73 (60.8%)	26 (89.7%)	68 (85.0%)	< .001
Involvement in decision making	223	141 (63.2%)	61 (53.0%)	20 (66.7%)	60 (76.9%)	= .003
<b>Managerial responsibilities of nurses</b>						
Service planning	227	107 (47.1%)	36 (30.5%)	21 (75.0%)	50 (61.7%)	< .001
Workforce planning	227	97 (42.7%)	39 (33.1%)	24 (82.8%)	43 (42.5%)	< .001
Hiring and recruiting new nurses	225	51 (22.7%)	14 (11.9%)	17 (60.7%)	20 (25.3%)	< .001
Project management	224	95 (42.2%)	27 (23.1%)	22 (78.6%)	46 (58.2%)	< .001
Off duty completion	221	35 (15.8%)	8 (7.0%)	15 (55.6%)	12 (15.2%)	< .001*
Ordering equipment for your clinical area	226	96 (42.5%)	46 (39.3%)	25 (86.2%)	25 (31.3%)	< .001
Ordering drugs for your clinical area	226	111 (49.1)	59 (49.6%)	23 (82.1%)	29 (36.7%)	< .001
<b>Involvement in research</b>						
Involved in nurse-led research	226	82 (36.3%)	30 (25.4%)	11 (37.90%)	41 (51.9%)	= .001
Part of a local nurse-led research team	226	59 (26.1%)	25 (21.0%)	10 (34.5%)	24 (30.8%)	= .171
Principal investigator for nurse-led research studies	224	39 (17.4%)	16 (13.4%)	5 (17.9%)	18 (23.4%)	< .190*
Involved in writing research publications	226	46 (20.4%)	16 (13.4%)	7 (24.1%)	23 (29.5%)	= .021
Presenting your own research	225	51 (22.7%)	20 (16.8%)	9 (31.0%)	22 (28.6%)	= .081
Writing abstracts about research projects	225	54 (24.0%)	18 (15.3%)	13 (44.8%)	23 (29.5%)	= .001
Applying for research grants/ funding	223	39 (17.5%)	14 (11.8%)	6 (20.7%)	19 (25.3%)	= .047
Involved in clinical research	225	97 (43.1%)	41 (34.7%)	17 (58.6%)	39 (50.0%)	= .021
If you want to do nurse-led research, do you have to do this outside of your employed hours?	220	99 (45.0%)	51 (44.3%)	11 (37.9%)	37 (48.7%)	= .600

\*Fisher's Exact test.

Other educational examples were Stem Cell Transplant related (the pathway, self-care after discharge), management of CVCs, and general topics (nutrition, hygiene and infection prevention, lifestyle education, sexuality, and coping).

Education of informal carers was also seen as a regular part of the nurse's role, covering disease and symptom management 188 (83.2%), treatment and side effect management 188 (82.8%), and medication training 178 (79.1%). Other topics reflected those described above and the performance of subcutaneous injections.

Peer/colleague education with student nurses in the clinical area was prevalent 184 (80.3%), mostly reported by Senior/NMs and APNs. Nurses in these roles were also more frequently involved in teaching in-house courses, university-based courses and organising educational events. However, these were overall a less common role for nurses 118 (52.0%), 52 (24.0%), and 109 (48.9%), respectively. All findings were statistically significant ( $p < .001$ ). Other involvements in education were described, including education for high schools and patient forums. Overall, nurses described education to all three groups as a very high/ high priority within their roles 216 (93.9%), 200 (88.8%), and 200 (88.5%), respectively.

*Role in the Multidisciplinary Team.* The majority of nurses gave a high/ very high priority to involvement in the multidisciplinary team as part of their role 186 (84.6%), with many being directly involved in meetings 167 (72.9%), but somewhat fewer involved in the decision-making process 141 (63.2%) (**Table 3**). In both cases, these roles were primarily reported by Senior/NMs and APNs ( $p < .001$ ,  $p = .003$ , respectively).

*Management responsibilities.* Many nurses reported management responsibilities within their roles, not only those in posts of nursing management (**Table 3**). Service and workforce planning activities were more common for Senior / NMs, just one-third of SNs/ ResN reported this as part of their role ( $p < .001$ ). Hiring and recruitment primarily comprised Senior/ NMs 17 (60.7%), whereas project management involved APNs. Interestingly, only 35 (15.8%) respondents performed off-duty completion, mostly Senior/ NMs. Ordering drugs and equipment for the clinical area was also a role reported by this group of nurses, 25 (86.2%) and 23 (82.1%), respectively.

*Research roles.* Involvement in nurse-led research was much less frequent as a part of nurses' practice (**Table 3**). Over one-third of nurses participated in nurse-led research 82 (36.3%), the majority being APNs (51.9%) ( $p = .001$ ). Over a quarter of nurses said they were part of a local research team 59 (26.1%), but few nurses were lead investigators for studies 39 (17.4%), a finding similar across the groups of respondents. Writing and

presenting research 51 (22.7%), 54 (24.0%), respectively, and applying for grants and funding 39 (17.5%), were again less common activities more often performed by Senior/NMs and APN groups. The majority of nurse-led research activities were reported by respondents from Western and Southern European countries, although the findings were not statistically significant. Of greater prevalence was nursing involvement in clinical research 97 (43.1%).

Almost half of the nurses said that nurse-led research had to be done outside of employed hours 99 (45.0%), particularly for Southern European respondents 53 (56.4%) ( $p = 0.016$ ). Additional comments highlighted that nurse-led research must be done within and outside working hours or negotiated in some cases. The research was given a very high/ high priority by just over half of the respondents 125 (57.6%), mainly by respondents from Southern European Countries 72 (77.4%) ( $p < .001$ ).

*Other areas of practice.* Other areas of current practice reported as being undertaken by respondents included hospital-wide practice development, quality management, risk management, data management (completing Stem Cell Transplant reporting forms), membership of Ethics Committees, and University professors (**Table 4**). One-third of nurses felt that there were other areas they should be involved in but were not currently part of their practice, including undertaking advanced practice roles (clinical assessment, prescribing, nurse-led clinics, case management, virtual and telephone clinics, performing ultrasound), direct patient care (nutrition, palliative care, psychological care), nurse-led research and evidence-based practice (including Stem Cell Transplant), decision making & multidisciplinary team meeting participation (inc. advanced care planning), managerial roles (budgeting, planning of medical staff rotations), education (integrated courses, nurse education), and involvement with primary care services.

Perceived barriers to performing these additional roles included lack of time 177 (85.1%), lack of skills 88 (44.0%), lack of education opportunities 109 (54.8%), lack of funding 142 (70.6%), lack of workplace support 130 (64.4%), national professional regulations 92 (47.2%), hospital regulations 112 (56.9%). Other barriers included poor managerial support, shift allocation, and lack of administrative support and space.

Respondents felt that they would be aided in performing these additional roles if they had protected time 191 (93.2%), access to educational courses 170 (84.2%), funding to attend courses 168 (82.4%), support from nursing management 183 (89.3%), support from the medical team 162 (81.4%), and greater awareness of nurses potential 186 (91.6%). Greater collaboration across haematology departments was also suggested.

**Table 4.** Other areas of nursing practice

What other areas of practice are you involved in?	N	Yes	Staff Nurse / Research Nurse	Senior nurse/ Nurse Manager	Advanced Practice Nurse	p-value
Quality management	225	110 (48.9%)	34 (28.6%)	21 (75.0%)	55 (70.5%)	< .001
Other areas/ activities in current practice that are not included in the questionnaire**	233	45 (19.3%)	21 (17.2%)	4 (13.3%)	20 (24.7%)	= .349*
<b>Are there other areas that you think you should be involved in?***</b>	213	78 (36.6%)	40 (36.4%)	8 (29.6%)	30 (39.5%)	= .658
<b>What are the barriers stopping you doing these things?</b>						
Lack of time	208	177 (85.1%)	91 (82.0%)	19 (73.1%)	67 (94.4%)	= .013
Lack of skills	200	88 (44.0%)	55 (50.5%)	12 (54.5%)	21 (30.4%)	= .018
Lack of educational opportunities	199	109 (54.8%)	71 (65.7%)	10 (43.5%)	28 (41.2%)	= .003
Lack of funding	201	142 (70.6%)	74 (69.2%)	14 (58.3%)	54 (77.1%)	= .193
Lack of support from my workplace	202	130 (64.4%)	72 (65.5%)	16 (66.7%)	42 (61.8%)	= .855
National professional regulations	195	92 (47.2%)	54 (50.9%)	9 (40.9%)	29 (43.3%)	= .507
Hospital regulations	197	112 (56.9%)	59 (55.1%)	14 (60.9%)	39 (58.2%)	= .848
Other barriers**	233	8 (3.4%)	3 (2.5%)	2 (6.7%)	3 (3.7%)	= .163*
<b>What do you think would help you to be able to do these things?</b>						
Having protected time	205	191 (93.2%)	100 (92.6%)	22 (81.5%)	69 (98.6%)	= .011*
Having access educational courses	202	170 (84.2%)	96 (89.7%)	20 (80.0%)	54 (77.1%)	= .068
Having funding to attend courses	204	168 (82.4%)	87 (82.1%)	23 (85.2%)	58 (81.7%)	= .916
Support from management (nursing)	205	183 (89.3%)	97 (89.0%)	23 (88.5%)	63 (90.0%)	= .968
Support from medical team	199	162 (81.4%)	86 (81.1%)	17 (68.0%)	59 (86.8%)	= .119
Greater awareness of nurses potential	203	186 (91.6%)	100 (92.6%)	22 (88.0%)	64 (91.4%)	= .754
Other facilitators**	233	6 (2.6%)	2 (1.6%)	1 (3.3%)	3 (3.7%)	= .297*

\*Fisher's Exact test. \*\* further detail is provided in the text.

**Discussion.** The study provides greater comprehension of the current clinical and non-clinical roles of nurses working within the haematology setting across various countries. While most respondents worked in SN / ResN roles, extended practice activities and APNs were evident.

Results demonstrated congruence with many activities cited in haematology patient care educational programs;<sup>23</sup> however, there are changes in reported practice compared with a previous survey investigating haematology nurses' role.<sup>18</sup>

Patients with haematological conditions often undergo blood sampling to evaluate a range of values, including cell counts, renal and hepatic functioning, and disease status; however, just over half of the respondents were involved in blood sampling. This procedure is not part of the usual activities for many nurses surveyed, and in some countries, the procedure is often performed by non-nursing personnel.<sup>26</sup>

The role of nurses in medication management includes a variety of responsibilities, not only administration but managing therapeutic and adverse effects, adherence, self-management, education, safety and care transition.<sup>27</sup> There are continuously emerging therapies for malignant and non-malignant haematological conditions,<sup>28,29</sup> some requiring enhanced

knowledge regarding administration techniques, side effect monitoring and management.<sup>30</sup> Nearly half of the sample reported having specific training for traditional treatment agents such as chemotherapy and innovative monoclonal antibody treatments and Chimeric Antigen Receptor -T cell therapy where treatment side effects include cytokine release and neurological toxicity and nursing management may be novel.<sup>31</sup>

The preparation of chemotherapy in hospitals and daycare units is a nursing procedure in some centres and countries.<sup>32,33</sup> While we observed few respondents preparing chemotherapy that reported having received specific training, it should be noted that European Parliament has provided legislation regarding the protection of workers from risks related to exposure to carcinogens,<sup>34,35</sup> and guidance is available for the safe handling of hazardous drugs for nurses in oncology emphasising the importance of documented training and competency.<sup>36</sup>

Transfusion of blood and blood products is part of routine practice due to their life-saving and therapeutic effects<sup>37</sup> and is commonly performed by nurses; however, infusion of stem cells is traditionally performed by medical staff or APNs. However, the literature provides evidence of nurse administration,<sup>38</sup> as is reported in this sample. A 2007 survey of the haematology nurses' role



highlighted the administration of cytotoxic agents, supportive care treatments and managing related side effects as activities performed mostly by unit-based nurses and NMs but also Clinical Nurse Specialists,<sup>18</sup> reflecting findings in this study.

Apheresis procedures were less frequently reported aspects of nurses' roles, particularly senior nurses. This niche nursing field requires specific training in using an apheresis machine, often in designated units with Nurse Practitioners and Lead Nurses guiding the team.<sup>39</sup>

While nurses are frequently involved in the management of venous access devices, the insertion by nurses of central venous access devices, such as Peripherally Inserted Central Catheters or Central Venous Catheters, is traditionally performed by nurses within advanced practice roles;<sup>40</sup> however, in this sample we observed SNs performing this role.

Clinical procedures often performed within a haematology setting, including bone marrow aspiration and biopsy, bone marrow harvesting, lumbar puncture and skin biopsies, are suggested to be competencies within a Nurse Practitioner role;<sup>21</sup> however, we again observed reports of SNs performing these procedures which may reflect evidence of advanced practice without changes within a job title. However, as many respondents also described how they assisted medical staff with the procedures, it may be that the question was misinterpreted.

In 2019, nurse prescribing of medicines had been authorised in 13 countries across a range of nursing roles, with educational requirements varying from being part of nurse education, to those additional education courses, without necessarily having an APN title.<sup>41</sup> Results from this study reflect this finding, with just over one-third of nurse prescribers not working in APN roles.

A small proportion of nurses in this sample reported prescribing medicines in countries where this is not legal, which may reflect informal prescribing practices.<sup>12</sup>

Nurse-led clinics for patients with haematological disorders have been reported in the literature,<sup>42-44</sup> including APNs running post-disease and treatment survivorship clinics with similar findings in this sample.

Many of the clinical activities reported by nurses in this survey were not reported in a previous survey of haematology nursing activities,<sup>18</sup> which may suggest a trend towards the development of advanced clinical skills and innovative changes in practice to address service needs.

Education is described as one of the key nursing roles<sup>45</sup> and recognised activity of haematology nurses.<sup>18</sup> Unsurprisingly this was echoed throughout the respondents in this sample, providing patient care and peer education. In some countries, APNs are a standard multidisciplinary team component for patients with haematological conditions.<sup>46</sup> While involvement in multidisciplinary team meetings was evident for

respondents of all nursing roles in this study, fewer felt part of the decision-making process. What can be classed as traditionally managerial roles for nurses<sup>47</sup> were sometimes reported as being performed by those outside a managerial role. Possible reasons may include an approach to prepare future NMs or a redistribution of duties according to workload.

Nursing research activities were undertaken by just one-third of respondents, often reporting that this was 'outside working hours'. Acceptance by managers and facilitation of resources from both managers and the organisation are attributes of a nursing research culture;<sup>48</sup> however, few clinical areas can claim to have research positions held by academically trained nurses.<sup>49</sup> The importance of nursing research to inform evidence-based practice is fundamental and should be promoted at a European level.

Respondents in this study highlighted various other areas of practice where they worked and also areas where they felt they should have a role, particularly in advanced nursing practice roles, research and evidence-based practice (EBP), management and education. Many of these roles require specific competencies and skills, and a lack of skills and educational opportunities were often cited as barriers to role development. Attendance at educational conferences is a preferred method for learning expressed by haematology nurses, allowing interaction and networking.<sup>22</sup> Of concern is that these issues impacting role development are more frequently reported than similar research reported 10 years ago.<sup>18</sup> Strategies are necessary to ensure that nurses are facilitated in practice development to meet the complex needs of haematology patients.

The study has identified various clinical and non-clinical professional practices performed by haematology nurses, with some differences observed between nursing roles. Evident across all roles was medication management, ranging from administration to symptom management, and nurses' key role in patient and caregiver education. Technical and advanced practice activities, as well as nurse-led research, were more frequently performed by nurses in APN roles, whereas both APNs and Senior / NMs had a greater managerial activity. Although a minority of nurses responded that there were other areas of practice they felt they should be involved in, no differences were seen in perceived barriers or facilitators according to the role.

This survey has provided an important overview of the professional practices of haematology nurses; however, the study has limitations. The total number of respondents is small in light of the overall number of nurses working with haematology patients. As such, these findings cannot be said to be representative of all nurses or countries. While the study also aimed to investigate differences according to country of practice, as two-thirds of the responses were from 3 countries, it

was impossible to make inferences regarding the country. The majority of respondents worked with patients affected by both malignant and non-malignant haematological disorders. Therefore, it was impossible to describe the role of nurses working only with patients affected by non-malignant haematological conditions. The survey was only available in the English language, which may have limited completion by some nurses. A convenience sample was used for the survey, accessed through a haematology nursing organisation mailing list, aiming to capture responses from nurses with experience in the speciality. However, it is recognised that this may bias results towards more experienced nurses and the tasks and roles reported. Nurses choosing to respond may be interested in sharing details of their role and activities.

**Conclusion.** Differences in haematology nursing practice are observed according to the nursing roles and

some countries' behaviours. The nursing care activities reported in this article reflect the performance of traditional roles such as drug administration and education, with developments in the care of patients affected by haematological conditions, improved survivorship and ever-evolving therapeutic strategies, requiring adaptation of nursing care activities to support patients. New activities reported in nursing practice may reflect new treatment regimens, task shifting, and regulatory developments. Policy reforms in some countries now permit expanded nursing roles supported by supplementary education. All this was evident within the extended practice roles in the haematology setting, often highlighting discrepancies between the use of APN titles and activities reported. These findings can be used to map trends in nursing activity and contribute to the discussion of a core skills framework for nurses working within different roles within the haematology setting.

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