Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Evaluation of standardized, multi-disciplinary, acute oncology competence assessment frameworks in the UK: Phase 3

Verna Lavender
verna.Lavender@nhs.net

Guy's and St Thomas' NHS Foundation Trust
Gina Madera
The Christie NHS Foundation Trust
Michael Flynn
Guy's and St Thomas' NHS Foundation Trust
Elizabeth Perry
The Christie NHS Foundation Trust
Lisa McCauley
Northern Health and Social Care Trust
Ceri Stubbs
Velindre Cancer Centre NHS Foundation Trust
Ali Wilson
Beatson Cancer Centre NHS Foundation Trust
Lara Roskelly
Frimley Health NHS Foundation Trust
Naomi Clatworthy
Royal Devon University Healthcare NHS Foundation Trust
Philippa Jones
Clatterbridge Cancer Centre NHS Foundation Trust
Ernie Marshall
Clatterbridge Cancer Centre NHS Foundation Trust

Research Article

Keywords: Acute oncology, clinical competence, multidisciplinary, quality improvement

Posted Date: October 24th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11295819/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License. Read Full License

Additional Declarations: No competing interests reported.

Abstract

Background

The Society for Acute Medicine Benchmarking Audit (2022) highlighted that despite robust historical reporting to improve suspected oncological emergency outcomes, significant variability in provision of acute oncology (AO) services exists UK-wide. This emphasised the need for standardised AO education, training and competence assessment. This study codesigned and evaluated nationally AO competence assessment 'Passports' for quality, acceptability, perceived staff confidence, AO knowledge and skills, and AO patient outcomes.

Methods

Data were collected from learners and assessors at four levels of practice in 27 NHS trusts, 3 universities and community settings across the UK. AO patient outcome data were collected from four cancer centres across the UK, and data analysed using descriptive, inferential statistics and content analysis.

Results

Responses from 718 pre- and 306 post-pilot participants showed differences between pre- and post-Passport confidence (t-test=-11.843, 1014df, p = < 0.01), but significance varied by practice level. Statistically significant differences were also found for perceived AO knowledge pre- and post-Passport completion at level 2 and level 3, but not level 4 (level 1 previously reported). The Passports were pitched at the correct level (Chi-square = 61.67, 8df, p = < 0.01). There was no significant difference in AO patient data between timepoints. Free-text responses indicated the Passports were informative and relevant, but practice-based learning and study time was needed.

Conclusions

The AO Passports were well-evaluated by learners. There was a high-level of stakeholder engagement, but limited timeframes presented challenges for learners and may account for no statistical difference in patient outcomes. The AO Passports are now used across the UK.

KEY MESSAGE

What is already known on this topic

INTRODUCTION

Annual cancer incidence in the UK is anticipated to rise from approximately 420,000 cases to around 506,000 cases in 2038–2040 [1]. Almost 3.5 million people are currently living with cancer in the UK [2], many of whom are older people with comorbidities; thus, there is increased pressure on acute healthcare services from oncological emergencies [3]. Cancer-related acute hospital occupancy is approximately 15% in England [4] and 20% in Wales [5], furthermore most people with cancer have a higher-risk of an emergency admission in the last year of their life [6]. There is also increased 14-day mortality and length of stay for patients admitted with cancer-related conditions [3]. Increased pressures on acute hospital services also arise from the increased use, novelty and complexity of Systemic Anti-Cancer Treatment (SACT) and their toxicities [7–9]. In addition, people with cancer who are acutely unwell have greater clinical acuity in comparison with non-cancer medical admissions, [3, 10]. These patients may present with oncology-specific emergency presentations, such as neutropenic sepsis, spinal cord compression and immunotherapy toxicities [11].

The emergence of AO as a new specialty in UK and Ireland cancer care aims to provide specialist advice and support, streamline acute cancer care and decrease duration of admissions [4, 12]. AO encompasses three broad categories of oncological emergencies (Types I – III; note Type III has two sub-categories) shown in Table 1.

Table 1
Descriptors of the three categories of oncological emergency that patients with cancer may have when presenting to emergency or urgent unplanned care settings.

Type I	**Patients presenting to emergency care settings and receiving a new diagnosis of cancer. AOS support may include initial clinical investigations, expediting access to disease site specific oncology teams and specialist palliative and supportive care access. AO teams also co-ordinate the management of the patients on Malignancy of Undefined Origin and Carcinoma of Unknown Primary pathways.**
Type II	Patients presenting acutely unwell with toxicity related to treatment of their cancer. For example, SACT or radiotherapy. In the UK, surgical complications are not usually managed within AOS.
Type IIIa	Patients with a known diagnosis of cancer who become unwell because of the disease itself. AOS can support with complex issues around progressive disease and palliative care needs.
Type IIIb	Patients with a known diagnosis of cancer who become unwell because of co-morbid conditions. These patients will be managed by acute care teams, but the AOS can provide support where an existing cancer diagnosis may impact their overall care and management plans.

Heterogeneity in urgent and emergency cancer (acute oncology) services (AOS) [3], and the variety of patient admissions pathways and routes of referral into specialist AOS (which may sit within ED, acute medicine or a dedicated AOS unit within secondary and tertiary care) mean that a wide range of workforce groups will interact with patients with an AO indication. Educational standards for all staff involved in the care and management of acutely unwell patients with cancer is, therefore, essential and attaining AO knowledge and skills is “everyone’s business”. In specific reference to medics, there is a requirement for trainee clinical oncologists to diagnose and manage AO conditions and manage AO services [13].

Following recommendations from the National Confidential Enquiry into Patient Outcomes and Death and National Chemotherapy Advisory Group reports [14, 15], national, multidisciplinary AO learning outcomes were defined at four levels of practice within the UK Oncology Nursing Society (UKONS) Acute Oncology Knowledge and Skills Framework [16]. There were existing educational resources mapped to the UKONS Framework and clinical guidelines to support AO care in practice [4, 17], but no standardised method of competence assessment; therefore, assessment of knowledge and skills varied between organisation and across professional disciplines.

The Co-design of Acute Oncology Standardised Competence Assessment Documents and their Evaluation (CASCADE) project codesigned and evaluated four levels of practice (Core, Intermediate, Advanced, Expert) competence assessment Passports (Madera & Lavender, 2024), of which level 2 and level 3 adopted the style and format of the UKONS Systemic Anti-cancer Therapies (SACT) Competence Assessment Passport (UKONS, 2018). Here we report results from a UK-wide quality improvement study, with a nested research study, to evaluate the effectiveness of the novel AO Passports.

MATERIALS AND METHODS

Study Design

The Checklist for Reporting Results of Internet E-Surveys (CHERRIES) was followed to report this study [18]. A mixed-methods study, structured into three evaluation workstreams, was conducted. Workstream 1 was a cross-sectional pre- and post-online survey of learner and competence assessors. Workstream 2 collected pre- and post-retrospective deidentified AO patient outcome data. Workstream 3 collected stakeholder feedback about Workstream 1 and 2 findings and develop recommendations for national implementation (Fig. 1).

Study Participants

Workstream 1

Healthcare staff working at NHS organisations were invited to complete an online expression of interest (EoI) to participate in this study. The EoI invitation was shared through UKONS, the UK Acute Oncology Society (UKAOS), the National AO Education Group, Cancer Alliances and Health Boards, and Macmillan Cancer Support.

The delivery of the intervention at each site was managed by nominated Passport assessors. Training for assessors was delivered to senior AO and/or clinical educator staff at all recruited study sites via online workshops on Microsoft Teams. Assessor training consisted of a 2-hour interactive workshop facilitated by the study team.

Workstream 2

We purposefully invited study site leads from Workstream 1 to participate in Workstream 2. Four major cancer provider organisations that had been recruited to Workstream 1, agreed to also be recruited to collect retrospective acute oncology key performance indicator (patient data) within Workstream 2.

Workstream 3

Stakeholders from Workstream 1, patient and public involvement groups, NHS commissioners, relevant personnel from NHS England Workforce, Training and Education Directorate, clinical AO practitioners and leads (AO clinical nurse specialists, AO advanced clinical practitioners, AO lead nurses, nurse consultants, medical oncology consultants), clinical educators, higher education institutions and charity sectors across the UK, were invited to attend one face-to-face and/or three online workshops via email.

Ethical considerations

Workstream 1

Participant information sheets were shared with study sites. Those who expressed interest in participating sought local quality improvement approvals. Once approval was gained, learners and assessors were invited to complete the online survey, which contained participant information at the start of the survey. Completion and submission of survey responses was regarded as consent to participate. Anonymous responses were collated and data stored in compliance with Data Protection law [19]. Participation was voluntary with no financial incentives.

Workstream 2

A favourable ethical opinion was granted by the NHS Health Research Authority (IRAS ID: 326060) to analyse routinely collected, deidentified, retrospective acute oncology key performance indicator data about patient outcomes for the purpose of the study.

Workstream 3

Potential participants were sent information about the purpose of the workshops and how findings would be collected, analysed and reported, and an invitation to either face-to-face or online workshops via their organisation email address. Verbal informed consent was obtained from participants at the start of each workshop.

Data collection

Workstream 1

The online surveys were co-designed[20] with, and tested by, Patient and Public Involvement (PPI) representatives and the project steering group. The surveys were built in MS Forms using a ‘parent-child’ hierarchy and had adaptive questioning dependent on Level of Practice and roles (as defined in Table 2). The surveys contained Likert scale questions on knowledge constructs, continuous rating scales on learner confidence in their knowledge and skills, and Likert scale and multiple-choice questions on the usability, accessibility, acceptability, appropriateness and educational quality of the Passport. Aside from the initial question about Level of Practice, no question response fields were mandatory. A minimum overall post-Passport response rate of 30% of the pre-Passport responses was sought (Hendra & Hill, 2019).

Table 2
Excerpts from UKONS Acute Oncology Knowledge and Skills Framework (Version 2) Different levels of practice are reflect the area of an individual's practice, rather than the NHS staff group.

Level of Practice	Competence	Requisite knowledge and skills
Level 1 – Core Knowledge and Skills E.g. primary care, paramedics, ED, non-cancer acute services	Demonstrate an awareness of acute oncology indications and the ability to identify common patient presentations of symptoms with acute cancer or cancer treatment complications	Awareness of the different categories of acute oncology presentations Ability to take appropriate action within scope of practice after recognition of potential emergency symptoms Awareness of signs and symptoms of novel SACT toxicities, and the importance of early recognition and referral, e.g. immunotherapy side effects
Level 2 – Intermediate Knowledge and Skills E.g. acute cancer services outside of specialist AO services	Demonstrate knowledge of treatment pathways for patients presenting with acute complications of non-surgical cancer treatment or from the disease itself	Demonstrate an understanding of other acute oncology indications and the ability to identify common patient presentations of symptoms with acute cancer or cancer treatment complications Ability to take appropriate action within scope of practice after recognition of potential emergency symptoms e.g. initial care and management of the patient, referral to AOS and awareness of other specialties involved in the management of complex issues Demonstrate an understanding of the importance of early recognition of symptoms and appropriate referral e.g. understanding that some initial signs and symptoms of immunotherapy toxicities may be subtle and an awareness of the impact of delayed treatment
Level 3 – Advanced Knowledge and Skills E.g. specialist acute oncology services	Demonstrate knowledge of the care and management of patients experiencing acute complications of non-surgical cancer treatment or from the disease itself	Demonstrate a detailed understanding of a range of AO indications, including recognition of less common presentations e.g. complex immune-mediated toxicities Referral to appropriate specialties following initial patient management Demonstrate the principles of safe ambulatory management of appropriate conditions
Level 4 – Expert Knowledge and Skills E.g. organisational AO service lead	Demonstrate involvement in the development, review and implementation of key operational pathways, policies, guidelines and protocols	Evidence of involvement in the review / development and implementation of the following: • Acute Oncology Operational Policy • Acute Oncology Initial Management Guidelines, including care of suspected neutropenic sepsis Admission and Assessment Pathway, and protocols / policies for management of immune-mediated toxicities • Suspected spinal metastases and MSCC referral and review pathways • Implementation of an MUO/CUP protocol / pathway

Data were collected between June 2023 and January 2024. Study site contacts (organisation project leads) shared the pre-Passport online survey together with the appropriate level competence assessment Passport with colleagues at their organisation. Post-Passport surveys were shared with learners by Passport assessors at the end of the data collection period.

Please insert Table 2 **here.**

Workstream 2

Deidentified, retrospective, patient data about AO Key Performance Indicators (KPIs) (Fig. 1) were collected from one study site in each of the four nations of the UK. Data were collected for the periods between 01 April 2023–30 June 2023 and 01 October 2023 and 31 December 2023. Password-protected Microsoft Excel© templates were sent via secure NHS email to study site principal investigators for data collection. Data were returned by the same means to the study team.

Workstream 3

One face-to-face and three online workshops were conducted between January 2024 – April 2024. A nominal group technique was used in the face-to-face workshop, following presentation of initial data analysis of Workstream 1 findings to generate ideas, iteratively discuss and agree a list of recommendations [21]. These recommendations, along with findings from Workstreams 1 and 2, were presented in subsequent online workshops to ensure all relevant questions had been asked of the data sets and agree final recommendations.

Data analysis

Workstream 1

Data were cleaned (to remove duplicate or null responses) and numerically coded in Microsoft Excel®. IBM SPSSv31 was used for statistical analysis. The mean imputation method was used to replace Missing data [22]. Nominal data was calculated as percentages for comparison, as there were different numbers of respondents in each dataset. To compare learner demographics between pre- and post-passport datasets, Pearson Chi-squared Goodness-of-Fit was used (Table 3). Median and range were used for ranked, ordinal data, mean and standard deviation (SD) were used to describe continuous data, and pre and post continuous data were compared using the Students' t-test.

Table 3
Learner characteristics and goodness of fit data

Variables		Pre	%	Post	%	X^2	df	p Value
Highest level of qualification	Bachelors degree	289	41	123	40.7	14.082	14	0.444
	MSc	95	13.5	49	16.2			
	HE Diploma	81	11.5	31	10.3			
	NVQ level 1–3	41	5.8	11	3.6			
	PG Diploma	33	4.7	12	4			
	Foundation degree	28	4	17	5.6			
	PG Certificate	20	2.8	10	3.3			
	MBBS	15	2.1	2	0.7			
	MA	9	1.3	2	0.7			
	BTEC	8	1.1	4	1.3			
	NVQ level 4–5	7	1	2	0.7			
	Professional doctorate	4	0.6	4	1.3			
	PhD	3	0.4	0	0			
	MRes	1	0.1	0	0			
	I prefer not to say	71	10.1	35	11.6			
Experience in healthcare (years)	More than 10	451	63.0	180	58.8	1.685	4	0.793
	5 to 10	119	16.6	56	18.3			
	3 to 5	66	9.2	33	10.8			
	1 to 3	51	7.1	23	7.5			
	0 to 1	29	4.1	14	4.6			
Experience in cancer care (years)	More than 10	131	18.3	71	23.3	9.385	5	0.095
	5 to 10	84	11.7	20	6.6			
	3 to 5	99	13.8	46	15.1			
	1 to 3	116	16.2	51	16.7			
	0 to 1	62	8.6	22	7.2			
	I do not work in cancer care	225	31.4	95	31.1			
Region of UK	North of England	223	31.2	90	29.5	3.274	6	0.774
	Southeast	217	30.3	85	27.9			
	Midlands	94	13.1	40	13.1			
	Southwest	88	12.3	38	12.5			
	Scotland	40	5.6	24	7.9			
	Wales	37	5.2	20	6.6			
	Northern Ireland	16	2.2	8	2.6			
Role	Nurse	483	67.4	213	69.6	11.885	14	0.616
	Support worker	129	18.0	50	16.3			
	Doctor	31	4.3	10	3.3			
	Pre-registration students	19	2.6	11	3.6			
	Paramedic	13	1.8	1	0.3			
	Occupational Therapist	8	1.1	4	1.3			
	Other AHP	7	1.0	7	2.3			

Variables		Pre	%	Post	%	χ^2	df	p Value
	Physiotherapist	6	0.8	4	1.3			
	Therapeutic Radiographer	6	0.8	1	0.3			
	Dietician	5	0.7	1	0.3			
	Nurse Associate	4	0.6	3	1.0			
	Physician Associate	3	0.4	1	0.3			
	Pharmacist	2	0.3	0	0.0			
	Diagnostic Radiographer	1	0.1	0	0.0			
	Speech and Language Therapist	0	0.0	0	0.0			
Place of work	Acute Hospital	617	86.1	253	82.7	0.285	2	0.867
	Community	79	11.0	42	13.7			
	Higher Education Institution	21	2.9	11	3.6			

Responses to 5-point Likert scale questions were assigned ratings from 1–5 e.g. 5 = Strongly agree and 1 = Strongly disagree. Reliability of internal consistency of four 'knowledge constructs' (Knowledge of AO, Assessment and Referral, Communication and Reporting, Senior Leadership and Management) was measured using Cronbach's **α** (p = 0.05), which ranged from 0.742 to 0.979. Ordinal pre and post data were compared using Mann Whitney U-test, for non-parametric data skewed to the left due to the upper limit of 5. For all statistical analyses, the p value = 0.05. Free-text responses were inductively coded using content analysis [23] to identify the frequency of responses, which were tabulated in descending order (Table 4).

Table 4
Ranked difference between knowledge constructs pre and post passport completion, Levels 2–4

Question (variable)	Pre-Passport			Post-Passport			U value	R (effect size)	p value	Significant?
	n	Median	SD	n	Median	SD				
Level 2										
1. I understand the Role and Provision of the Local Acute Oncology Service	180	4	1.07	53	5	0.99	3948.5	-0.14	0.039	*
2. I understand the 24/7 Oncology Advice service	180	4	1.17	53	5	0.99	3579	-0.19	0.003	*
3. I understand the AO guidelines, pathways and referral processes for patients presenting with oncological emergencies where I work	180	4	1.12	53	5	1.00	3175.5	-0.26	< .001	*
4. I understand the MSCC pathway for my locality, including recognition of red flag symptoms, initial care and management and how to contact the MSCC service	180	4	1.16	53	5	1.02	3079.5	-0.27	< .001	*
5. I understand the local neutropenic sepsis pathway, including recognition of red flag symptoms, using the UKONS risk assessment tool, initiation of urgent treatment and emergency admission processes	180	4	1.07	53	5	1.02	3750	-0.17	0.011	*
6. I understand the principles of appropriate care and management of CVADs, including awareness of potential complications and their management	180	4	1.19	53	5	0.97	3535	-0.20	0.003	*
7. I am aware of local and national audit requirements for acute oncology indications	180	3	1.18	53	4	1.05	2659	-0.33	< .001	*
8. I can demonstrate the importance of communication of a patient's presentation and/or admission, and comprehensive documentation of this episode of care	180	4	1.02	53	5	1.01	4138	-0.10	0.111	
9. I am aware of the UKONS triage tool and understand how to use the version relevant to my area of practice	180	4	1.30	53	5	0.98	3298.5	-0.23	< .001	*
Level 3										
1. I understand the Role and Provision of the Local and Regional Acute Oncology Service and its role in the acute care pathway	125	4	0.78	52	5	0.73	2619.5	-0.17	0.023	*
2. I understand the 24/7 Oncology Advice/ telephone triage service, including associated protocols, pathways and assessment processes and how to access the consultant on-call service	125	5	0.83	52	5	0.71	2851.5	-0.10	0.183	
3. I have excellent knowledge of the systematic assessment and management of oncological emergencies, including the application of clinical assessment skills, exploring differential diagnoses decision making, and initiation of urgent interventions	125	4	0.79	52	5	0.76	2559	-0.17	0.023	*
4. I understand the AO guidelines, pathways and referral, review, and discharge processes for patients presenting with oncological emergencies where I work, including referral to specialist teams	125	4	0.79	52	5	0.76	2401	-0.20	0.009	*
5. I understand the MSCC pathway and policies for my locality, including the care and management of suspected MSCC and knowledge of the specialist clinical referral pathway	125	5	0.84	52	5	0.83	2484.5	-0.17	0.025	*
6. I understand the local neutropenic sepsis pathway, including recognition of red flag symptoms, using the risk assessment tools,	125	5	0.74	52	5	0.42	2612	-0.16	0.032	*

Data shown: n = number of respondents; statistical mean and median on 1–5 scale, where 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree; SD standard deviation; U = is the Mann Whitney U value for the difference between the pre and post ranking; an effect size (r) of 0.24–0.29 is small, and of 0.32–0.47 is medium; p value significance = 0.05.

Question (variable)	Pre-Passport			Post-Passport			U value	R (effect size)	p value	Significant?
	n	Median	SD	n	Median	SD				
Level 2										
initiation of urgent treatment and emergency admission processes										
7. I understand the MUO & CUP referral pathways within my organisation, including fast-track and MDT referrals and undertaking keyworker role if applicable	125	4	1.07	52	5	1.03	2699	-0.12	0.104	
8. I understand the principles of appropriate care and management of CVADs, including awareness of potential complications and their management and education around this to patients and staff if applicable to role	125	5	0.89	52	4	0.83	3013	-0.05	0.527	
9. I can demonstrate the importance of communication of a patient's presentation and/or admission, and comprehensive documentation of this episode of care, including clinical findings and actions taken and the critique and review clinical notes	125	5	0.74	52	5	0.70	2534.5	-0.19	0.012	*
10 I am aware of and participate in service development initiatives, including review of protocols/ pathways, clinical audit, education and training	125	4	0.87	52	5	0.95	2655	-0.14	0.072	
Level 4										
1. I can evidence detailed understanding of and/or involvement in the AO referral guidelines and the principles of the AO service	53	5	1.315	19	5	0.831	284	-0.11	0.361	
2. I can demonstrate detailed knowledge of the assessment, investigation and management of oncological emergencies, including for MUO and CUP pathways and leading advanced decision-making discussions	53	5	1.206	19	5	0.562	289.5	-0.09	0.422	
3. I can demonstrate detailed knowledge of the local and regional AOS and participate in the development and review/audit of network and operational guidelines and policies and advocacy for the AOS as a clinical leader	53	5	1.321	19	5	0.697	306.5	-0.04	0.723	
4. I can demonstrate participation in staff development and appraisal activity and clinical support/ mentorship, including identification of training needs and delivery of AO educational activities	53	5	1.297	19	5	0.769	301	-0.05	0.651	
5. I can demonstrate knowledge of and involvement/ leadership in local and network wide audits to benchmark the AOS against compliance with nationally agreed quality indicators and apply these findings to promote evidence-based practice	53	5	1.225	19	5	0.761	307.5	-0.04	0.752	

Data shown: n = number of respondents; statistical mean and median on 1–5 scale, where 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree; SD standard deviation; U = is the Mann Whitney U value for the difference between the pre and post ranking; an effect size (r) of 0.24–0.29 is small, and of 0.32–0.47 is medium; p value significance = 0.05.

Workstream 2

The data were summarised using descriptive statistics (mean, Standard Deviation and Confidence Interval). Percentages were calculated to identify the proportion of patients presenting with suspected neutropenic sepsis (NS) or metastatic spinal cord compression (MSCC) who converted to treatment and diagnosis. Inferential statistics were conducted using the pairwise t-test at time points 0 months and 6 months to compare KPI outcomes (Table 6), p value ≤ 0.05.

Workstream 3

Independent content analysis of workshop transcripts by VL and GM were compared, and key recommendations identified.

Patient and Public Involvement statement

PPI and Steering Group members were sought from a cancer alliance patient voices group and academic health sciences network consumer research panel. PPI representatives were reimbursed for their time as per NIHR guidance and local organisation policy[24]. PPI contributions were amendments to Steering Group Terms of Reference to meet 6-weekly to reduce PPI burden; study co-design and development of patient information posters; feedback on data collection questionnaire; Workstream 3 content development; and proposing agreed study recommendations and dissemination plans e.g. suggesting Workshop participants. PPI experiences led to amendments to the ethics application and the data analysis plan. A lay summary of project findings was produced in accessible language and presented to the cancer patient voices and consumer research panel groups.

RESULTS

Data Quality

There were 718 pre-Passport responses and 306-post Passport responses. The number of pre-Passport were n = 376 level 1, n = 182 level 2, n = 126 level 3, n = 34 level 4. The number of post-Passport respondents were n = 176 (46.8% response rate) level 1, n = 53 (29.1%) level 2, n = 58 (46.0%) level 3, n = 19 (55.8%) level 4. There was a high level of questionnaire data completeness (pre 99.52%, n = 5031 items and post 99.72%, n = 2145 items). A Chi-square Goodness of Fit analysis (Table 3) of learner characteristics ($p < 0.05$) showed no significant difference between the pre- and post-Passport data sets.

The highest level of qualification for most learners (34.4% pre and 35.1% post) was a Bachelors' degree. Most respondents (69% pre and post) had some experience working in cancer care. The majority of respondents were from the North (31.2% pre and 29.5% post) and Southeast (30.3% pre and 27.9% post) regions of England, and most respondents were nurses (67.4% pre and 69.6% post), reflecting the AO workforce across the UK. Other staff groups were, however, also represented (Table 3). Missing data was minimal at < 1%.

There were 76 trained assessors, who were AO clinicians with prior assessment or supervision experience from medical, nursing and Allied Health Professional (AHP) staff groups. Of those 76, n = 31 were survey respondents and composed of: AO CNSs (n = 10, 32%), AO service leads (n = 10, 32%), AO ACPs (n = 8, 26%) and clinical practice educators (n = 3, 10%), 15 (48%) of these individuals were the study site contact.

Please insert Table 3 **here.**

Levels of knowledge and understanding

Learners were asked to report their level of confidence in their knowledge and skills about AO before and after the completion of Passports. There was a statistically significant difference (t-value = -11.843, degrees of freedom [df] 1014, p = < .001) for all responses analysed as a single dataset; however, the level of confidence varied between levels of practice, with statistically significant differences for Level 1 (-13.206, df 549, p = < .001) and Level 2 (-4.505, df 230, p = < .001), but not for Level 3 (0.483, df 178, p = .315) and Level 4 (1.107, df 51, p = .137).

Learners were also asked how much they agreed or disagreed with Likert scale statements about their perceived level of knowledge, within the three knowledge constructs. Findings for levels of practice 2–4 are shown in (Table 4). Level 1 findings have been previously reported (Madera et al., 2026). For Passport Level 2 learners, there was a statistically significant increase in perceived levels of AO knowledge between pre and post responses to all statements, except Statement 8 about communication with patients and documenting care, using the Mann-Whitney U test with a small to medium effect size (Table 4). There were statistically significant differences for responses from level 3 learners for six of the ten statements that asked about knowledge of systematic assessment and specific acute oncology pathways, but with only small effect sizes (Table 4). There were no statistically significance differences in perceived knowledge pre and post Passport completion for level 4 learners (Table 4).

Please insert Table 4 **here.**

Learner perceptions and experiences

The majority of learners agreed the Passport was pitched at the correct level (Chi-square = 61.67, 8 df, p = < 0.01). Content analysis of free-text comments showed that there were perceived benefits for learners and assessors. It also identified challenges, additional training needs and recommended revisions to the Passport documents. Training needs were identified about SACT toxicities and immune-related adverse events (IRAEs), also the need for protected time and AO Continuing Professional Development (CPD) opportunities were reported.

Positive experiences were that the Passports were informative, relevant, engaging, easy to use and were well-designed, high-quality resources. Facilitating factors for Level 2 and 3 learners were signposted to online learning resources and references within the Passports. For Level 4 the main facilitating factor was the presence of peer support for AO leads. Challenges common to all learner groups were a lack of study time and need for additional in-practice learning support. Education and training on additional topics related to AO were also identified. Recommended revisions to the Passports were to reduce the volume of content and rationalise some questions at Levels 2 and 3 (Table 5).

Table 5

Frequency of Free-text responses in descending order following inductive coding using content analysis. *IRAE- Immune-related adverse events.

Code\Frequency	Level 1	Level 2	Level 3	Level 4	Assessors	Total
Desired study outcomes						
Informative	45	25	29	2	16	117
Relevant	35	17	26	13	16	107
Engaging	26	3	6	7	7	49
Correct Level of Practice	29	5	7	5		46
Helpful and comprehensive assessor information, resources & pilot support					27	27
Well-structured/designed	11	3	5	3		22
Easy to use	14	4	1	3		22
Overall Quality	7	2	9	1		19
Passports support learning for new staff					14	14
Participating in the pilot provided a learning or developmental opportunity					7	7
Other					6	6
Additional training needs						
Practice based learning	22	6	8	5		41
Protected study/CPD* time	0	1	3	1	22	27
Postgraduate clinical CPD courses		2	15	2	0	19
Update and Reaccreditation	2	5	7	4		18
Level 2 Education and Training	16					16
SACT (including IRAE* specific topics)	4	2	1	1	0	8
AO services, policies & guidelines	5	2	1	0		8
Other	9	3	5	0		17
Challenges						
Lack of study time	3	16	44	14	22	99
Additional support required	9	5	4	5	2	25
Volume of content	0	5	12	1	4	22
Accessibility (inc. linked resources)	4	5	8	1		18
Relevance to job role	0	3	5	1		9
Question clarity	0	3	1	1		5
Need for increased number of assessors					5	5
Lack of suitable learning environment	3	0	1	0		4
Other					5	5
Facilitating factors						
Resources/referenced materials		9	9	0		18
Protected study/CPD time		4	8	2		14
Peer support		4	3	6		13
Prior clinical experience		3	4	1		8
Manager/Assessor support		3	2	2		7
AOS support		2	1	0		3

Please insert Table 5 **here.**

Learners were also asked how long it took them to complete the Passport and over what period this was undertaken (Table 6).

Table 6
Median completion times and duration of study period for Passports at each level of practice

Level of Practice		Level 1	Level 2	Level 3	Level 4
Time period completed over	Median	2 days	2 months	3 months	3 months
	Range	1 day- 10 days	1 day- 4 months	2 days- 6 months	2 days- 4 months
	Responses	125	23	21	10
Time taken to complete	Median	3 hours – 5 hours	6 hours – 10 hours	16 hours – 20 hours	6 hours – 10 hours
	Range	1 hours – 10 hours	4 hours – 48 hours	5 hours – 32 hours	4 hours – 50 hours
	Responses	133	27	15	10

Assessor perceptions and experiences

Content analysis of free-text comments from assessors identified that in addition to the Passport content being informative, relevant and engaging for learners, the assessor information, train-the-trainer resources, and support from the study team, were helpful and comprehensive. The Passports also provided a mechanism to structure learning and support new staff and were a developmental opportunity for assessors. Assessors reported the need for protected time for both Passport completion and assessment. The need for more assessors was also highlighted.

Assessors spent a median time of 4–6 hours for Level 2 (n = 18 respondents) and 2 days for Level 3 (n = 10 respondents) to assess the Passports. Time taken to assess the Level 4 Passport was dependent on learner's choice between portfolio assessment or viva-style discussion with a peer assessor, ranging from 1 to 4 hours.

Patient outcome data

We identified that of n = 387 t0 and n = 382 t6 suspected of NS, n = 61 t0 (15.8%) and n = 52 t6 (13.6%) had a confirmed diagnosis of NS. Of those suspected with MSCC n = 367 t0 and n = 51 t6, n = 44 t0 (5.7% and n = 38 t6 (74.5%) had a confirmed diagnosis. Using the pairwise t-test, there was no significant difference between baseline and 6-month timepoint for NS or MSCC KPIs ($p \leq 0.05$) (Table 7).

Table 7
KPIs relating to NS and MSCC clinical targets taken at baseline and 6-month timepoints. *Note: data for KPI 6 was missing from one of the 4 study sites.

KPI	Timepoint (month)	Mean (cases)	SD	CI	SEM (Paired difference)	t value	DF	Two-sided significance
1 - Number of patients assessed for suspected neutropenic sepsis	0	96.75	132.099	-8.591 to 11.091	3.092	.404	3	.713
	6	95.50	135.079					
2 - Number of patients assessed with confirmed neutropenic sepsis	0	15.25	15.543	-3.319 to 7.819	1.750	1.286	3	.289
	6	13.00	13.491					
3 - Number of patients where compliance was achieved for 1 hour door to needle time for IV antibiotic administration in suspected neutropenic sepsis	0	80.25	136.314	-4.637 to .137	.750	-3.000	3	.058
	6	82.50	135.584					
4 - Number of patients where compliance was achieved for completion of sepsis six tasks	0	73.25	140.545	-3.252 to .752	.629	-1.987	3	.141
	6	74.50	140.415					
5 - Number of sepsis breaches linked to lack of timely recognition of sepsis	0	2.50	3.786	-3.530 to 3.030	1.031	− .243	3	.824
	6	2.75	5.500					
6 - Number of patients assessed with suspected MSCC	0	18.67	7.506	-30.747 to 35.414	7.688	.303	2*	.790
	6	16.33	15.044					
7 - Number of patients assessed with confirmed MSCC	0	11.00	6.583	-8.606 to 11.606	3.175	.472	3	.669
	6	9.50	9.292					
8 - Number of patient where compliance was achieved for MRI scan completion within 24 hours	0	16.75	6.185	-11.965 to 219.965	5.017	.797	3	.484
	6	12.75	10.905					
9 - Number of patients prescribed radiotherapy (opposed to surgery or best supportive care)	0	7.00	6.218	-13.996 to 10.996	3.926	− .382	3	.728
	6	8.50	12.767					
10 - Number of patients where compliance was achieved for time to radiotherapy treatment within 24 hours	0	6.75	6.076	-5.896 to 6.396	1.931	.129	3	.905
	6	6.50	8.963					

Please insert Table 7 **here.**

Consensus about key recommendations

17 (of 27 invited) AO clinicians and educators attended an initial face-to-face workshop. This included representation from all UK nations, varied professional groups, and a range of organisations including charities, private and NHS cancer centres, and NHS acute hospitals. 400 stakeholders were invited to online workshops of which 40–44 attended per workshop. This included AO clinicians, educators and PPI, NHS England, charitable organisation and professional society representation. Workshops identified that the Passports were highly commended and regarded as an essential requirement for improving AO patient outcomes via upskilling and standardising workforce knowledge and skills. Recommendations were made to create an online assessor training course, confirm governance structures and create an implementation plan to ensure sustainability. A CPD accredited online assessor e-learning course was, therefore, developed to ensure sustainability and the UKONS Acute Oncology Knowledge and Skills Framework was revised.

DISCUSSION

This study co-designed and evaluated multidisciplinary AO Competence Assessment Passports, which were reported to be acceptable, relevant and pitched at the correct level. The Passports provide a standardised national framework to benchmark knowledge and skills at each of the four levels of practice. Having a standardised framework for competence assessment facilitates transferability of assessment documentation between organisations. This may increase the mobility of the workforce by reducing repeated competence assessment, for example when staff move between organisations. The multidisciplinary function of the Passports also reflects the nature of the diverse settings where people with AO indications may present with symptoms, be assessed, treated and cared for, particularly for life-threatening conditions. It also provides accessible learning and development resources for non-specialist settings, which will help address the need for community-based staff to have the AO knowledge and skills needed to accomplish aims of NHS England's National Cancer Plan [25].

The AO Passports have been aligned to levels of nursing and allied health professional practice within the NHS England Aspirant Cancer Career and Education Development programme (ACCEND) capability framework [26], which provides an overarching and standardised, multidisciplinary framework

for staff working in cancer care in the UK. The UK Acute Oncology Society have proposed using the Level 3 and Level 4 Passports as benchmarking tools aligned to the Oncology Curriculum for trainee oncologists, to ensure standardisation for, and a common language among, AO educators, trainers and assessors. Additionally, integration of the Passport as an assessment strategy within UK Higher Education Institution AO modules is recommended. Together with the UK Acute Oncology Society and Macmillan Cancer Support, the UK Oncology Nursing Society will provide ongoing governance and review of the Passport resources to ensure currency.

Content analysis findings from surveys and workshops helped to inform the subsequent development of a freely available online assessor course. Group learning and peer support among practice mentors/supervisors, was recommended as this was found to be highly beneficial for reducing assessor workload burden. Facilitator-led group learning can be rewarding for both learners and assessors if active participation is encouraged and purposeful activities employed. Feedback and use of directed reflective practice within e-learning can also support assessor delivery [27].

Manager support for time to undertake learning and assessment is essential to facilitate Passport completion. Allocation of dedicated time for learning and competence assessment does, however, compete with challenging clinical pressures [28]. Nevertheless, safe services that recognise and appropriately manage patients presenting with oncological emergencies are a priority and cannot be provided without a knowledgeable and skilled workforce.

Strengths and limitations

We collected data from multiple NHS organisations from across the four nations of the UK, where the provision of AO services varies and included broad stakeholder representation. This resulted in high-level engagement for the implementation of the AO Passports and their evaluation and optimised the transferability of the findings within the UK.

Sufficient responses from learner questionnaires were received for statistical analyses with limited response bias [29]. For assessor surveys, insufficient responses were received to complete inferential statistical analysis, so data analysis was limited to descriptive statistics and content analysis. Within the constraints of the study, a matched-pairs survey approach was not possible, but Chi-square Goodness of Fit analysis allowed the pre and post data to be treated as matched datasets.

The primary limitation of this study was that not all learners at practice Levels 2–4 were able to complete the AO Passport in the time frame (data not shown), although the data collected in this study can be used as a baseline for future evaluation. The study was limited to a six-month evaluation period due to project funding, within this period there were significant external factors leading to increased clinical pressure on study sites, e.g. migration to new electronic patient record systems in several NHS organisations, nationwide industrial action and winter bed pressures. There was one site where patient data was missing for KPI 6, so this could not be analysed. Missing data highlights the difficulty of analysing routinely collected, retrospective data. Survey design where numerous respondents selected ‘Prefer not to say’ for level of qualification was likely due to a lack of an ‘other’ response option to this question.

CONCLUSION

Given the variation of AO provision across the UK, this study addressed the need to standardise AO competence assessment for all staff caring for people with cancer. The AO Passports are relevant, acceptable and pitched appropriately for each level of practice. The AO Passports have been widely adopted in NHS organisations across the UK, but ongoing evaluation will be needed to assess their effectiveness and successful implementation. The co-designed approach may provide a model that can be adopted in other areas of specialist practice, and the AO Passports may be adopted for use outside of the NHS.

Declarations

Ethics approval and consent to participate

A favourable ethical opinion was granted by the NHS Health Research Authority (IRAS ID: 326060) to analyse routinely collected, deidentified, retrospective acute oncology key performance indicator data about patient outcomes for the purpose of the study. We worked closely with the NHS Health Research Authority and the sponsors to confirm that additional data collected for this study did not require approval from a Research Ethics Committee. Nonetheless, participation of learners, assessors and workshop attendees was managed in accordance with national Data Protection Law and the Declaration of Helsinki. Local quality improvement project approvals were gained at each study site. Informed consent was gained from all participants. Survey respondents were provided with information at the start of the survey that their anonymous responses would be analysed and used for reporting the project outcomes in peer-reviewed journals. Survey respondents were informed that submission of their responses would be regarded as informed consent. Fully informed consent was obtained from all workshop participants, which was confirmed by verbally at the start of the workshops.

Consent for publication

Response from The Christie R&D as sponsors

Competing interests

The authors declare that they have no competing interests.

Funding

This project was funded by NHS England Workforce Training and Education Directorate, formerly Health Education England. Financial support was also provided by the UK Oncology Nursing Society to conduct workshops in Workstream 3.

Author Contribution

V.L. and P.J. conceptualised the project, applied for funding and co-designed the study with key stakeholders.V.L. and G.M. conducted codesign workshops, developed the AO Passports, co-designed data collection tools with key stakeholders, collected and analysed data, prepared, reviewed and approved the final manuscript. M.F., E.P., L.Mc., C.A. and A.W. were involved in the investigation and data collection processes as Principal Investigators at each of the 5 study sites within workstream 2. M.F. contributed resources and provision of study materials to support development of the Passport documents. L.R. and N.C. contributed to Passport development and recommendations for use of the Passports in clinical practice and review on behalf of UKONS. E.M. contributed to project conceptualisation and recommendations for use of the Passports in clinical practice and review on behalf of UKAOS.All co-authors were involved in reading and reviewing manuscript prior to submission

Acknowledgement

The study team would like to thank NHS England for funding this project, the UK Oncology Nursing Society for funding workshops, and particularly members of the UKONS Acute Oncology Members' Interest Group for supporting the project codesign, providing oversight of governance, and hosting electronic resources on their website. We also thank Macmillan Cancer Support for their collaboration in creating the level 1 AO Passport, and the UK Acute Oncology Society for their contribution and support. Thank you to Greater Manchester Cancer Alliance for supporting the funding application, project manager line management and honorary contract processes. We sincerely thank patients whose data was analysed as part of this study, members of the CASCADE Advisory Group, all study sites, points of contacts, study respondents and workshop participants for so generously giving their time for this project. We would also like to thank WELLKNOWN for creating the assessor online learning course with the study team and the Greater Manchester Cancer Academy for hosting the AO assessor online learning course. Thanks to Dr Catherine Oakley for creating the UKONS SACT Competence Assessment Passport, which informed the structure for the level 2 and level 3 AO Competence Assessment Passports.

Data Availability

Data supporting the conclusions of this article are available from the corresponding author on reasonable request.

References

1. Cancer Research UK. (2023) Cancer incidence statistics. In: https://www.cancerresearchuk.org/health-professional/cancer-statistics/incidence#heading-Zero
2. Macmillan Cancer Support. (2025) Statistics fact sheet. https://www.macmillan.org.uk/dfsmedia/1a6f23537f7f4519bb0cf14c45b2a629/19886-10061/Macmillan-cancer-statistics-fact-sheet-January-2025. Accessed 6 Mar 2025.
3. Kulkarni S, Knight T, Cooksley T, et al. Provision of acute oncology services in the UK: data from the Society for Acute Medicine Benchmarking Audit 2022 (SAMBA22). Clin Med. 2023;23:571–81. https://doi.org/10.7861/clinmed.2023-0251.
4. Royal College of Physicians, Society of Acute Medicine. (2023) Acute care toolkit 7 Acute oncology on the acute medical unit. https://www.rcp.ac.uk/media/lbylqdni/acute-care-toolkit-7-oncology.pdf
5. Royal College of Physicians. (2023) Cancer care at the front door: The future of acute oncology in Wales. https://www.rcp.ac.uk/resources/cancer-care-at-the-front-door-the-future-of-acute-oncology-in-wales/
6. Macmillan Cancer Support. (2023) See it, say it, share it: Recognising acute hospital admission as a key milestone in the treatment journey of a person living with cancer. https://www.macmillan.org.uk/dfsmedia/1a6f23537f7f4519bb0cf14c45b2a629/12097-10061/Acute%20Admissions%20Statement%20English%20April%202023. Accessed 6 Mar 2025.
7. Rapoport BL, Cooksley T, Johnson DB, Anderson R. Supportive care for new cancer therapies. Curr Opin Oncol. 2021;33:287–94. https://doi.org/10.1097/CCO.0000000000000736.
8. Lavender V, Tanay M, Gomm L. (2025) The Transformation of Cancer Nursing Propelled by Novel SACT. Semin Oncol Nurs 151843. https://doi.org/10.1016/j.soncn.2025.151843
9. Madera G, Hodge A, Roskelly L, Greenbaum C. (2025) What Is the Impact of Novel Systemic Anticancer Therapy on Acute Oncology Education and Service Delivery? Semin Oncol Nurs 151842. https://doi.org/10.1016/j.soncn.2025.151842

10. Rico JF, Caterino JM, Stephens JA, et al. Variables associated with admission rates among cancer patients presenting to emergency departments: a CONCERN group study. Emerg Cancer Care. 2023;2:7. https://doi.org/10.1186/s44201-023-00022-z.
11. Martos-Benítez FD, Soler-Morejón C, de D, Lara-Ponce KX, et al. Critically ill patients with cancer: A clinical perspective. World J Clin Oncol. 2020;11:809–35. https://doi.org/10.5306/wjco.v11.i10.809.
12. Mansour D, Simcock R, Gilbert DC. Acute Oncology Service: Assessing the Need and its Implications. Clin Oncol. 2011;23:168–73. https://doi.org/10.1016/J.CLON.2010.12.005.
13. The Royal College of Radiologists. (2023) Clinical Oncology Specialty Training Curriculum. https://www.rcr.ac.uk/exams-training/specialty-training/clinical-oncology-curriculum/
14. National Chemotherapy Advisory Group (NCAG), Whittome J, St Thomas' Hospital. (2009) Chemotherapy Services in England: Ensuring quality and safety Contents. https://webarchive.nationalarchives.gov.uk/ukgwa/20130104173757/http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/DH_104500
15. NCEPOD: National Confidential Enquiry into Patient Outcome and Death. (2008) Systemic Anti-Cancer Therapy: For better, for worse? https://www.ncepod.org.uk/2008sact.html
16. UK Oncology Nursing Society, Macmillan Cancer Support. (2024) UKONS Acute Oncology Knowledge and Skills Framework with Competence Passport User Guide. https://ukons.org/site/assets/files/17953/acute_oncology_knowledge_and_skills_framework_with_competence_passport_user_guide_2024.pdf
17. UK Oncology Nursing Society. (2025) UKONS Acute Oncology Initial Management Guidelines, Version 4. https://ukons.hosting.sundownsolutions.co.uk/
18. Eysenbach G. Improving the quality of Web surveys: the Checklist for Reporting Results of Internet E-Surveys (CHERRIES). J Med Internet Res. 2004;6:e34. https://doi.org/10.2196/jmir.6.3.e34.
19. Data Protection Act. 2018. https://www.legislation.gov.uk/ukpga/2018/12/contents/enacted, United Kingdom.
20. Tsang S, Royse CF, Terkawi AS. Guidelines for developing, translating, and validating a questionnaire in perioperative and pain medicine. Saudi J Anaesth. 2017;11:S80–9. https://doi.org/10.4103/sja.SJA_203_17.
21. McMillan SS, Kelly F, Sav A, et al. Using the Nominal Group Technique: how to analyse across multiple groups. Health Serv Outcomes Res Methodol. 2014;14:92–108. https://doi.org/10.1007/s10742-014-0121-1.
22. Allison PD. Missing Data. London: SAGE; 2001.
23. Dixon-Woods M, Agarwal S, Jones D, et al. Synthesising qualitative and quantitative evidence: A review of possible methods. J Health Serv Res Policy. 2005;10:45–53. https://doi.org/10.1177/135581960501000110.
24. National Institute for Health and Care Research. (2024) Payment guidance for researchers and professionals. https://www.nihr.ac.uk/payment-guidance-researchers-and-professionals
25. Department of Health and Social Care. (2026) National Cancer Plan for England. London https://www.gov.uk/government/publications/national-cancer-plan-for-england
26. NHS England. (2023) ACCEND Framework. In: Aspirant Cancer Career and Education Development programme. https://www.hee.nhs.uk/our-work/cancer-diagnostics/aspirant-cancer-career-education-development-programme/accend-framework. Accessed 1 Feb 2023.
27. Burgess A, van Diggele C, Roberts C, Mellis C. Facilitating small group learning in the health professions. BMC Med Educ. 2020;20:457. https://doi.org/10.1186/s12909-020-02282-3.
28. Hulf S, Duarte J, Llahana S, et al. Characterising the cancer healthcare professional workforce in the UK. Br J Nurs. 2026;35. https://doi.org/10.12968/bjon.2025.0180.
29. Hendra R, Hill A. Rethinking Response Rates: New Evidence of Little Relationship Between Survey Response Rates and Nonresponse Bias. Eval Rev. 2019;43:307–30. https://doi.org/10.1177/0193841X18807719.

Figures

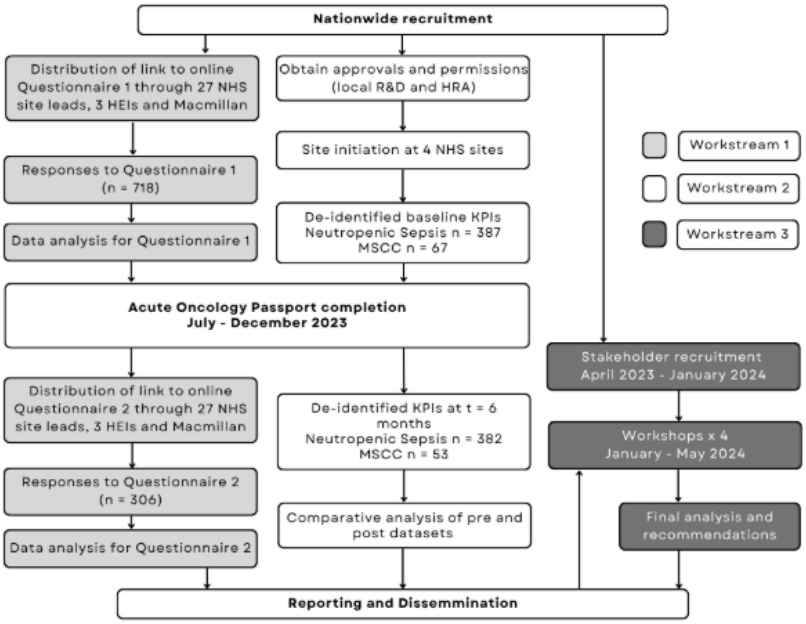

Figure 1

Study schema with details of key stages and data processing within each workstream.