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Retention of doctors in emergency medicine: a scoping review of the academic literature

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Handling editor Richard John Parris

► Additional supplemental material are published online only. To view, please visit the journal online (http://dx.doi.org/10.1136/emermed-2020-210450).

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Received 22 July 2020
Accepted 13 January 2021

To cite: Darbyshire D, Brewster L, Isba R, *et al*. *Emerg Med J* Epub ahead of print: [*please include* Day Month Year]. doi:10.1136/emermed-2020-210450

ABSTRACT

Introduction Workforce issues prevail across healthcare; in emergency medicine (EM), previous work improved retention, but the staffing problem changed rather than improved. More experienced doctors provide higher quality and more cost-effective care, and turnover of these physicians is expensive. Research focusing on staff retention is an urgent priority.

Methods This study is a scoping review of the academic literature relating to the retention of doctors in EM and describes current evidence about sustainable careers (focusing on factors influencing retention), as well as interventions to improve retention. The established and rigorous JBI scoping review methodology was followed. The data sources searched were MEDLINE, Embase, Cochrane, HMIC and PsycINFO, with papers published up to April 2020 included. Broad eligibility criteria were used to identify papers about retention or related terms, including turnover, sustainability, exodus, intention to quit and attrition, whose population included emergency physicians within the setting of the ED. Papers which solely measured the rate of one of these concepts were excluded.

Results Eighteen papers met the inclusion criteria. Multiple factors were identified as linked with retention, including perceptions about teamwork, excessive workloads, working conditions, errors, teaching and education, portfolio careers, physical and emotional strain, stress, burnout, debt, income, work–life balance and antisocial working patterns. Definitions of key terms were used inconsistently. No factors clearly dominated; studies of correlation between factors were common. There were minimal research reporting interventions.

Conclusion Many factors have been linked to retention of doctors in EM, but the research lacks an appreciation of the complexity inherent in career decision-making. A broad approach, addressing multiple factors rather than focusing on single factors, may prove more informative.

Key messages

What is already known on this subject

- ► Addressing the retention of emergency physicians has been identified as a high priority for research in emergency medicine (EM).
- ► More experienced clinicians provide higher-quality and more cost-effective care. Keeping them in the specialty is vital now that efforts to improve recruitment have yielded positive results.

What this study adds

- ► Dozens of factors that influence retention have been identified in the literature.
- ► There is a real lack of studies looking at ways to improve retention in EM.
- ► Future work should address complexity; understanding the multiple interacting factors associated with retention is more likely to be beneficial than replicating correlational studies.

INTRODUCTION

In 2012, an editorial summarising the finding of an interim report from the emergency medicine (EM) task force (a multiprofessional group set-up by the UK government's Department of Health to address workforce issue in EM) emphatically outlined the problem:

'Speak it loudly and speak it clearly: the specialty of Emergency Medicine (EM) in the UK has a medical staffing crisis'.[1]

In the intervening years, many of the recommendations contained in the report have been instigated. Consultant numbers have increased across the UK.[2] Recruitment to EM training has remained consistently above 85%.[1 3] An alternative route into EM training has been developed.[4] The number of clinical nurse specialists, advanced practitioners and physician associates within the ED has been expanded.[4] Despite these successes, growth in ED attendances continues to outstrip that of the workforce.[2] Problems with attrition from training programmes[5] and exodus of established clinicians via early retirement[6] mean that the workforce crisis may have changed, but it certainly has not been solved. Nor is it a problem unique to the UK. The landscape may be different, but staffing EDs is a problem worldwide.[7–11] Similar stories can be told across other specialties: psychiatry[12 13]; paediatrics[14] and general practice[15 16] are examples. This issue also affects emergency nurses, the largest group working in EDs.[17]

Facilitating long and productive careers, be it for emergency physicians (EPs) or the other equally vital staff groups, is of paramount importance to sustainable long-term staffing of EDs. While perhaps self-evident, it is becoming increasingly apparent that more experienced clinicians provide higher quality and better value care for their patients.[18–20] Much of the previous work related to EM careers has focused on reasons for leaving, with the literature on burnout, the challenging working environment and the impact of out-of-hours working continuing to develop. There is, therefore, a clear gap in the

Table 1 Definitions of retention from the limited number of sources which define the term

Source and title	Definition
Retention	
Human resource management textbook: *Managing Employee Retention: A Strategic Accountability Approach*	'the percentage of employees remaining in the organization. High levels of retention are desired in most job groups'[26]
Research in nursing and health: *The Nursing Practice Environment, Staff Retention, and Quality of Care*	'the proportion of full-time staff nurses employed on a unit at the beginning of the study and remaining on the unit at the end of a 1-year period'[27]
Employee retention	
Human resource planning: *The Race for Talent: Retaining and Engaging Workers in the 21st Century*	'the effort by an employer to keep desirable workers in order to meet business objectives'[23]
International Journal of Advance Research in Computer Science and Management Studies: Review paper—study on employee retention and commitment	'a technique adopted by businesses to maintain an effective workforce and at the same time meet operational requirements'[24]
Journal of Economics, Management and Trade: Human resource management practices and employee retention: a review of literature	'the hierarchical arrangements and practices utilised as a part of the organisation to keep key workers from leaving the association'[25]
Volunteer retention	
Independent research organisation report: *Volunteer Management Practices and Retention of Volunteers*	The percentage of volunteers involved with the organisation 1 year ago who are still involved today.[28]

literature to view this problem from an alternative perspective: not to look at why people *leave* but to focus on why those who *stay* do so, despite the universal challenges. This review is part of a programme of work focused on addressing that gap,[21] one of the key problems facing the specialty of EM.[22]

This review is framed in terms of retention, but the terms used in academic and policy documents are inconsistent and lack clarity. The different definitions of retention, expanded on in table 1, relate to efforts by,[23–25] or the structure of,[25] the employing organisation to keep staff, or the proportion of workers still with an organisation after a period of time.[26–28] We use the term retention in reference to its dictionary definition. The Merriam-Webster dictionary has three descriptions which, when taken as a whole, clarify the meaning of the term 'retention' without positioning it too tightly within a specific academic domain.[29] These definitions are 'the act of retaining', 'the power of retaining' and 'something retained'.[29] Retention therefore is something that can be done, can be done in a particular way and has been done. This brings us to 'retain', which is the transitive verb to the noun of retention. The definition 'to keep in possession or use' is helpful as it refers to both place and action.[29] Our use of the term is not time specific, but we recognise that in certain contexts, where measurement is important, a more technical definition may be required.

As well as retention, the literature contains a myriad of other terms which overlap in stated definition and usage with many being used interchangeably. For example, the word 'attrition' was frequently used interchangeably with the terms 'dropouts', 'turnover', 'brain drain', 'losses', 'premature departure' and 'separation'.[30] The commonly used terms for both staying in a role or leaving it are defined in table 2.

Because of these definitional inconsistencies, the search included a wide selection of these terms. The included papers are those that address retention, as we have defined, regardless of the terminology used by the authors.

METHODS

The protocol for this review was published in advance and is available open access.[31] This paper focuses on the academic literature; the scoping review of the grey literature discussed in the protocol will be reported separately.

The aim of this study, aligning with the scoping review methodology,[32] was to map the extent of the literature directly pertaining to retention of doctors in EM. More specifically, this

Table 2 Definitions for terms related to retention

Terms	Definition
Terms related to staying in a role	
Sustainable careers	'the sequence of an individual's different career experiences, reflected through a variety of patterns of continuity over time, crossing several social spaces, and characterised by individual agency, herewith providing meaning to the individual'[74]
Career longevity	'a fundamental metric that influences the overall legacy of an employee because for most individuals the measure of success is intrinsically related, although not perfectly correlated, to his or her career length'[75]
Employee/personnel loyalty	'may be measured in terms of expressed commitment to the (organisation) and its mission and in terms of length of employment'[76]
Organisational commitment	'the relative strength of an individual's identification with and involvement in a particular organization'[77]
Occupational embeddedness	'the totality of forces that keep people in their present occupations'[78]
Term related to leaving a role	
Turnover	'unplanned loss of workers who voluntarily leave and whom employers would prefer to keep'[23]
Intention to quit	'how often the respondents seriously considered quitting the job, whether they wanted to quit, and whether they were actually planning to quit'[79]
Exodus	Not defined in the literature. The Cambridge Dictionary has a business English definition of 'the movement of lots of people or things away from a place'[80]
Attrition	'exits from the workforce'[30] generally presented as a rate over time'
Career mobility	'the transition from one position to another'[81]
Organisational change	'any change in the employing firm'[78]
Job change	'any substantial changes in work responsibilities, hierarchical levels, or titles within an organization. It includes internal promotions, transfers, and demotions.'[78]
Occupational change	'transitions that require fundamentally new skills, routines, and work environments and require fundamentally new training, education, or vocational preparation'[78]

Table 3 Ovid MEDLINE search strategy

	Search term
1	physicians/ or exp pediatricians/
2	(physician$ or doctor$ or trainee$ or foundation year or fy1 or fy2 or sho or shos or senior house officer$ or registrar$1 or staff grade or associate specialist$ or consultant$).mp.(mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms)
3	p?ediatrician$.mp.
4	(medical practitioner$ or clinician$).mp.
5	or/1–4
6	emergency medical services/ or emergency service, hospital/ or trauma centers/
7	emergency medicine/ or pediatric emergency medicine/
8	(emergency medical services or emergency service or trauma center$ or trauma centre$).mp.
9	(emergency medicine or pediatric emergency medicine).mp.
10	(emergency department$ or emergency room or casualty department$ or "A&E").mp.
11	"accident and emergency".mp.
12	emergency training program$.mp.
13	emergency medical care.mp.
14	or/6–13
15	5 and 14
16	workforce/ or health workforce/ or personnel loyalty/ or work schedule tolerance/ or work-life balance/ or workload/ or personnel turnover/
17	burnout, psychological/ or burnout, professional/ or exp occupational stress/
18	Career Choice/
19	career mobility/
20	(workforce or manpower or staffing or retention or work-life balance or turnover or leaving medicine or exiting or burnout).mp.
21	(career adj4 (choice or mobility or progress$ or ladder or promotion or advancement or satisfaction)).mp.
22	or/16–21
23	15 and 22

involves identifying the types of evidence available, collating the key characteristics of papers, identifying the key definitions and concepts, and delineating and analysing the gaps in the literature. This is in keeping with the predetermined review question:

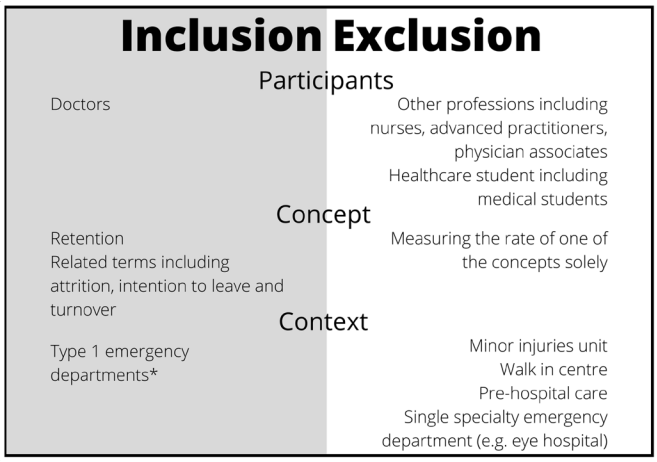

Figure 1 Inclusion and exclusion criteria. *Type 1 EDs are 'consultant led 24 hour service with full resuscitation facilities and designated accommodation for the reception of accident and emergency patients'.[82]

- Primary question: What is known about retention of doctors in EM?
- Subquestion 1: What factors have been studied relating to retention of doctors in EM?
- Subquestion 2: What interventions have been implemented to improve retention of doctors in EM?

A search of MEDLINE, Embase, Cochrane, HMIC and PsycINFO was initially completed on 15 March 2019 by Helen Elwell, clinical librarian at the British Medical Association Library, and then updated for papers published in the interim, on 14 April 2020 (Cochrane and MEDLINE) and 21 April (Embase, HMIC and PsycINFO). This was supplemented by searches of Business Source Complete, Proquest Business Premium Collection and Emerald Insight. The search terms for Ovid MEDLINE are available in table 3, with the remainder in online supplemental appendix 1. Reflecting the nature of scoping reviews and the research questions, this search aimed for breadth of coverage. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews) checklist is included in online supplemental appendix 2.

All searches were limited to English language. No date limitations were applied. Given the vast number of results, a team-based multistage approach was undertaken. Titles were reviewed by DD and clearly irrelevant items were excluded. Abstracts were then independently reviewed by DD and UB. To ensure consistency, this was piloted with tranches of 20 until complete adherence was achieved and reviewers were in frequent communication during the abstract screening process. Abstracts were reviewed against the inclusion criteria (see figure 1 and the protocol[31]), with those clearly not meeting the criteria excluded. Full-text articles were then accessed and again compared with the inclusion criteria; see figure 1 for inclusion and exclusion criteria and figure 2 for the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA) diagram.

The following data were extracted from the included articles: citation, methodology, factors influencing retention, efforts to improve retention and other findings relevant to retention of doctors in EM. Data are presented to summarise the different approaches to doctor retention in EM that are represented in the literature and to give a picture of where the gaps in the literature lie. Papers not pertaining to EPs and those that did not go beyond measuring a rate of retention (or attrition) were excluded. This is because defining the rate of retention in EM is not a research question for this study and would be best answered with a complementary methodology, such as systematic review and meta-analysis.

RESULTS

The result of database searching is presented in the PRISMA diagram (see figure 2). The studies excluded at the eligibility (full-text reading) stage, including rationale for exclusion, are summarised in online supplemental appendix 3. Methodological details and study characteristics of included papers are available in online supplemental appendix 4. A brief summary of each paper alongside the links to the research questions is in table 4.

Factors influencing retention

The identified papers explored retention in different ways. Three papers analysed factors that correlated with intention to leave, five correlated with reasons for having quit or attrition rates,[33–37] two with reasons for continuing EM work[38 39] and in one case with reasons why EPs might leave or why they stay.[40] Two of the papers found no practically applicable correlations: margin

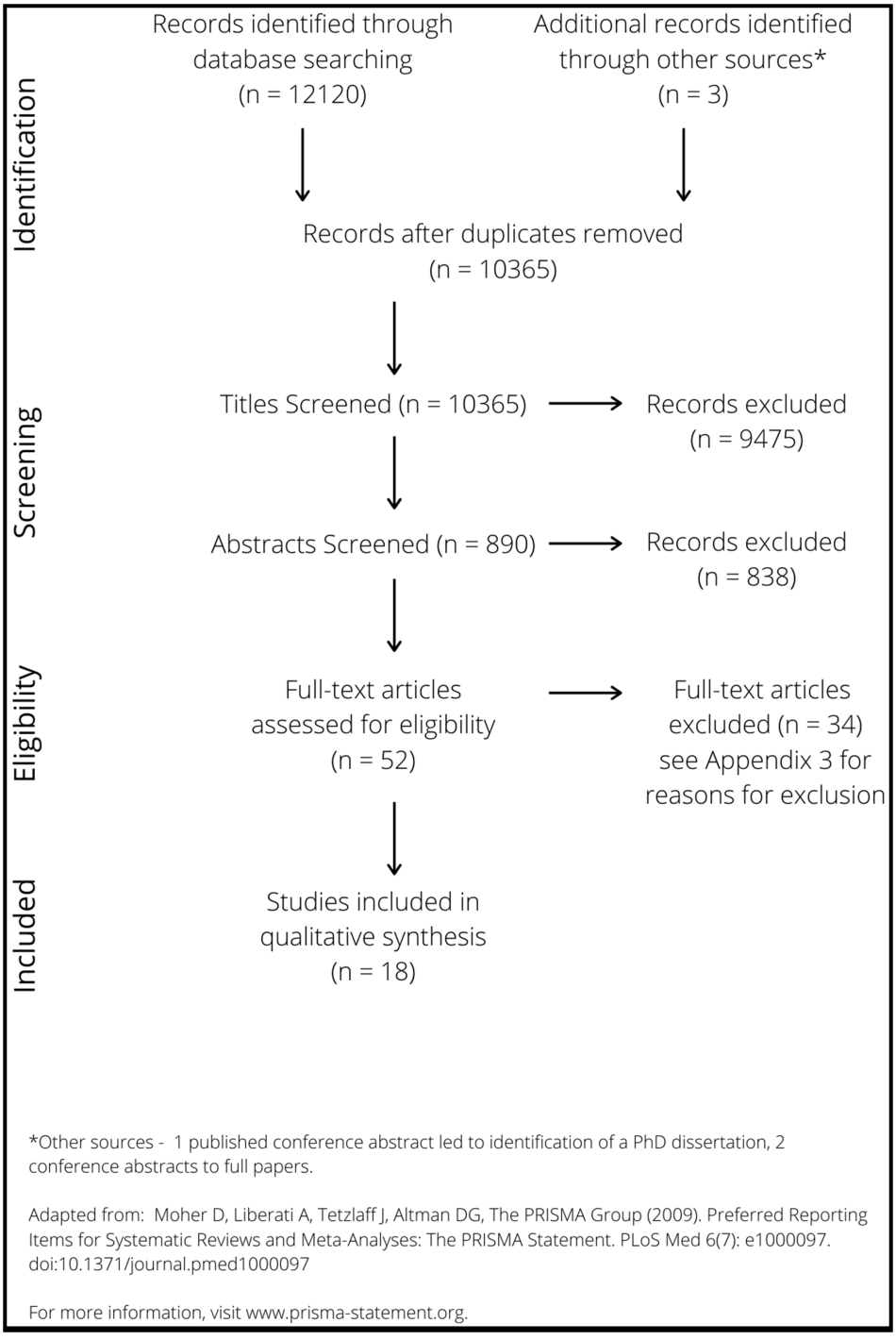

Figure 2 Preferred Reporting Items for Systematic Reviews and Meta-Analyses diagram.

in life (a psychological theory of adult development) scale had no correlation with intention to quit,[41] and while a low score on the Global Job Satisfaction instrument scale was correlated with leaving EM, its test characteristics meant that it was not a useful predictor of quitting.[35] A pragmatic literature review described elements of EM that negatively impacted retention[42]; a case report and discussion explored incidents that may lead an EP to quit[43]; a letter[44] commenting on an included study[36] mainly reiterated points from the letter writers own study (also included in this review), which correlated burnout with intention to quit.[45] The two remaining letters focused on sustainable careers in Ireland and Australia, respectively.[46 47] The diversity of approaches used in the articles included in the review has led to a large number of different factors correlating with retention in EM; these are documented in table 5.

Efforts to influence retention

The majority of papers did not directly address efforts to improve retention.[33 34 36–38 41 44 45 48 49] Of those that did, only three drew conclusions from empirical work.[35 39 40] The participants in James and Gerrard's study said that improving flow and staffing would improve retention,[39] while those in the study from Fitzgerald *et al*. thought that the emergence of self-care

Table 4 Summary of included papers

Paper details		Extraction			
Author, year and origin	**Journal and type of paper**	**Method and aim of study**	**Factors influencing retention**	**Efforts to improve retention**	**Other relevant findings**
Estryn-Behar *et al.*,[48] 2011, France	*Emergency Medicine Journal*, research paper	Questionnaire using several psychological scales applied to 538 EPs and 1924 matched physicians from other specialties, aimed to measure and correlate aspects of working life and intention to leave.	Intention to leave linked with quality of teamwork, burnout, musculoskeletal disorders, job offers from outside medicine, absence of continuing education for 12 months, worry about mistakes, harassment by superiors, lack of influence at work and tense relations with administration.	None.	Working conditions may be more important than pay.
Feitosa-Filho *et al.*,[49] 2017, Brazil	*Revista da Associação Médica Brasileira*, research paper	Questionnaire of 659 ED physicians across a region of Brazil assessing workplace characteristics, EPs training, main reason for working in EM, work satisfaction and reasons why they might leave; primary aim to quantify work characteristics.	Higher job satisfaction correlated with lower intention to quit.	None.	81.3% said they intended to stop working at the ED in the next 15 years, pointing out 'excessive stress at work' as their main reason.
Fitzgerald *et al.*,[40] 2017, UK	*Emergency Medicine Journal,* research paper	Interpretive phenomenological analysis study based on 18 semistructured interviews with EM consultants in southwest England, primary aim to explore the experience of psychological distress and well-being.	Consultants perceive the physical and emotional strain of EM work to be unsustainable, peer social support and developing new roles can help sustainability.	The emergence of self-care and compassion dialogues may be beneficial.	Participants unanimously identified with the term 'sustainability' when describing their emotional and physical status.
Goldberg *et al.*,[45] 1996, USA	*Academic Emergency Medicine*, research paper	Questionnaire of 1272 attendees at an EM conference over 4 years; questionnaire incorporated the Maslach Burnout Inventory and practice demographics, including intent to practice EM in the future, aiming to measure burnout and to identify predictive factors.	Intention to leave EM correlates with a higher burnout score.	None.	None.
Hall *et al.*,[33] 1992, USA	*Academic Emergency Medicine,* research paper	Postal questionnaire sent to US EPs who finished training between 1978 and 1982; 539 responses; compared practice characteristics of those who still practice EM with those who have left.	Those who left were less likely to be board certified in EM, more likely to be board certified in another specialty, were less likely to work with residents and reported lower income.	None.	None.
Hall and Wakeman,[36]1999, USA	*The Journal of Emergency Medicine*, research paper	Questionnaire sent to residency trained EPs about demographics, work characteristics, attrition and reasons for leaving. 1638 responses. Aims to measure practice characteristics, how careers change with time and career longevity.	EPs with higher income had lower attrition, but those who left did not rate income as a reason for leaving. EPs who had done a residency or fellowship outside EM or were not board certified had higher attrition.	None.	Clinicians decreased clinical work and increased other work though their career.
Holmes,[47] 2019, Australia	*Emergency Medicine Australasia*, brief communication	Discussion paper (termed 'Perspective' in this journal) giving the authors view on sustainable careers in EM is Australia. Two areas of focus are burnout and the ageing EP.	The author believes that credentialing in a subspecialty field, maintaining professional links and lifelong learning may help sustainability.	Unreferenced claim that some countries do not require older doctors to work on-calls or out of hours and a belief that this would help in Australia.	The authors state that 'there has been insufficient recognition of the particular needs of older physicians, including that they tolerate shift work and night duty more poorly than their junior colleagues.'
James and Gerrard,[39] 2017, UK	*Emergency Medicine Journal*, research paper	Semistructured interviews with 10 consultants from Welsh EDs exploring what attracted them to the career and what keeps them there.	Diagnostic challenges, teaching junior colleagues, teamwork, flattened hierarchy, flexible working and positive work–life balance.	Participants thought that improving flow and staffing would help retention.	None.
Kalynych,[41] 2010, USA	UNF Graduate Theses and Dissertations, dissertation, primary research	Questionnaire of 273 EM residents measuring margin in life (psychological theory of adult development) scale and intention to leave; aim to assess for a difference between EM residents scores and remediation, intention to quit and actual attrition.	No correlations identified.	None.	None.
Lloyd *et al.*,[35] 1998, Canada	*Academic Emergency Medicine*, research paper	Questionnaire to compare two different job satisfaction instruments with 14 'reasons for leaving'. The study aim was to evaluate the predictive validity of the Emergency Physician Job Satisfaction and Global Job Satisfaction instruments.	A low Global Job Satisfaction instrument score is associated with leaving EM (the test characteristics mean it is not a useful predictor).	Scheduling, as an extrinsic component of job satisfaction, is amenable to change.	Ranked reasons for leaving EM and compared with a previous (US) cohort.

Continued

Table 4 Continued

Paper details		Extraction			
Author, year and origin	Journal and type of paper	Method and aim of study	Factors influencing retention	Efforts to improve retention	Other relevant findings
Mallon,[44] 2000, USA	*The Journal of Emergency Medicine*, letter	Letter commenting on Hall and Wakeman 1999 and referencing the authors' study (Goldberg *et al*.[45])	Reiterates key points from Goldberg *et al*.[45]	None.	Concern about overestimating attrition and oversubscribing the workforce devaluing EPs and creating job insecurity.
Murphy,[46] 2014, Ireland	*Irish Medical Journal*, editorial	Editorial outlining the retention problem in Ireland.	Better support and less stress, personal development.	Streamline training, ministerial review of the medical workforce.	There is a retention problem across Irish medicine; it is more visible in EM.
Pflipsen *et al*.,[37] 2019, Ireland	*Irish Journal of Medical Science*, research paper	Questionnaire sent to those who had left the Irish EM training scheme. 30 respondents, aim to gain insight into reasons for attrition from EM training in Ireland	Lack of training and supervision negatively impacted retention, as do excessive workloads and poor working conditions.	None.	Findings similar in other specialties in Ireland.
Smith and Dasan,[42] 2018, UK	*British Journal of Hospital Medicine (London)*,review	Pragmatic review of academic and policy literature aiming to describe the impact increasing working pressure is having on staff in the ED and to begin to explore the potential for developing sustainability within the workforce.	Occupational stress and burnout negatively impact retention.	Job planning, less than full time working, portfolio careers, appropriate renumeration, well-being; introduces sustainability work from Royal College of Emergency Medicine.	None.
Takakuwa *et al*.,[50] 2013, USA	*Academic Medicine*, research paper	Questionnaire sent to leads of EM training programmes, 78 responses, aims to describe the policies, practices and attitudes of EM leaders about workforce issues, particularly for EPs in the last decade of their career.	A strategic approach to staffing overnight shifts, various different policies inconsistently applied.	Refers to documents related to ageing and EM work produced by the group that did this research.	Variable and inconsistent approach to the role of the EP in the final 10–15 years of their career.
Xu *et al*.,[34] 1994, USA	*Academic Emergency Medicine*, research paper	Cohort Study using routinely collected data; looking at three groups: those who choose EM and stay, those who move into EM and those who leave; compares academic performance, age and indebtedness with an aim to identify factors that may have contributed to career change.	High academic performance and high indebtedness are factors associated with choosing or staying in EM.	None.	Indebtedness is complex.
Xu and Veloski,[38] 1991, USA	*Academic Medicine*, brief communication	Questionnaire sent to graduates of a specific university who had chosen EM at graduation, 36 responses, aim to measure factors influencing their decision to continue EM careers.	Most important factors for remaining in EM were challenging diagnostic problems, predictable working hours, intellectual content of the specialty and income.	None.	Educational debt a minor factor.
Zun *et al*.,[43] 1988, USA	*American Journal of Emergency Medicine*, discussion	Case report and literature review. Describes a case where a patient dies after being discharged from the ED. This leads to a discussion, citing relevant literature, about the stress such an event causes and stress for EPs in general.	Discusses factors that lead to stress for EPs, specifically errors, incivility by colleagues and working patterns.	Authors' thoughts; open discussion as key to helping manage stress, also helped by time management systems, lifestyle approaches and specific relaxation approaches.	None.

EP, emergency physician.

and compassion dialogues may be beneficial.[40] Lloyd *et al*. stated that work scheduling (rostering), as an extrinsic part of job satisfaction, is amenable to change and therefore has potential to improve retention.[35] However, it should be noted that in this study, evaluating the predictive validity of two job satisfaction scales, while one of the scales they tested had a statistically significant correlation with attrition, we found that the test characteristics of this relationship mean it lacks predictive utility.

The other studies offered suggestions from a range of perspectives. One paper referenced documents on ageing and the EM workforce,[50] while another offered an unreferenced statement that in some countries, 'older doctors are not required to participate in after-hour rosters'.[47] An editorial explained that streamlining training and a ministerial review of the broader medical workforce in Ireland, both ongoing when published in 2014, might help retention.[46] The case report and discussion paper provided examples and references for stress management techniques that are relevant to EPs, which the authors postulated might help career sustainability.[43] Smith and Dasan's review paper highlighted measures to improve retention, reflecting some of the work of the previous section, specifically job planning, less than full time working, portfolio careers, appropriate remuneration and well-being.[42] They then introduced sustainability work from the UK's Royal College of Emergency Medicine (RCEM).

Other findings related to retention

The participants in the study by Fitzgerald *et al*. universally identified with the term 'sustainability' when discussing their emotional and physical status related to their work.[40] This parallels the terminology used in the review by Smith and Dasan,

Table 5 Items related to retention, attrition or intention to leave EM

Experience of work	Lack of quality teamwork[48] Teamworking and non-hierarchical structure[39] Harassment by supervisors[48] and incivility[43] Job satisfaction[35 49] Excessive workloads[37] Poor working condition[37] Peer support[40 46] and professional links[47] Diagnostic challenges[38 39] Errors[43] Lack of influence at work[48]
Training and education	Absence of continuing professional education[48] Lifelong learning[46 47] Lack of training and supervision[37] Board certification (higher training) in EM[33 36] Board certification in another specialty[33 36] Fellowship in another specialty[36] Work with trainees[33] Teaching[39] New roles[40] Subspecialty training[47]
Impact of work	Worry about mistakes[48] Musculoskeletal complaints[48] Physical and emotional strain[40] Burnout[42 45 46 48] Occupational stress[42] Stress[46]
Work–life balance	Debt[34] Income[33 36 38] Flexible working[39] and predictable hours[38] Strategic approach to shift work[50] Antisocial working patterns[43] Receiving a job offer outside of medicine[48]

EM, emergency medicine.

also from the UK, along with the materials from RCEM that it references.[42]

In their study of residency trained US EPs, Hall and Wakeman found that clinicians tended to decrease clinical work and increase other types of work, such as teaching and administration, as their careers progressed.[36] Takakuwa *et al.* found that policies related to ageing were inconsistent for the EPs approaching the final years of their career.[50] While both studies were from the USA, this message is mirrored in Holmes' opinion piece from Australia.[47]

In their large study of French EPs, Estryn-Behar *et al.* found that working conditions may be more important than pay.[48] Related to money, Xu and Veloski[38] and Xu *et al*[34] found that having educational debt was associated with staying in EM in the USA.

A study from Brazil by Feitosa-Filho *et al.* found that 81.3% of EPs planned to stop working in the ED in the following 15 years.[49] A letter by Mallon (from the USA),[44] commenting on Hall and Wakeman (again from the USA),[36] expressed concern about the possibility of overestimating attrition in the USA, leading to having too many trained EPs, leading in turn to job insecurity and a fall in the perceived value of EPs.

DISCUSSION

It has been over 20 years since the first paper on retention of EPs, identified by this review, was published,[43] with a seeming trend of increased activity in this domain reflecting the growth of EM research globally.[51] Despite this relative growth, the absolute number of papers is low, and those that have been produced display significant methodological heterogeneity. The most frequently used methodological approach has been measurement, using a pre-existing scale of a psychological construct and testing to see if it is correlated with retention (or a term related to it).[39 41 45 48] Burnout is the most assessed construct,[45 48] reflecting the prominence of burnout research in both the EM[52 53] and wider medical literature.[54–56] Again, reflecting the wider medical literature on burnout, problems arise with definitions and interpretations of the term, different cut-offs used for the threshold for defining burnout, different burnout inventories used and type I errors (false positives) when multiple tests for correlation are undertaken.[57]

Despite these issues, it is useful that two studies from different continents, using two different validated measures, have linked burnout with retention (both via intention to leave),[45 48] a finding that is replicated in the nursing profession,[58] teachers[59] and volunteers.[60] Margin in life (a psychological theory of adult development) was not correlated with intention to leave[41]—the measure is most often correlated with readiness for change such, as organisational restructuring or merger.[61 62] While global job satisfaction was correlated with attrition, Xu *et al.* found that the correlation was not strong enough to use the scale predictively,[34] a finding consistent with the broader human resources literature, which finds that intrinsic job satisfaction is negatively correlated to turnover, whereas extrinsic job satisfaction has no statistically convincing link.[63]

The second prominent group of studies measured aspects of work life and alongside either attrition[33 36] or intention to leave,[49] or described policies related to retention in the final third of an EP's working life.[50] Of the many aspects of work life that Feitosa-Filho *et al.* assessed, job satisfaction— measured as a single multiple choice question with the options 'satisfied', 'neutral' and 'dissatisfied'—was the only one showing a statistically significant correlation with intention to leave.[49] The study by Lloyd *et al.*, discussed earlier, linked job satisfaction and quitting EM but not strongly enough to offer a predictive test.[35] Feitosa-Filho *et al.* found that 64% of their EPs who were satisfied and 94% who were dissatisfied intended to quit in the next 15 years; however, the baseline characteristics of their study from Brazil make it equally difficult to apply a different practice setting.[49] This does not mean that job satisfaction should be discounted—there is a long history from economics marking satisfaction as a 'major determinant of labour market mobility'[64]—and it has been linked with concepts related to retention across several professional groups, including nurses,[65] general practitioners,[66] physician assistants and nurse practitioners.[67] The second aspect of work life relates to training, with board certification (postgraduate specialty examinations in the USA) and fellowships (a period, generally a year, of subspecialty training related to the primary training specialty) correlating with lower attrition.[33 36] What it is about fellowship or board certification that influences attrition is not clear, but other studies have linked high academic achievement while at medical school[34] and the intellectual content, specifically diagnostic challenges, of the specialty as important.[38] These features can be threatened by a lack of training or supervision, excessive workloads and poor working conditions.[37]

Most of the studies examined retention from a broad, though necessarily superficial perspective. However, two studies took the opposite approach, gaining in-depth accounts from a relatively smaller number of participants.[39 40] Describing the physical and emotional strain of working in the ED as 'unsustainable' adds credence to the idea that psychological measures (such as burnout) may have utility in efforts to improve retention while simultaneously suggesting that such measures may be an oversimplification. The more social aspects of EM, such as the

flattened hierarchy[39] and peer social support,[40] move the discussion away from the individual approach to retention to the idea that the interactions between the people involved in the work of EM might be key.

The papers in this study support the notion that pay is linked to retention[26] with higher income correlating with lower attrition[36] and with those who leave the specialty having had lower incomes than those who stayed,[33] though this finding could be skewed by salaries generally rising with career length. Income was reported as a major factor in decisions to stay in EM.[38] Educational debt is another factor, representing a strong correlate with staying in EM in one study[34] and a minor factor in another.[38] It should be noted that these studies are from the USA, where both income for doctors and educational debt are significantly higher than most other counties, with the study by Estryn-Behar *et al.* from France concluding that 'working conditions may be more important than pay'.[48] The relationship between pay and retention is more complex than a linear correlation, so that even with high pay, 'pay dissatisfaction can lead to turnover'.[26] Other factors, beyond the amount of remuneration received, make pay more complex with perceptions of fairness being the most important. This is described at two levels. This first, distributive justice, refers to the distribution of pay within an organisation,[68] while the second, procedural justice, is about the process through which pay is administered,[69] with both repeatedly linked to retention both within[69] and outside of healthcare.[26 68]

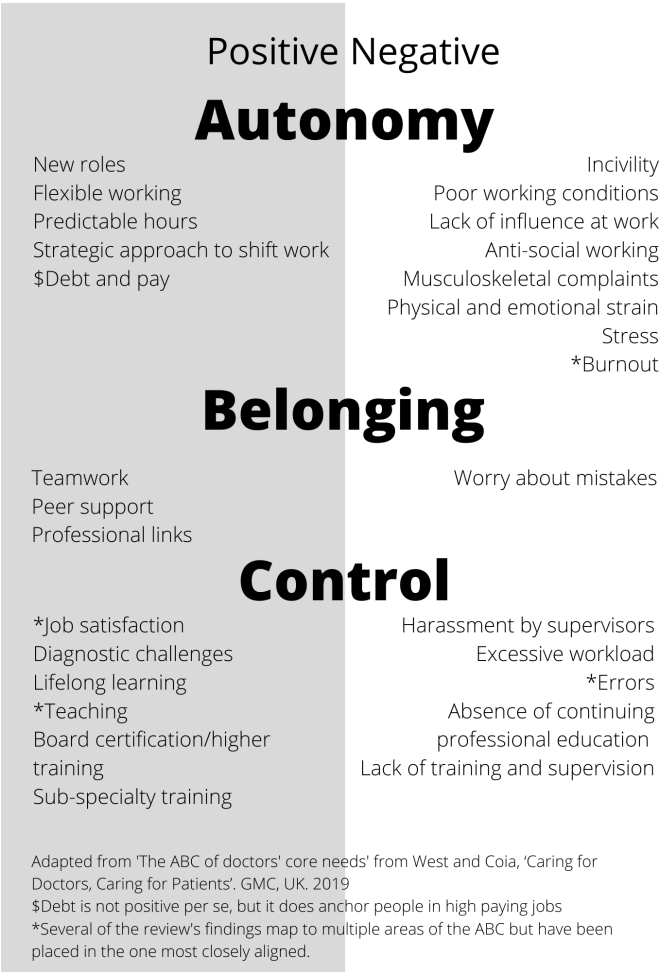

Figure 3 Review findings mapped to the ABC of doctors' core needs.

While some of the studies presented here discussed aspects of work that may be amenable to change, in order to improve retention, none tested this as a hypothesis directly. The lack of interventions in the academic literature may be due to them being reported elsewhere. It is highly unlikely that a change to a single aspect of work influencing retention would lead to measurable change—the required number of participants and scale of impact would likely be too large to be feasible. Moving towards recognising, studying and implementing change with complexity,[70] rather than imposing false notions of simplicity, will be key to any successful interventions, something that the review by Smith and Dasan alludes to.[42]

The concept of career change or evolution may be more closely aligned to careers in EM than the more linear concept of promotion, demotion and resignation. Hall and Wakeman found that clinicians decreased clinical work and increased other work though their career.[36] Portfolio careers, here meaning role diversity within a profession rather than the definition more common outside of healthcare—'individuals develop a portfolio of skills that they sell to a range of clients',[71] are gaining increasing prominence in discourses about health professions careers.[42 72] The idea that using skills developed through professional training and experience in related roles helps prevent people getting bored or jaded has strong face validity and, while there is a small body of research supporting this, the findings are not conclusive.[16]

A recent body of work published by the UK medical regulator (General Medical Council (GMC)) started with the premise that patient safety is dependent on doctors' well-being, integrated a summary of the existing academic literature with case studies and developed the ABCs of doctors' core needs; the findings of this review can be mapped to the ABC structure (see figure 3). While not the primary aim of this work, it is clear that retention was within its broader remit, with the foreword from the chair of the GMC stating that 'If we act together we will avoid losing good doctors and seize a golden opportunity to tackle the challenges the health service must meet now and in the future'.[73]

Referring to the table of definitions (table 2), we found that while the papers use terms related to retention, there is a universal lack of clear definitions; for example, Hall *et al.* use the term 'career longevity' without defining it.[33] Estryn-Behar *et al.* do not define 'intention to leave', but they do state the question they use to measure it, and in other instances, the terms related to retention come from interview participants rather than the researcher.[39 40] Lloyd *et al.* use an approach that avoids clearly defined terms, instead using short descriptive statements such as 'left job and EM altogether' consistently.[35] However, the general lack of clarity in terms related to retention is a real weakness of this body of literature. Terms such as 'attrition rate', meaning different things in different papers, if indeed they are clearly defined at all, are a potential source of confusion and misinterpretation. The table of excluded papers (online supplemental appendix 3) reinforces this confusion, with papers relating to intention to leave referring to the workplace rather than the profession, and many papers presenting an estimate for levels of intention to leave or turnover, which, while useful in that specific context, does not help with developing understanding of retention.

The scoping review process has inherent limitations; we have described the factors that influence retention but not the scale of influence of each factor. The breadth of types of papers meant that several different quality appraisal tools would have been required to do this and a decision was therefore made that this would not have added significantly to the current study.

The literature related to retention of doctors in EM yielded a variety of factors with complicated and mostly unclear interactions. Interventions to improve retention have a very limited research base. Linked to the factors influencing retention, it is likely that programmes to address a single issue are unlikely to be effective; instead, holistic approaches cutting across the multiple domains of work life should be trialled. Future research needs to embrace this complexity rather than try to eradicate it.

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Acknowledgements The authors acknowledge Helen Elwell, Clinical Librarian at the British Medical Association Library, for her expertise in contributing to the search development.

Contributors DD conceived the project. DD, LB, RB and DG developed the initial proposals for funding. DD, LB, DG, RI and RB developed the protocol. DD and UB conducted the search and extraction. DD produced the initial draft of the manuscript. LB and DG are providing direct PhD supervision for DD. RB and RI are supporting the PhD with specialty and institutional expertise, respectively. All authors contributed to and revised the final manuscript.

Funding DD is funded by a National Institute for Health Research Doctoral Fellowship for this research project. Initiation of the study was supported by the BMA Foundation Kathleen Harper Award and the RCEM Young Investigator Award.

Competing interests None declared.

Patient consent for publication Not required.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement All data relevant to the study are included in the article or uploaded as supplemental information.

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Appendix 1 Search Strategies

OVID MEDLINE

	Search Term
1	physicians/ or exp pediatricians/
2	(physician$ or doctor$ or trainee$ or foundation year or fy1 or fy2 or sho or shos or senior house officer$ or registrar$1 or staff grade or associate specialist$ or consultant$).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
3	p?ediatrician$.mp.
4	(medical practitioner$ or clinician$).mp.
5	or/1-4
6	emergency medical services/ or emergency service, hospital/ or trauma centers/
7	emergency medicine/ or pediatric emergency medicine/
8	(emergency medical services or emergency service or trauma center$ or trauma centre$).mp.
9	(emergency medicine or pediatric emergency medicine).mp.
10	(emergency department$ or emergency room or casualty department$ or "A&E").mp.
11	"accident and emergency".mp.
12	emergency training program$.mp.
13	emergency medical care.mp.
14	or/6-13
15	5 and 14
16	workforce/ or health workforce/ or personnel loyalty/ or work schedule tolerance/ or work-life balance/ or workload/ or personnel turnover/
17	burnout, psychological/ or burnout, professional/ or exp occupational stress/
18	Career Choice/
19	career mobility/
20	(workforce or manpower or staffing or retention or work-life balance or turnover or leaving medicine or exiting or burnout).mp.
21	(career adj4 (choice or mobility or progress$ or ladder or promotion or advancement or satisfaction)).mp.
22	or/16-21
23	15 and 22

EMBASE

	Search Term
1	exp physician/ or pediatrician/
2	(physician$ or doctor$ or trainee$ or foundation year or fy1 or fy2 or sho or shos or senior house officer$ or registrar$1 or staff grade or associate specialist$ or consultant$).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]
3	p?ediatrician$.mp.
4	(medical practitioner$ or clinician$).mp.
5	or/1-4
6	emergency health service/ or hospital emergency service
7	emergency medicine/ or pediatric emergency medicine/
8	(emergency medical services or emergency service or trauma center$ or trauma centre$).mp
9	(emergency medicine or pediatric emergency medicine).mp.
10	(emergency department$ or emergency room or casualty department$ or "A&E").mp.
11	"accident and emergency".mp.
12	emergency training program$.mp.
13	emergency medical care.mp.
14	or/6-13
15	5 and 14
16	emergency physician/
17	or/15-16
18	workforce/ or health care manpower/ or work schedule/ or work-life balance/ or workload/
19	burnout/ or exp job stress/
20	Career Choice/
21	career mobility/
22	(workforce or manpower or staffing or retention or work-life balance or turnover or leaving medicine or exiting or burnout).mp
23	(career adj4 (choice or mobility or progress$ or ladder or promotion or advancement or satisfaction)).mp
24	or/18-23
25	17 and 24

Cochrane

	Search Term
1	MeSH descriptor: [Physicians] this term only
2	MeSH descriptor: [Pediatricians] explode all trees
3	Physician* or doctor* or trainee* or “foundation year” or fy1 or fy2 or sho or shos or “senior house officer*” or registrar or registrars or “staff grade” or “associate specialist*” or consultant*
4	pediatrician* or paediatrician*
5	"medical practitioner*" or clinician*
6	#1 or #2 or #3 or #4 or #5
7	MeSH descriptor: [Emergency Medical Services] this term only
8	MeSH descriptor: [Emergency Service, Hospital] this term only
9	MeSH descriptor: [Trauma Centers] this term only
10	MeSH descriptor: [Emergency Medicine] this term only
11	MeSH descriptor: [Pediatric Emergency Medicine] this term only
12	“emergency medical services” or “emergency service” or “trauma center*” or “trauma centre*”
13	“emergency medicine” or “pediatric emergency medicine”
14	“emergency department*” or “emergency room” or “casualty department*” or "A&E"
15	"accident and emergency"
16	"emergency training program*"
17	"emergency medical care"
18	#7 or #8 or #9 or #10 or #11 or #12 or #13 or #14 or #15 or #16 or #17
19	#6 and #18
20	MeSH descriptor: [Personnel Loyalty] this term only
21	MeSH descriptor: [Work Schedule Tolerance] this term only
22	MeSH descriptor: [Work-Life Balance] this term only
23	MeSH descriptor: [Workload] this term only
24	MeSH descriptor: [Personnel Turnover] this term only
25	MeSH descriptor: [Burnout, Professional] this term only
26	MeSH descriptor: [Occupational Stress] explode all trees
27	MeSH descriptor: [Career Choice] this term only
28	MeSH descriptor: [Career Mobility] this term only
29	workforce or manpower or staffing or retention or “work-life balance” or turnover or “leaving medicine” or exiting or burnout
30	career near/4 (choice or mobility or progress* or ladder or promotion or advancement or satisfaction)
31	#20 or #21 or #22 or #23 or #24 or #25 or #26 or #27 or #28 or #29 or #30
32	#19 and #31

HMIC

	Search Term
1	medical staff/
2	exp Paediatricians/
3	(physician$ or doctor$ or trainee$ or foundation year or fy1 or fy2 or sho or shos or senior house officer$ or registrar$1 or staff grade or associate specialist$ or consultant$).mp. [mp=title, other title, abstract, heading words]
4	p?ediatrician$.mp
5	(medical practitioner$ or clinician$).mp.
6	or/1-5
7	emergency services/ or emergency hospitals
8	exp emergency health services/ or accident & emergency services/
9	trauma centres/
10	accident & emergency departments/
11	(emergency medical services or emergency service$ or trauma center$ or trauma centre$).mp.
12	(emergency medicine or pediatric emergency medicine).mp.
13	(emergency department$ or emergency room or casualty department$ or "A&E").mp.
14	“accident and emergency".mp.
15	emergency training program$.mp.
16	emergency medical care.mp.
17	or/7-16
18	6 and 17
19	workforce/ or working hours/ or night work/ or shift work/ or unsocial hours/ or staff turnover/ or working conditions/ or working environment/ or occupational stress/ (8095)
20	occupational choice/ or occupational mobility/
21	(workforce or manpower or staffing or retention or work-life balance or turnover or leaving medicine or exiting or burnout or working conditions or job enrichment or quality of work life or workload or work-related illness$).mp.
22	(career adj4 (choice or mobility or progress$ or ladder or promotion or advancement or satisfaction)).mp
23	((length or shift$) adj2 (work or working)).mp.
24	(working hours or unsocial hours).mp.
25	or/19-24
26	18 and 25

PsychINFO

	Search Term
1	exp physicians/
2	(physician$ or doctor$ or trainee$ or foundation year or fy1 or fy2 or sho or shos or senior house officer$ or registrar$1 or staff grade or associate specialist$ or consultant$).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures]
3	p?ediatrician$.mp.
4	medical practitioner$ or clinician$).mp.
5	or/1-4
6	emergency services/
7	(emergency medical services or emergency service or trauma center$ or trauma centre$).mp.
8	(emergency medicine or pediatric emergency medicine).mp.
9	(emergency department$ or emergency room or casualty department$ or "A&E").mp.
10	accident and emergency".mp.
11	emergency training program$.mp
12	emergency medical care.mp.
13	or/6-12
14	5 and 13
15	workforce/ or work-life balance/ or workload/ or employee turnover/ or exp working conditions/ or job enrichment/ or work rest cycles/ or work week length/ or workday shifts/ or person environment fit/ or "quality of work life"/ or workload/ or work related illnesses/
16	exp occupational stress/
17	career change/ or job satisfaction/ or occupational aspirations/ or occupational choice/
18	occupational mobility/
19	(workforce or manpower or staffing or retention or work-life balance or turnover or leaving medicine or exiting or burnout or working conditions or job enrichment or quality of work life or workload or work-related illness$).mp.
20	(career adj4 (choice or mobility or progress$ or ladder or promotion or advancement or satisfaction)).mp.
21	((length or shift$) adj2 (work or working)).mp.
22	or/15-21
23	14 and 22

Business Source Complete

S1	career choice or career decision or career selection or occupation or workforce or manpower or staffing or retention or work-life balance or turnover or leaving medicine or exiting or burnout or career mobility or career choice
S2	(physician or doctor or medical professional) OR paediatrician OR (medical practitioner or clinician) OR emergency physician
S3	emergency training program$ OR emergency medical care OR emergency health service OR hospital emergency services OR emergency medicine OR pediatric emergency medicine OR (emergency service or emergency medical services or trauma centre) OR (emergency department or emergency room or accident and emergency or accident & emergency or a&e or a & e)
S4	(emergency training program$ OR emergency medical care OR emergency health service OR hospital emergency services OR emergency medicine) AND (S1 AND S2 AND S3)

ProQuest Business Premium Collection

(pub(career choice OR career decision OR career selection OR occupation OR workforce OR manpower OR staffing OR retention OR work-life balance OR turnover OR leaving medicine OR exiting OR burnout OR career mobility OR career choice) OR ab(career choice OR career decision OR career selection OR occupation OR workforce OR manpower OR staffing OR retention OR work-life balance OR turnover OR leaving medicine OR exiting OR burnout OR career mobility OR career choice)) AND (pub(physician OR doctor OR medical professional OR paediatrician OR medical practitioner OR clinician OR emergency physician) OR ab(physician OR doctor OR medical professional OR paediatrician OR medical practitioner OR clinician OR emergency physician)) AND (pub(emergency training program OR emergency medical care OR emergency health service OR hospital emergency services OR emergency medicine OR pediatric emergency medicine OR emergency service OR emergency medical services OR trauma centre OR emergency department OR emergency room OR accident AND emergency OR accident emergency OR a e OR a e) OR ab(emergency training program OR emergency medical care OR emergency health service OR hospital emergency services OR emergency medicine OR pediatric emergency medicine OR emergency service OR emergency medical services OR trauma centre OR emergency department OR emergency room OR accident AND emergency OR accident emergency OR a e OR a e))

Emerald Insight

[Anywhere: retention] AND [Anywhere: doctors] AND [Anywhere: emergency medicine]

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	
INTRODUCTION			2-4
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	5
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	5
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	5
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	5
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	Table 3, p5
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	5
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	6
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	7 N/A
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	

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7

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	Figure 2, p8 Appendix XYZ
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	N/A
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	Appendix XYZ
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	9-11
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	12-15
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	16
Limitations	20	Discuss the limitations of the scoping review process.	16
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.
* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.
† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).
‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.
§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. Ann Intern Med. ;169:467–473. doi: 10.7326/M18-0850

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Author, Year Journal Origin	**Title**	**Synopsis**	**Rationale for exclusion**
Aiello and Mellor, 2019 J of Integrated Care UK (England)	Integrating health and care in the 21st century workforce	Describes a series of case studies demonstrating how NHS organisations have adopted integrated workforce models at scale.	The abstract did not specify the areas of practice. The paper did not contain specific example from EM.
Anwar, 1983 Ann Emerg Med USA	A longitudinal study of Residency trained emergency physicians	Questionnaire study of graduates of US emergency medicine training. Asked about background and demographic characteristics, current practice environment and position, income, clinical and academic responsibilities, career goals, commitment, and job satisfaction.	Focuses on practice demographics and, despite abstract stating the data is analysed with attention to long-term commitment to EM, a single question about career goals does not merit inclusion in the review.
Anwar and Hogan, 1979 JACEP USA	Residency-trained emergency physicians: where have all the flowers gone?	Questionnaire of newly residency trained EM physicians at the start of the specialty in the US.	Useful historical context, states some anticipated threats to retention but no specifics.
Aziz et al., 2018 J Coll Physicians Surg Pak Qatar	Female physicians suffer a higher burnout rate: A 10-year experience of the Qatar EM residency training programme	Questionnaire of EPs who have recently finished training in Qatar focusing on burnout.	Asks reasons for leaving for those who have left, but nothing on retention or sustainability.
Bragard et al., 2015 BMC Res Notes Canada	Quality of work life of rural emergency department nurses and physicians: a pilot study	Questionnaire looking at quality of work life of EPs and ED nurses in rural Canada. Pilot study.	Essentially a discussion of the methodological factors that the authors will need to attend to scale up from a pilot study to a larger one.

Branie, 2007 J of Health Org and Mgt UK	Part-time work and job sharing in health care: is the NHS a family-friendly employer?	Interviews and questionnaires of managers and workers doing part-time work and job shares.	Not specific to EM.
Chan et al., 2014 Hong Kong J. Emerg Med Hong Kong	Emergency physician job satisfaction in Hong Kong	Questionnaire of Hong Kong EPs measuring job satisfaction and intent to leave.	Focus is on intent to leave current workplace not the specialty or profession.
Chen et al., 2017 Tzu Chi Medical Journal Taiwan	A survey of the perception of well-being among emergency physicians in Taiwan	Measures self-rated wellness of EPs in Taiwan.	Self-rated measure of intent to leave relates to workplace not profession.
Doan-Wiggins et al., 1995 Acad Emerg Med USA	Practice satisfaction, occupational stress, and attrition of emergency physicians	Questionnaire sent to members of ABEM about self-rated job satisfaction, burnout and intention to quit.	Gives estimates for intent to leave and burnout but superficial and does not really address retention or sustainability.
Elder et al., 2020 Int Emerg Nurs Australia	The demoralisation of nurses and medical doctors working in the emergency department: A qualitative descriptive study	Descriptive qualitative interviews with 6 EPs and 6 ED nurses. Thematic analysis of transcripts.	While there is a discussion about coping strategies, the focus is how they cope with the stressors rather than how they use them to facilitate career sustainability.
Flynn, 2013 Ann Emerg Med USA	Emergency care crisis in the United Kingdom and Ireland: Emergency physician exodus looms in wake of pay cuts, staffing shortages	News article summarising the staffing problem in the UK and. Ireland for an international audience.	News item, useful background only.

Gallery et al., 1992 Ann Emerg Med USA	A study of occupational stress and depression among emergency physicians	Questionnaire measuring multiple different psychological scales and intention to leave.	Gives baseline figures for a population but no interrogation for themes or correlation.
Ginde et al., 2010 Ann Emerg Med USA	Attrition from emergency medicine clinical practice in the United States	Measures rate of attrition from US EM practice and destination of those leaving.	While rates of attrition are useful, they do not inform what drives retention.
Gregov et al., 2011 Croat Med J Croatia	Stress among Croatian physicians: comparison between physicians working in emergency medical service and health centers: pilot study.	Questionnaire about stress levels for those working in different conditions.	Mostly sampled general practitioners.
Kalynych et al., 2011 Acad Emerg Med USA	Application of margin in life theory to remediation and attrition rates among emergency medicine residents	Abstract for the Society of Academic Emergency Medicine 2011 Annual Meeting. Study aimed to correlate margin in life scores with attrition.	Conference abstract. Further searching identified doctoral dissertation on which the conference abstract was based which was included (Kalynych 2010).
Klasner, 2011 J Investig Med USA	Attrition rates of pediatric emergency medicine fellowship graduates	Survey elucidating the proportion of those who had completed a specific paediatric EM fellowship who still practice paediatric EM.	No data beyond estimated attrition rate.
Krywko et al., 2018 Acad Emerg Med USA	Developing a formalized wellness and professional development continuing medical education program for emergency medicine physicians	Faculty are interested in wellness as part of professional development.	No direct link to retention.
Lall et al., 2017	Burnout in board certified emergency medicine physicians	Secondary analysis of the 2014 American Board of Emergency Medicine Longitudinal Survey of EPs	Conference abstract only. Manuscript submitted for publication but not

Acad Emerg Med USA		looking for factors associated with seriously considering leaving the specialty. Age and self-reported burnout associated with higher intention to quit, career satisfaction and a higher ratio of academic writing or administration time lower intention to quit.	available in time to include in the scoping review.
Lee et al., 2013 Emerg Med J Taiwan	High risk of 'failure' among emergency physicians compared with other specialists: a nationwide cohort study	Cohort study comparing EPs, surgeons and radiologists using national level data to examine rates of leaving the profession. Higher probability of EPs leaving the profession compared with other specialties in Taiwan.	No data beyond estimated attrition rate.
Meurer et al., 2010 Acad Emerg Med USA	The incidence of emergency physician turnover: A prospective cohort study within the INSTINCT trial	Extracts turnover data for EP from administrative data helped to facilitate the running of a clinical trial.	Conference abstract. Measures turnover only. Subsequent paper focuses on this from the context of recruiting to clinical trials.
O'Connor and O'Connor, 2015 Emerg Med Australas Ireland	EM training in Ireland: are we future proof?	Review of changes to specialist training in EM in Ireland and explore barriers to sustainable, rewarding careers in the speciality.	Conference abstract. Unable to obtain full report from the authors.
Phillips 2016 Emerg Med Australas Australia	A call for ACEM to act on gender inequity in our training programme: A male perspective.	Perspective of a male trainee on gender inequality in EM in Australia.	Fleeting mention of violence as a threat to retention only link to inclusion criteria.
Reiter et al. 2016 J Emerg Med USA	The Emergency Medicine workforce: Profile and projections.	Discusses the current and projected EM workforce in the US context.	Neglects retention as a key aspect.

Schneider and Weigl, 2018 PLoS ONE Germany	Associations between psychosocial work factors and provider mental well-being in emergency departments: A systematic review.	Demonstrates links between certain work factors and well-being.	No direct link to retention or sustainability made in the paper.
Smith-Coggins et al., 2014 J Emerg Med USA	Night shifts in emergency medicine: the American Board of Emergency Medicine longitudinal study of emergency physicians.	Questionnaire looking at the impact of night shifts. EPs report that night shifts negatively impact their health.	Limited to a single question asking if nights shifts had caused them to think about leaving EM.
Thiemt, 2016 Emerg Med Australas Australia	A call for ACEM to act on gender inequity in our training programme: A female perspective.	Perspective of a female trainee on gender inequality in EM in Australia.	Alludes to factors related to retention but does not directly address any.
Thomas et al., 1991 Ann Emerg Med USA	Faculty attrition among three specialties.	Questionnaire. Sent to departmental chairs of ED that had EM trainees and Cardiology and Orthopaedic chairs at the same hospital. Asked who left and what they went to do. Interviewed those who left to try and find out why. Rates of attrition similar across specialties.	Most who left a department didn't leave the specialty. Excluded as solely focused on rates of attrition.
Van der Goot et al., 2020 Med Ed Netherlands	Trainee-environment interactions that stimulate motivation: A rich pictures study	Qualitative interviews with 15 junior doctors using the rich pictures drawing method as a visual tool to capture the complexities of the working environment.	No EPs.
van Schothorst et al., 2017 Eur J Emerg Med Netherlands	The role of emergency physicians in the institutionalization of emergency medicine.	Ethnography of looking at institutional work in EM in the Netherlands. Institutional work by EM physicians and other shapes the work domain.	Excluded as no direct link to retention in the article.

Vermare and Frappe, 2012 Ann Fr Med d'Ugence France	Career cessation in emergency medicine Abandons de carrières en médecine d'urgence	Questionnaire. Sent to all EM physicians working in a region of France. 43 questionnaires returned. Between 2000 and 2010 10 of the 43 respondents left EM.	Focus on leaving, nil on retention.
Weigl and Schneider, 2017 Int Emerg Nurs Germany	Associations of work characteristics, employee strain and self-perceived quality of care in Emergency Departments: A cross-sectional study.	Questionnaire linking work characteristics with work strain.	Focus on doctors from specialties other than EM working in the ED, for example general practitioners or orthopaedic surgeons. No direct link to retention.
Weyman et al., 2019 Int J Workplace Heal Man UK	One-way pendulum? Staff retention in the NHS: determining the relative salience of recognised drivers of early exit	Focus group defining reasons for leaving the UKs NHS, large survey to rank these in terms of importance. Not clear than any EPs are included in the sample.	Authors offered to review dataset to see if any EPs conducted the survey but unable to at time of writing due to COVID-19.
Wiley et al., 2002 Pediatr Emerg Care USA	A comparison of pediatric emergency medicine and general emergency medicine physicians' practice patterns: Results from the Future of Pediatric Education II Survey of Sections Project	Questionnaire of EM an PEM physicians.	One item was intention to leave but no other direct relevance.
Zun, 1996 Acad Emerg Med USA	Emergency Physician Terminations: Doing It Right	The paper focuses on dismissal of emergency physicians from a management perspective.	While it has some strategies to avoid getting to that point, dismissal in this context is from an employer, not from the profession.

EM = emergency medicine

EP = emergency physician

Paper Details		Study Methods			
Author Year Journal Origin	Title	Data Collection Method/s Scales/questions	Population	Approach to Analysis	Major Limitations
Estryn-Behar 2011 Emerg Med J France	Emergency physicians accumulate more stress factors than other physicians-results from the French SESMAT study	Questionnaire. Online. Copenhagen Burnout Inventory. Intention to leave (ITL) the profession with a single question. Work-family conflict scale. Satisfaction with pay scale. Job satisfaction scale. Copenhagen Psychological Questionnaire (COPSOQ). Modified Nurses Early Exit (NEXT) questionnaire.	Physicians working in France on a salaried basis. Available on-line a promoted by 2 major associations of physicians. 3196 physicians completed the survey, 538 EPs. The EPs were matched to 1924 physicians by demographic characteristics from the total study population. Available March 28th of 2007 and April 30th of 2008.	Bivariate analyses, using Pearson's Chi-square test, to determine the association of predictors with burnout and ITL. Multivariate analyses of factors linked with burnout and ITL.	Self-reported measures. Single question assessing ITL. Response bias.
Feitosa-Filho et al. 2017 Rev Assoc Med Bras Brazil	Characteristics of training and motivation of physicians working in emergency medicine	Questionnaire. Medical students applied it to participants. Author developed. General characteristics of workplace and participating EP. Main reasons for working in EM. Degree of satisfaction. Main reasons they might leave.	Physicians working in EDs of medium to large hospitals in a large Brazilian city. 24 of 25 possible sites participated. 659 EPs participated, approx. 75% of those eligible. Conducted January to March 2012.	Descriptive statistics - means and standard deviation or interquartile range and absolute values and percentages. Chi-square test was used for categorical variables and the Mann-Whitney and Kruskal-Wallis for continuous variables.	The authors interchange 'interview' and 'questionnaire'. Unvalidated questionnaire.
Fitzgerald et al.	The psychological health and well-	Interviews Conducted by the lead	Opportunistic sample of 18 EM consultants in	Interpretive phenomenological analysis (IPA). Involved multiple	Selection bias on multiple levels.

2017 Emerg Med J UK	being of emergency medicine consultants in the UK	author (clinical psychologist). Semi-structured, flexible and non-directive, open questions covering: stressors and challenges at work, relation to psychological health, experiences of coping in these circumstances and the implications of these experiences on their working career.	southwest England. From 5 of 19 eligible sites. The 5 sites had 33 whole time equivalent EPs. Between May and October 2013.	readings of transcripts focusing on the language used and semantic content, explanation, key words and phrases. Grouped into themes exemplified by specific quotations. Important contradictions highlighted. Three level validation. Fellow researcher checked themes were grounded in the data, 2 phycologists checked consistency by analysing a sample transcript, 2 participants checked the analysis for representativeness.	Consultants working full time only, geographically limited.
Goldberg et al. 1996 Acad Emerg Med USA	Burnout and Its Correlates in Emergency Physicians: Four Years' Experience with a Wellness Booth	Questionnaire Administered at a wellness booth at a conference. Maslach Burnout Inventory and a 79-item questionnaire related to demographics, practice characteristics, including intent to practice EM in the future, and health habits.	Opportunistic sample of 1272 EP attending an annual conference in the USA between 1992 to 1995.	Composite indicators generated from survey responses. Relationship between indicators and moderate/high burnout group and low burnout group compared with chi-squared test. Correlation of each independent variable with raw burnout score determined followed by stepwise logistic regression analysis to rank them. Intercorrelations between significant predictor variables in the multivariate analysis were then examined.	Statistical analysis does not control for multiple comparisons. Selection bias – attendees at a scientific conference who opt to attend the wellness both and complete the questionnaire likely to be different from the wider population of EPs. Self-reported measures of attitudes at a single time point.
Hall et al 1992 Ann Emerg Med USA	Factors Associated with Career Longevity in Residency-Trained Emergency Physicians	Questionnaire. Postal. Personal demographics, training history, professional demographics, the instrument asked those who left EM to use a three-point scale to rate the importance of aspects of practice in	US EPs who finished training between 1978 and 1982. 539 responses from a population of 858 EPs. 62.8% response rate.	Chi-square and Fisher's exact t to test the differences between responders and non-responders. Fisher's exact t test was used if the number of expected responses in any given group was less than five. Actuarial-method life-table analysis was used to determine the survival rate of EPs. Logistic regression was	Large number of variables applied to the small group who left risks non-existent correlations appearing by chance. Respondent bias. Limited to early career EPs entering the profession though residency training.

		making this decision.		used to compare those who left EM with those who remained for personal and professional demographics.	
Hall and Wakeman 1999 J Emerg Med USA	Residency-Trained Emergency Physicians: Their Demographics, Practice Evolution, and Attrition from Emergency Medicine	Questionnaire Postal. Updated version of Hall et al. 1992 above. Personal and professional demographics, practice patterns and duties, attrition rate, and reasons for leaving EM.	US EPs who finished training between 1978 and 1988. 1638 responses from a population of 2874 EPs. 58.3% response rate.	Chi-square and Fisher's exact t-test were used to test the differences between responders and non-responders. Summary statistics were used to evaluate the practice patterns of EPs. Kaplan–Meier life table analysis was used to determine the survival rate of EPs within EM. Logistic regression was used to compare those who left EM with those who remained for personal and professional demographics.	Ignores non-residency trained EPs. Unable to obtain mail lists for all residency programmes. Response bias. Large number of variables applied to the small group who left risks non-existent correlations appearing by chance.
James and Gerrard 2017 Emerg Med J UK	Emergency medicine: what keeps me, what might lose me? A narrative study of consultant views in Wales	Semi-structured interviews. Conduced by lead author - intercalating 4th year medical student. Narrative interviews covering what attracted them to the career, barriers they have encountered, if they had considered leaving, and what keeps them there.	10 consultants from 7 Welsh EDs spread across the country. Conducted between February and April 2015.	Interviews voice recorded and professionally transcribed. Analysis utilised an approach from applied policy analysis - familiarisation, identifying a thematic framework, indexing, charting and mapping, and interpretation.	Explored the views of 10 EPs in a specific geography, may not translate to other EDs or EPs. Selection bias.
Kalynych 2010 UNF Graduate Theses and Dissertations. USA	The Application of Margin in Life Theory in Regard to Attrition and Remediation Among Emergency Medicine Residents	Questionnaire Handed out at training days. Margin in life (psychological theory of adult development) scale (MILS-EM) compared with intention to leave and remediation. EM	273 responses from 452 EM residents enrolled in 10 different training programmes across 9 south-eastern states of the US.	MILS-EM and intention to leave EM, medicine broadly or chance training programme analysed with Frequency Statistics, *t*-test and Wilcoxon Mann Whitney. Other null hypothesis addressed in the thesis have their analytical plans described.	Geographically limited convenience sample. Respondent bias. Self-reported measure of intention to leave may not correlate with actual attrition. Distributed by superiors – risk of coercion.

		modification of a validated instrument.			
Lloyd et al. 1998 Acad Emerg Med Canada	Predictive Validity of the Emergency Physician and Global Job Satisfaction Instruments	Questionnaire Postal. Current job status. Demographics. Emergency Physician Job Satisfaction (EPJS) and Global Job Satisfaction (GJS) instruments. 14 'reasons for leaving' for those who have left.	232 fulltime Canadian EPs who participated in an earlier study were eligible. 209 responded. Response rate of 93.7%.	Descriptive statistics of attrition rate. Demographics and income of those who continue in EM and those who have left compared with Chi-square test. EPJS and GJS analysed using one-way ANOVA with Scheffe's test. Descriptive statistics applied to reasons for leaving.	Small and fixed sample limited by participation in a previous study. Missing data. Test properties, particularly of EPJS, poor.
Pflipsen et al. 2019 Ir J Med Sci Ireland	Why our doctors are leaving Irish emergency medicine training	Questionnaire. Free text question asking EPs to reflect on their experience of EM training in Ireland.	Sent to all 43 EPs who had left the Irish EM training scheme from 2011 to 2016. Conducted in February 2016. 30 respondents. 71% response rate.	Analytical approach not documented.	None presented by the authors. Small sample, wording of question not presented. No analytical framework for qualitative data.
Takakuwa et al. 2013 Acad Med USA	A National Survey of Academic Emergency Medicine Leaders on the Physician Workforce and Institutional Workforce and Aging Policies	Questionnaire. Online survey instrument. Demographics of respondent and EPs in their programme including age, how out-of-hours shifts are staffed, the policies, practices and attitudes towards EPs in the last decade of their career.	Sent to 146 identified EM leaders. 78 responses. Response rate 53%. Distributed October 2009.	Univariate descriptive statistics for closed question, along with standard deviations for continuous data. Thematic analysis of open questions. Bivariate comparisons by age, gender, or years as an EM leader with chi-square or Fisher exact test for categorical data.	Low response rate of mostly white men over 55. Unvalidated survey requesting large amounts of data. Only sampled from academic EDs.
Xu et al. 1994 Acad Emerg Med	Emergency Medicine Career Change: Associations with Performances in Medical School and	Cohort Study. Routinely collected data. Final year students career intention. Physicians current specialty from the	Doctors graduating from one US medical school from 1978 to 1987. Compared: those who choose EM and stay, those who move into EM	Specialty preference and actual specialty cross tabulated. Categorical variables were compared using nonparametric tests. Continuous variable analysed using ANOVA F-tests.	Results from a small proportion of graduates from a single US medical school. Statistical analysis does not control for multiple

USA	in the First Postgraduate Year and with Indebtedness	American Medical Association Masterfile. Assessment scores from medical school and specialty training. Education dept from the College registrar's office.	and those who leave. Complete career choice data for 1943 graduates. 34 had planned on EM careers. 75 graduates practicing EM.	Post hoc Duncan tests were performed for analyses with significant F-test results.	comparisons. Assumes reliability of routinely collected data.
Xu and Veloski Acad Med 1992 USA	Factors Influencing Physicians' Decisions to Remain in Emergency Medicine	Questionnaire. Distribution method unclear. Rate on a scale how much 23 different factors influenced them to stay in EM.	Sent to 53 graduates of one US medical school from 1981-1990 who stated EM as their career preference. Thirty-six responses (response rate 68%).	Mean scores of self-devised scale (0 = no influence, 1 = minor positive influence, 4 = major positive influence).	Presentation as brief communication means detail is lacking. Small sample. No rationale for choice of scale or questions.