


BMJ Open Research engagement by British early-career practitioners in nephrology: a multidisciplinary survey

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ABSTRACT

Objectives To establish barriers and motivators underlying research engagement among early-career practitioners in nephrology across the UK, in order to guide potential interventions to enhance research involvement in renal units.

Design Cross-sectional online survey employing a range of free-text, Likert scale and binomial/multiple-choice responses, distributed via mailing lists and social media. Topics covered research experience, research involvement and barriers, impact of COVID-19 and strategies to improve research engagement. Thematic analysis was used to assess free-text responses.

Setting Renal units throughout the UK.

Participants Non-consultant healthcare staff self-identifying as working in nephrology were included (n=211), with responses from non-UK respondents or consultant nephrologists excluded (n=12).

Results Responses were received from across the multidisciplinary team (physicians (n=83) and nurses (n=83)) and other allied health professionals (n=45). Most were aware of ongoing local research, but under half of them were actively involved. Multivariate analysis indicated employment as a physician, protected time for research activity and provision of appropriate training were associated with greater research experience and output. There was general enthusiasm to undertake research, but perceived barriers included insufficient staffing, lack of time, funding and encouragement. COVID-19 was felt to have further impacted negatively upon opportunities. Among the suggested strategies to promote engagement, mentorship and an online research resource were felt to be of most interest.

Conclusions In the first survey of this type in nephrology, we demonstrate differences across the multidisciplinary spectrum in perceived research experience and accessibility, which have been worsened by COVID-19. Our findings will guide strategies to broaden engagement in early-career practitioners and serve as a baseline to assess the impact of these interventions.

BACKGROUND

Research engagement by clinicians is associated with increased patient satisfaction, superior care and reduced mortality.^{1 2} Research involvement is therefore expected

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ Contribution from throughout the UK and across the multidisciplinary spectrum, ensuring responses likely to be representative.
- ⇒ Consistent survey questioning across the multidisciplinary spectrum allowing direct comparison between healthcare groups.
- ⇒ Survey limited to British respondents, meaning international generalisability of findings is uncertain.
- ⇒ Responder bias and subjective self-reporting of research experience may lead to under-reporting or over-reporting of research knowledge and skills.

of physicians by the General Medical Council and Joint Royal College of Physicians Training Board,^{3 4} and of advanced nurse practitioners by the Royal College of Nursing.⁵ British government policy now promotes routine embedding of clinical research into patient care,^{6 7} and specifically in nephrology the 2016 ‘UK Renal Research Strategy’ called for increased efforts ‘to develop and maintain research skills amongst [clinicians and nursing, midwife and allied health professionals (NMAHP)] to ensure high quality multidisciplinary renal research’.⁸

Implementation of schemes to foster clinical research, such as integrated clinical-academic pathways, which facilitate protected research time alongside clinical practice, have been implemented for physicians and NMAHP.⁹ However, these schemes offer only a relatively small number of places. Other opportunities to develop research skills and broaden research access among clinical staff have been developed, including the National Institute for Health Research (NIHR) ‘Associate Principal Investigator (PI)’ scheme and ‘Good Clinical Practice’ training.^{10 11}

There is no contemporary data on the motivators to undertake clinical research in nephrology by early-career clinicians (by which we refer to all members of the



multidisciplinary team (MDT)). There is a similar dearth of data on challenges to research engagement. The complexity of funding and ethical approval for applications may deter potential researchers,^{12–15} while others suggest funding scarcity and workforce shortages are eroding opportunities to undertake research training and activity.^{16 17} The impact of the COVID-19 pandemic on clinical practice may have further reduced educational and research opportunities; previous studies have focused on the clinical effect on clinicians and the impact on research opportunities have not been specifically explored.^{18–21}

A cross-sectional survey of early-career clinicians working in nephrology from across the multidisciplinary spectrum in the UK was undertaken, as part of an evaluation of progress by the UK Kidney Research Consortium towards the 2016 paper's recommendations,⁸ aiming to identify barriers and motivators to research involvement in the early-career British nephrology workforce. We report here the findings of this survey.

METHODS

This report was written according to the recently published Consensus-Based Checklist for Reporting of Survey Studies guidelines²² (see online supplemental information for checklist).

Survey development and format

The survey was drafted by nephrology specialty trainees (MJB/HB), consultant nephrologists with academic roles (DCW/JH/NSS), allied health professionals with academic interests (SG) and representatives from a charitable funding body (Kidney Research UK (KRUK), AM/MN). The survey was divided into 'background and research experience', 'day-to-day opportunities for research', 'impact of COVID-19 upon research' and 'improving access to research'. There were 38 items with a range of free-text, Likert scale and binomial/multiple-choice responses (see online supplemental data Supplemental Data for survey).

Respondents were briefed on the definition of research at the beginning of the survey (see survey in online supplemental information).

Distribution and survey window

The survey was hosted on a commercial site (SurveyMonkey, San Mateo, California, USA; www.surveymonkey.com) for a 3-week period in May 2021 and was targeted to non-consultant members of the MDT who self-identified as working in nephrology in the UK. IP addresses of responses were recorded in order to identify potential 'multiple participation'; however as computers are often shared in the National Health Service potential duplicates were then manually screened, using answers to job role, qualifications and banding/seniority to identify replicate entries. No responses were excluded on this basis.

The survey was distributed through dedicated mailings and newsletters distributed through the mailing lists of the UK Renal Association (RA, the main professional body for physicians working in nephrology) and British Renal Society (BRS, the main professional body for nurses and allied health professionals), since merged into the UK Kidney Association (UKKA). Details of the survey were locally disseminated via the UKKA trainee regional representatives and to early-career researchers on KRUK mailing lists. The survey was also advertised through social media postings.

Thematic analysis

Analysis was conducted using an inductive approach to thematic analysis.^{23 24} Free-text comments were coded and an initial table of themes identified. Themes were then grouped into higher-level master themes and subthemes following repeat review of the text. Quotes have been pseudo-anonymised to retain occupation.

Statistics

Categorical data is reported as percentage of respondents in that role who responded to the question. Continuous data is reported as mean (SD). Comparisons between groups was performed using χ^2 testing (categorical) or Kruskal-Wallis testing with post hoc comparisons by Dunn's test, with adjusted p values reported. Continuous data was assumed to be non-parametric.

Multivariable linear modelling was performed using Poisson regression. Variables included in models were first assessed in isolation (univariable) then models were constructed including all terms. Variables included in regression models were prespecified. Statistical analyses were performed on IBM SPSS V.27 and graphs generated using GraphPad Prism V.9.

Ethical approval

This study involved anonymised data collected voluntarily from healthcare staff by virtue of their professional role, and as such ethical review is waived under the UK Health Research Authority's 'Governance Arrangements for Research Ethics Committees'.²⁵ Informed consent was inferred by completion of the survey, with respondents informed prior to commencing the survey that results would be used to generate and disseminate anonymised data regarding engagement with research during clinical practice. All methods were carried out in accordance with the Declaration of Helsinki.

Patient and public involvement

No patients were involved in the design or conduct of this study.

RESULTS

Respondent demographics

A total of 223 responses were received; 12 were excluded prior to analysis (8 specified consultant job role, 4 did not specify job role or location or were a non-UK

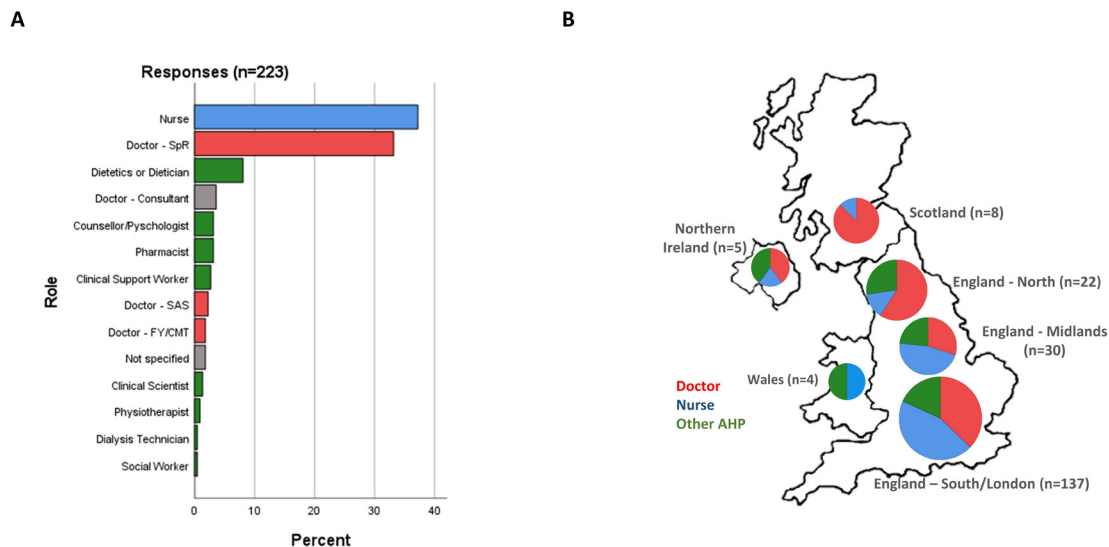


Figure 1 Self-reported job role (A) and location within UK (B) of respondents by grouped job role. Roles specified in 'A' were grouped for further analysis (indicated by colour coding). The location of respondents is indicated in 'B', with pie chart size representing the proportion of respondents from each job role within that region. AHP, allied health professionals; 'SpR', specialist registrar (training role); 'FY/CMT', Foundation Year/Core Medical Training Physician; 'SAS', Specialty and specialist physician (a non-training role).

respondent). Responses were received from around the UK and across the multidisciplinary spectrum (figure 1), though there was a bias toward the south of England. Among 83 eligible physician respondents 74 (89%) self-identified as specialty trainees (who are a minimum of 4 years postgraduation from medical school), while 35 (42%) reported they were currently employed in an integrated academic role (a post where there is protected time for academic activity alongside clinical practice in a trainee's job plan). Based on an estimate of 297 trainee nephrologists in the UK on the RA mailing list, the survey response rate by trainee nephrologists was approximately 28%. There are 906 contacts on the BRS mailing list, representing a crude response rate of nurses and allied health professionals of 14%.

Respondents were grouped into 'physicians', 'nurses' and 'other allied health professionals (AHP)' for downstream analysis (figure 1A). Non-physician respondents reported their Agenda for Change banding as a proxy measure of seniority and experience—over 80% of nurses were Band 5–7, while other AHP demonstrated a much larger spread, ranging from Band 2 to Band 9 (online supplemental table S1).

Respondent postgraduate qualifications

Overall, 35% of the physicians reported having completed, or currently undertaking, a postgraduate doctorate, compared with 5% and 9% of the nurses and other AHP, respectively. Around one-third of the nurses and other AHP reported completing or currently undertaking a postgraduate masters, compared with one-fifth of the physicians.

Involvement in research activity

Current research activity in their renal unit was confirmed by 72% of the respondents, though there was some

discrepancy among job roles with a non-significant trend towards a greater proportion of physicians being aware of ongoing research (figure 2). Physicians were significantly more likely to report current involvement in research activity and protected time for research compared with nurses and other AHP, respectively; the discrepancy in protected research time was driven by physicians in integrated academic training (IAT) roles, where 84% reported dedicated research time, versus 16% among those in non-IAT roles.

There was a trend towards a greater proportion of physicians reporting training on research skills in their current role, compared with other disciplines (figure 2). The difference among physicians was again driven by those in an IAT role, with 81% reporting research training, compared with 42% of those not on an IAT pathway ($p < 0.001$).

Research experience

The extent and breadth of research experience by respondents was assessed in three ways. First, respondents were asked to choose previously undertaken research activities, research types and research outputs from a list (figures 3A,4A,5A). Most physicians self-reported experience in at least one skill, while around half of the nurses and other AHP reported no research activity. Breadth of activity was assessed by the number of activities, types and outputs chosen (figures 3B,4B,5B). Physicians reported a significantly greater breadth of research activity compared with nurses and other AHPs ($p < 0.001$ and 0.004, respectively).

As with research activities, physicians reported involvement in a greater breadth of research types, whereas both nurses and other AHP tended to report involvement in only qualitative research or none of the research types

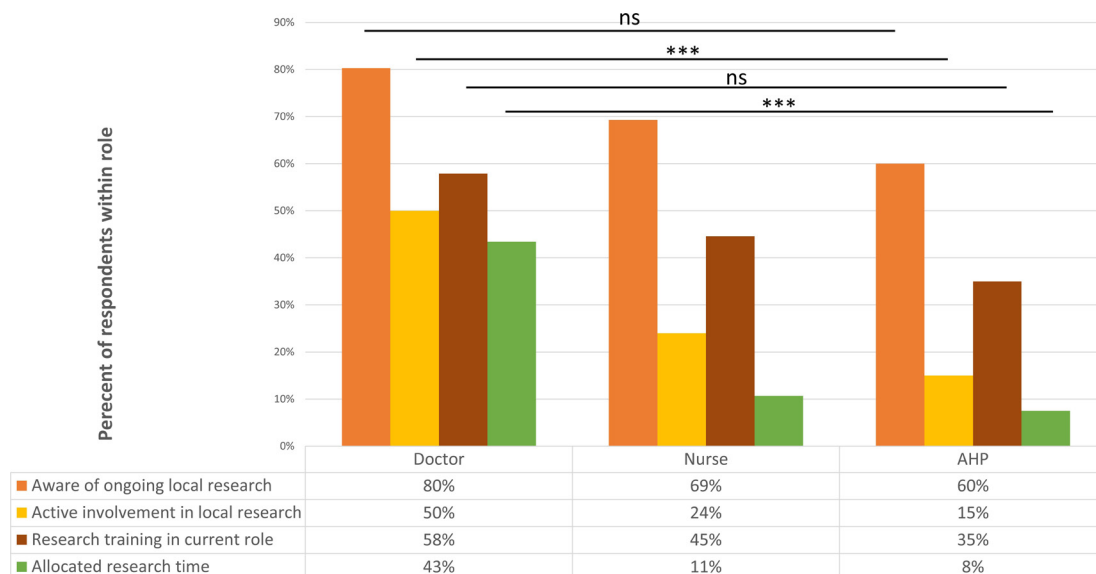


Figure 2 Involvement in research activity in local renal unit by job role. 'Yes' responses as a total of respondents within that group are shown. Horizontal lines indicate the result of χ^2 testing of proportion of 'yes' responses compared across grouped job roles. 'ns', not significant, *** $p < 0.001$. AHP, allied health professionals.

specified (figure 4A). Basic science research experience was reported by half of the physician respondents, compared with under 10% of the other respondents. As before, IAT physicians reported the greatest breadth of research type involvement (figure 4B), though physicians in both IAT and non-IAT roles reported broader

involvement in research types compared with nurses and other AHP.

Physicians were significantly more likely to have taken part in one or more of the listed outputs compared with other groups (figure 5). Most physicians reported presenting at conferences or involvement in manuscript

A

Which of these research activities have you previously undertaken or are currently undertaking?	Physicians		Nurse	AHP	Total
	Non-IAT	IAT			
Writing or contributing to writing an application for dedicated funding to undertake a research or QI project	46%	83%	16%	20%	35%
Writing or contributing to writing an application for ethical approval for a research project	44%	71%	16%	20%	32%
Assisting in data collection specifically for a research project	77%	89%	46%	40%	59%
Recruiting patients to a clinical study	54%	66%	29%	16%	38%
Led data collection specifically for a research project	48%	74%	17%	16%	33%
Assisting in analysing data specifically for a research project	56%	89%	13%	24%	38%
I have not taken part in any of the above	8%	3%	42%	49%	29%

B

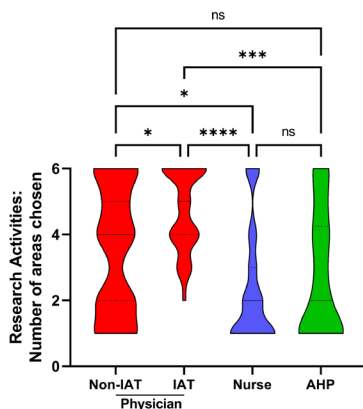


Figure 3 Extent and breadth of research activities reported by respondents, grouped by job role. (A) Heatmap of affirmative responses to presented list of research activities previously undertaken, grouped by job role. (B) Violin plot of number of research activities chosen by respondents reporting previous research activities, grouped by job role (B). Only those reporting one or more activities were included. The median and upper/lower quartiles are shown as solid and broken lines, respectively. Distributions were compared by Kruskal-Wallis test followed by post hoc Dunn's multiple comparisons testing. 'ns', not significant; * $p < 0.05$; *** $p < 0.001$; **** $p < 0.0001$. AHP, allied health professionals; IAT, integrated academic training; QI, quality improvement.

A

What types of research have you previously been involved with?	Physicians		Nurse	AHP	Total
	Non-IAT	IAT			
Basic Science	52%	51%	1%	9%	23%
Interventional Trials	31%	54%	25%	18%	30%
Other clinical studies	48%	49%	23%	22%	33%
Qualitative research	48%	57%	40%	40%	45%
Health economics	8%	6%	1%	0%	3%
Data science or epidemiology	38%	57%	5%	4%	21%
None of the above	15%	3%	41%	42%	29%

B

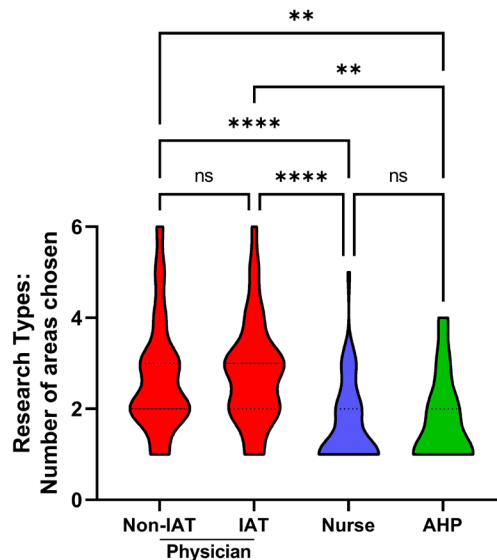


Figure 4 Extent and breadth of research types reported by respondents, grouped by job role. (A) Heatmap of affirmative responses to presented list of research types previously undertaken, grouped by job role. (B) Violin plot of number of research types chosen by respondents reporting prior experience of research, grouped by job role (B). Only those reporting one or more types were included. The median and upper/lower quartiles are shown as solid and broken lines, respectively. Distributions were compared by Kruskal-Wallis test followed by post hoc Dunn's multiple comparisons testing. 'ns', not significant; ** $p < 0.01$; **** $p < 0.0001$. AHP, allied health professionals; IAT, integrated academic training.

preparation, unlike. In contrast, nurses and AHPs were less likely to report manuscript preparation, peer review of manuscripts or conference presentations. Physicians demonstrated a greater breadth of output compared with nurses irrespective of whether on an IAT pathway, and trended towards a greater number of outputs compared with other AHPs (figure 5B). There was a strong and significant correlation across all three measures of research experience in terms of number of options chosen ($r = 0.73$, $p < 0.001$ for all three comparisons).

Three multivariable models were constructed to assess for factors independently associated with greater reported research experience. The number of options from each of the three domains of research experience were used as dependent variables (figure 6). Across all three measures, working in a nurse or other AHP role was associated with less experience. Current involvement in research, allocated research time and research training in the current role were also associated with increased self-reported research experience in at least two of the domains. Notably, encouragement to engage in research

was not associated with greater self-reported research experience in any of the three domains.

Among existing programmes to provide research training, only 12% of the respondents were aware of the NIHR Associate PI scheme,¹⁰ with 2% having taken part in it. 'Good Clinical Practice' (GCP) training was more widely undertaken, with over three-quarters of the physicians having undertaken this at some point (online supplemental figure S). In contrast, less than one-third of the nurses and AHPs had undertaken this, with over half reporting they had never been offered it.

Attitudes to research

Attitudes to research were explored using a 5-point Likert scale (figure 7). Physician respondents were more likely to report encouragement to take part in research compared with other disciplines. There was enthusiasm across all respondents to undertake more research though most felt they would need to undertake this in their own time. This was particularly pronounced among non-IAT physicians. All respondents agreed they would like more

A

Which of these research outputs have you taken part in?	Physicians		Nurse	AHP	Total
	Non-IAT	IAT			
Attended research conference without presenting	63%	91%	34%	44%	52%
Presented at a research conference	71%	97%	27%	33%	50%
Assisted writing manuscript (not first author)	69%	83%	18%	40%	45%
First author on a manuscript	77%	94%	11%	22%	42%
Senior author on a manuscript	10%	9%	6%	4%	7%
Peer reviewed a research manuscript	40%	54%	10%	18%	26%
Invited or keynote speaker at conference	21%	17%	14%	16%	17%
Won national or international award for research	23%	40%	4%	9%	15%
None of the above	8%	0%	49%	38%	29%

B

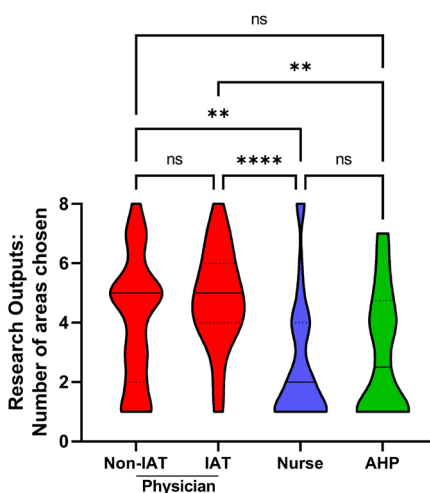


Figure 5 Extent and breadth of research outputs reported by respondents, grouped by job role (A) Heatmap of affirmative responses to presented list of research outputs previously undertaken, grouped by job role. (B) Violin plot of number of research outputs chosen by respondents reporting previous research output, grouped by job role (B). Only those reporting one or more outputs were included. The median and upper/lower quartiles are shown as solid and broken lines, respectively. Distributions were compared by Kruskal-Wallis test followed by post hoc Dunn's multiple comparisons testing. 'ns', not significant; **p<0.01; ****p<0.0001. AHP, allied health professionals; IAT, integrated academic training.

training to be able to undertake research. Physicians were more likely to respond that they would want to undertake research due to a genuine interest, and more likely to respond that undertaking research would improve their career prospects.

Barriers to research engagement

When considering barriers to undertaking research, lack of funding and lack of time were consistent responses among all respondents (figure 8). Nurses and AHPs were

more likely to report a lack of knowledge or skills to undertake research. Lack of interest, lack of research activity within the unit or uncertainty about whether research would be enjoyable were not cited as major reasons.

Strategies to encourage research participation

The survey explored respondents' opinions on potential strategies to encourage involvement in research. A list of strategies was provided, along with a free-text response option (figure 9).

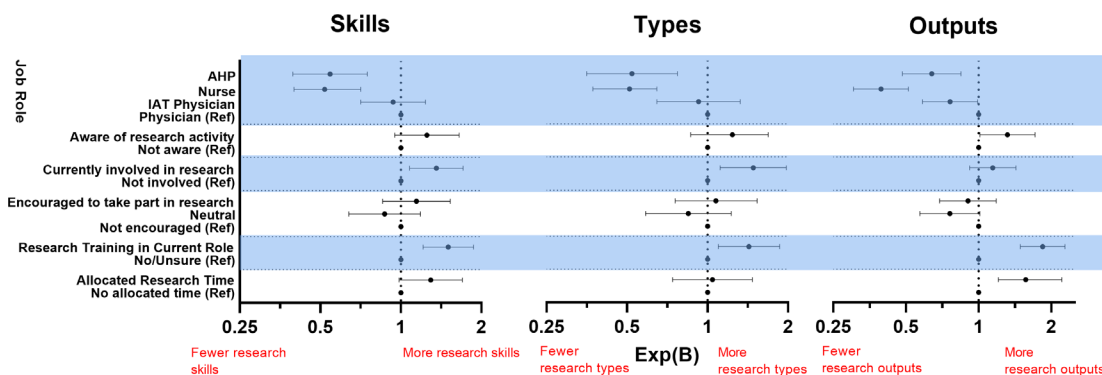


Figure 6 Forest plot of factors associated with self-reported research experience, as evaluated by number of research skills, types and outputs chosen by respondents. Multivariable models were constructed by Poisson regression, using prespecified variables. 95% CIs are provided. AHP, allied health professionals; IAT, integrated academic training.

		Strongly Agree	Agree	Neutral	Disagree	Strongly disagree	P value
Encouraged to take part in research	Non-IAT	33%	24%	22%	13%	7%	<0.0001
	IAT	50%	23%	23%	0%	3%	
	Nurse	10%	20%	39%	23%	8%	
	AHP	8%	15%	38%	26%	13%	
Would need to do research in own time	Non-IAT	65%	26%	7%	2%	0%	0.018
	IAT	29%	43%	14%	11%	4%	
	Nurse	22%	41%	26%	7%	4%	
	AHP	28%	45%	10%	15%	3%	
Would like to do more research	Non-IAT	43%	36%	21%	0%	0%	0.54
	IAT	27%	36%	27%	9%	0%	
	Nurse	23%	51%	23%	3%	1%	
	AHP	30%	50%	15%	5%	0%	
Would like more training to do research	Non-IAT	48%	34%	11%	7%	0%	0.67
	IAT	46%	35%	15%	4%	0%	
	Nurse	16%	52%	19%	10%	3%	
	AHP	28%	45%	15%	10%	3%	
Confident to write research grant	Non-IAT	7%	18%	16%	33%	27%	<0.0001
	IAT	23%	29%	13%	23%	13%	
	Nurse	0%	10%	24%	42%	25%	
	AHP	3%	3%	19%	38%	38%	
See self doing research long-term	Non-IAT	36%	40%	20%	4%	0%	0.010
	IAT	48%	39%	10%	3%	0%	
	Nurse	2%	43%	34%	18%	3%	
	AHP	15%	41%	26%	15%	3%	
Would want to do (more) research due to genuine interest	Non-IAT	40%	47%	13%	0%	0%	0.002
	IAT	61%	39%	0%	0%	0%	
	Nurse	18%	48%	25%	6%	3%	
	AHP	30%	55%	8%	8%	0%	
Would want to do (more) research to improve career prospects	Non-IAT	13%	56%	16%	16%	0%	0.0002
	IAT	45%	32%	13%	3%	6%	
	Nurse	14%	25%	42%	13%	7%	
	AHP	5%	28%	36%	23%	8%	

Figure 7 Heatmap of responses to questions related to attitude to research. Responses are colour coded with responses coloured red through yellow to green with an increasing proportion of respondents. Percentages are provided as the number of responses divided by the total number of respondents to the question in that category. Significance was assessed by χ^2 testing, using grouped job role and ‘neutral’, ‘agree or strongly agree’ and ‘disagree or strongly disagree’ as three separate response categories. AHP, allied health professionals; IAT, integrated academic training.

Responses chosen differed between job roles, though there was strong concordance between physicians in IAT and non-IAT roles. There was general enthusiasm for mentorship. Physicians were more receptive to other options suggested, though relatively few felt an online research toolkit would be of use. In contrast, other AHP but not nurses were interested in this possibility as well as the opportunity to spend time out of their usual role to experience research.

Thematic analysis of free-text responses

Free-text responses to research barriers and potential strategies to broaden research engagement were provided

by 137 respondents. Thematic analysis identified four main themes: improvements to research infrastructure, funding opportunities, equity of access and increased individual support (online supplemental table S2).

Improvements to research infrastructure

The need for protected research time was referenced frequently, with a strong perception that respondents felt forced into undertaking research on top of their existing responsibilities and in their own time.

Increased staffing levels were proposed as a potential solution, and a greater focus on workforce/career planning, (as opposed to only grant acquisition). Participants

What do you consider to be the main barriers that prevent you undertaking more research in your current role?	Physician		Nurse	AHP	Total
	Non-IAT	IAT			
I have no interest in further research	0%	9%	1%	0%	2%
There isn't any research going on	0%	9%	11%	13%	9%
Unsure how to start a research project	27%	11%	25%	47%	28%
Lack of funding to undertake research	60%	46%	18%	38%	36%
don't feel I have the skills or knowledge needed to take part in research	25%	11%	25%	53%	29%
I don't know if I'd enjoy research	6%	0%	6%	11%	6%
I don't have enough time in my day-to-day job	63%	37%	47%	67%	53%
Unsure how to get involved in/do more research in my renal unit	15%	6%	27%	44%	24%

Figure 8 Heatmap of responses to the question ‘What do you consider to be the main barriers that prevent you undertaking more research in your current role?’ Percentages are provided as the number of positive responses divided by the total number of respondents to the survey in that category. Responses are colour coded with responses coloured red through yellow to green with an increasing proportion of respondents. Respondents were able to pick more than one answer. AHP, allied health professionals; IAT, integrated academic training.



If they were available, would any of the below be of interest to you?	Physician		Nurse	AHP	Total	P value
	Non-IAT	IAT				
An online research toolkit resource, with information about how to undertake research and how to get involved	40%	37%	42%	64%	45%	0.036
A funded Masters postgraduate qualification, part of which would entail training in research skills	58%	54%	23%	36%	39%	0.0001
Mentorship from someone more experienced in research	63%	66%	54%	71%	62%	0.27
Networking opportunities to meet (other) trainees/health professionals involved in research	54%	54%	36%	40%	44%	0.12
A funded short period of time out of my day-to-day role to experience research first-hand	63%	51%	40%	60%	51%	0.04
The opportunity to become a co-investigator in ongoing research studies or trials	63%	60%	28%	42%	44%	0.0002

Figure 9 Heatmap of responses to the question ‘If they were available, would any of the below be of interest to you?’ Percentages are provided as the number of positive responses divided by the total number of respondents to the survey in that category. Responses are colour coded with responses coloured red through yellow to green with an increasing proportion of respondents. Respondents were able to pick more than one answer. P values generated using χ^2 test comparing proportion of positive respondents within grouped job role to other roles. AHP, allied health professionals; IAT, integrated academic training.

were keen to develop collaborative research networks and to integrate development of generic research skills into their career and training pathways.

Funding opportunities

Funding was noted as a particular challenge to research engagement. Respondents requested greater transparency of application processes and opportunities for funding outside pre-existing fellowships (eg, included ‘access to help cover Article Processing Charges’ and ‘smaller pots of money more readily available to early career researchers’). The post-doctoral career point was highlighted as a time particularly requiring additional support. It was felt that there was a lack of awareness of non-traditional funding opportunities or pathways to research within the renal community, and that these alternative career routes should be advertised more widely.

Equity of access

Respondents felt that there needs to be better equality of access to research opportunities, with references to favouritism, bias and subconscious prejudice recorded. More encouragement of applications from women, those outside the IAT pathway and AHPs were sought. A lack of open communication regarding current research in units was widely commented on, with a need for opportunities for all disciplines to become involved as well as improved sharing and dissemination of results.

Increased individual support

A desire for increased individual support was frequently raised. Mentorship was suggested as a potential solution: this appeared to be inferred at a local level. The importance of a supportive line manager as well as local acceptance and willingness to create a positive research culture within the workplace was stressed. The need to support ‘levelling up’ within academia was highlighted, particularly the provision of additional support for those who have taken career breaks or who work less than full-time. The expectation that research would be undertaken in ‘free’ time was emphasised, alongside the particular

challenge this poses for those with young families or additional caring responsibilities.

Effect of COVID-19

A quarter of the respondents had taken part in clinical research relating to COVID-19, with the majority being physicians within an IAT role (online supplemental table S3). There was a significant discrepancy about the perceived effect of COVID-19 on research accessibility (online supplemental table S4), with physicians reporting COVID-19 had worsened research opportunities, while nurses and other AHPs were more ambivalent or even felt that things had improved ($p=0.0004$).

Analysis of free-text responses on the effect of COVID-19 on research opportunities identified four main themes: Impacts on research environment, the prioritisation of clinical work, shifting research focuses and individual capacity to take research on (online supplemental table S5).

Impacts on research environment

Facility closure at higher education institutes provided physical limitations for those working in laboratory or animal-based research. A shift to remote working resulted in a perceived loss of in-person collaboration, recruitment and networking opportunities. Finally, changes to operational procedures (eg, infection control, access to ethical review panels or collaborative data) impacted on respondents’ ability to undertake research and many (predominantly physicians) commented on the difficulty in accessing funding for research as a result of the pandemic.

Prioritisation of clinical work

Clinical workload throughout the pandemic was felt to be all-encompassing and delivery of frontline clinical support prioritised at the expense of research. Loss of protected academic time negatively impacted participants’ ability to conduct research, with most research nurses and academic trainees redeployed to clinical services. The backlog of elective and routine work after

the first wave produced further challenges, particularly for non-academics, after clinical academics had returned to research activities.

Shifting research focus

For those that were able to continue taking part in research, the prioritisation of COVID-19 studies at the expense of other studies was frequently commented on by survey respondents. This was generally perceived negatively, although some opportunities to take part in COVID-19-related research were noted.

Individual capacity to undertake research

Many respondents undertaking research in their own time reported they no longer feel able to take on this additional load. Those with additional caring responsibilities commented on the practicalities and difficulties of trying to undertake research, whereas those who have been working from home have felt their access to opportunities have been significantly reduced.

DISCUSSION

We report the results of a national cross-sectional survey of early-career clinical staff working in nephrology from across the multidisciplinary spectrum; the first time such an exercise has been undertaken in this field. We found widespread enthusiasm for research engagement, but also multiple and varied barriers preventing involvement, across the MDT. Surveys have been previously undertaken focusing on academic medical trainees in other specialties but these exclude non-academic physicians in training and non-medical staff²⁶; groups who have historically had less involvement in research,¹⁵ and will need to be activated in order to meet the aims of the Royal Colleges, Nephrology charities and the Department of Health and Social Care.^{3 5 6 8} For context, an awareness of research activity is expected of physician trainees during postgraduate education, though authorship on publications and conference presentations of original research are not a mandatory stipulation. Similarly, there are no research-related stipulations on nurses or AHP practicing in the UK, to our knowledge.

The comparison between different members of the MDT as a single exercise is important as recent work has suggested that the profiles, and therefore motivators and barriers, of academically-active NMAHP may differ from physicians, tending to be older and committing to undertaking research at a later point in their career.²⁷ Our findings are broadly in agreement with historical single-group surveys in other specialties. Two surveys of UK trainee gastroenterologists undertaken 9 years apart indicated a consistent desire by respondents to pursue academic interests, but that funding was a major barrier.²⁸ Sixty per cent of the respondents to the later survey reported a previous peer-reviewed publication in the preceding 2 years and a similar proportion reported having undergone GCP training²⁸; the former proportion is lower than

that reported in our survey, which may be due to the lack of time frame for publication in our study, while the latter proportion is similar to that reported by non-IAT physicians but lower than IAT physicians in our work. Taken together, this suggests a similar level of academic engagement by UK nephrology trainees compared with gastroenterology trainees, although using historical data. The low level of engagement in the Associate PI scheme is unsurprising as it was not available to nephrology studies until very recently; this is likely to increase in future surveys.

Research experience, gauged by three measures, differed markedly across the MDT. Physicians reported broader experience and were more likely to have undertaken basic science research. In contrast, most nurses and AHP respondents had undertaken qualitative research—we would hypothesise this experience has arisen from widespread involvement in the annual UK-wide Kidney Patient Reported Experience Measure exercise.²⁹ The proportion of physicians undertaking basic science research is similar to that reported in trainee gastroenterologists and in an online survey of early-career academic physicians across 50 specialties.^{28 30} Serial surveys in other specialties have suggested involvement by trainee physicians in basic science research may be diminishing over time, possibly as a result of reduced undergraduate exposure to basic science with increased focus on clinical practice^{28 31 32}; future iterations of this survey may reveal similar temporal trends in nephrology. The recent establishment of the 'NephWork',³³ a trainee-led collaborative renal research network akin to those seen in other specialties, such as the British Urology Researchers in Surgical Training Research Collaborative,³⁴ may result in an increased proportion reporting experience in clinical studies in future.

Respondents frequently reported reduced access to research opportunities due to the COVID-19 pandemic. A recent survey of the impact of COVID-19 on nephrology clinical practice identified a widespread loss of academic opportunities reported by the majority of respondents.¹⁸ Academic clinicians reported particular concerns around the impact on career plans and future funding availability, a justifiable concern given the global reduction in biomedical funding.³⁵ Notably, this survey was open only to physicians and included established academics and consultants. Our work confirms a similar effect specifically on trainees and non-physician groups.

COVID-19 may have disproportionately impacted on early-career researchers.^{36 37} Our thematic analysis supports this. NMAHP were less negative in their view of the impact of the pandemic and this may be due to less frequent research engagement overall. The NIHR has recently published a strategy in response to the disruption to clinical academic training by COVID-19³⁸; it is notable that no similar document has been published for academic NMAHP.

Consistent barriers to research engagement were reported across disciplines, such as access to funding, but also discrepancies such as a perceived lack of knowledge



among non-physician respondents. A North American study of emergency department nurses revealed similar barriers related to lack of research skills and intimidation by the perceived complexity of research bureaucracy.¹⁵ Similarly, a meta-analysis of pharmacists' attitudes to research suggested lack of competence in research practice and lack of time and funding as major barriers to research.¹⁴ A recent study of British NMAHPs demonstrated that research funding was perceived as a major barrier.¹⁷ Multivariate analysis suggested that overcoming barriers identified by thematic analysis and closed questioning may associate with a greater breadth of research experience and output, independent of clinical role: namely research training, dedicated research time and active involvement in research. Addressing these may assist in 'levelling up' research output, particularly among non-physician practitioners.

While this study provides important insight into the early-career academic landscape, there were some limitations. The combined (mailing list and social media) method of contacting professionals was felt to be the best approach in the absence of a definitive list of clinicians working in nephrology in the UK. Based on data provided by the General Medical Council (S. Carr, personal correspondence), around 70% of the physician trainees are on the RA mailing list; no such estimate is possible with regard to nursing and AHP. Nonetheless, this will have contributed to response bias which is the foremost limitation, leading to an overestimate of engagement in research, with those active on society mailing lists or social media most likely to respond. This is evidenced by the apparent frequency of first-author publications and IAT roles among medical respondents. Around one-third of the trainee nephrologists on the RA mailing list completed the survey and the proportion of UK nurses and other AHP working in nephrology was lower; it is therefore likely that the accessibility to research involvement is worse than this study suggests. Healthcare and medical students were not included; some studies have suggested students may consider research unappealing and interventions at this stage may improve future engagement.³⁹ The use of self-reported experience may lead to under-reporting or over-reporting of skills. Notably, previous work has suggested limited correlation between physician self-assessment and objective measures in clinical practice.^{40 41} Whether this reflects in academic practice and in non-physicians is unknown. There was an over-representation of English respondents; however the research structure of the UK devolved nations is similar and therefore results are likely to be broadly generalisable. Similarly, our findings are likely to be broadly applicable to other developed countries, but we recognise barriers are likely to differ in less developed countries. Work is currently underway to replicate this study internationally to assess how research barriers and attitudes differ globally.

CONCLUSION

There is enthusiasm among British early-career nephrology practitioners for research engagement, but

substantial barriers prevent this and have been exacerbated by the negative impact of COVID-19. Bespoke strategies to promote engagement, including mentorship and protected research time, are likely to be well-received to address the needs of professional groups. Our findings will inform funding and educational programmes within nephrology.

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