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Role expansion for nurses in the cardiac catheter laboratory: findings from a systematic scoping review

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Abstract

Background/Aims: The cardiac catheter laboratory offers services to patients with a variety of conditions. These may include coronary heart disease, structural heart disorders and cardiac electrophysiological syndromes. Owing to the complex nature of an evolving health service and the increasing demands placed on healthcare workers, it is essential that innovative paradigms of service delivery are identified. This scoping review examines the state of knowledge regarding the rationale for change, solutions and potential consequences of expanding the roles of nurses in the cardiac catheter lab.

Methods: An exploratory scoping study approach was employed, using an established framework. Databases searched included the Cumulative Index to Nursing and Allied Health Literature, Medline and Google Scholar. A systematic search strategy spanning a date range from 1988–2018 was formulated. Titles and abstracts of 172 papers were screened; a total of 20 papers were identified for full review, including 16 from the UK, one from the United States, two from Europe and one from Australia.

Results Literature to date concentrated on seven key areas: (1) drivers for change, (2) principles underpinning change, (3) ways of developing the workforce, (4) appropriate change management, (5) recommendations for practice, (6) barriers and facilitators, and (7) outcomes.

Conclusions The cardiac catheter lab is under pressure to meet the variable demands placed upon it. There is documented evidence of a shortage of cardiac physiologists, which has a direct and measurable impact on operational efficiency and patient care. The concept of expanding the nurse's role to incorporate aspects of the cardiac physiologist's role has been explored and could be a potential solution. Role expansion and advanced practice is a well-explored model in nursing. There are many themes associated with this issue, which are outlined in this paper. There needs to be more evidence surrounding the patient's perceptions in relation to professional roles in the workplace. An economic evaluation of the costs and benefits of a multiskilled workforce would be a challenging but worthwhile endeavour.

Key words: Advanced practice; Cardiac catheter lab; Clinical nurse specialists; Multiskill; Nursing role expansion; Workforce management

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Introduction

Coronary heart disease is a major cause of morbidity and mortality among the worldwide population despite reductions in the prevalence of cardiovascular risk factors and improvements in treatment options. Statistics from the World Health Organization (WHO) report that over 400,000 deaths are attributed to coronary heart disease annually in the United States and Canada (WHO, 2018). In Europe, coronary heart disease causes almost 1.8 million deaths yearly and is a major contributor to morbidity (Nichols et al, 2013).

When the signs and symptoms of coronary heart disease occur, coronary angiography is used to determine the presence, location and extent of the disease. In cases of partial or total artery occlusion, percutaneous coronary intervention may then be used immediately to improve prognosis, relieve symptoms and reduce the occurrence of further cardiac events (O’Gara et al, 2013).

The cardiac catheter laboratory (cath lab) is a clinical area where diagnostic tests and treatments are performed such as percutaneous coronary intervention, transcatheter aortic valve implantation and electrophysiology procedures.

There has been dramatic progress in the technology and applicability of percutaneous techniques to treat coronary heart disease. There is a substantial evidence base for the application of percutaneous coronary intervention and it is firmly established as the most common procedure used in the invasive treatment of patients with coronary heart disease (Banning et al, 2015). With this increase in evidence of effectiveness, there has been a corresponding increase in procedures.

In the UK, in 2016, there were 1530 percutaneous coronary intervention procedures per million population (ppmp) compared with 2006, where 1216 percutaneous coronary interventions ppmp were performed, showing an increase of 25.8% in activity. A 30.7% increase in service provision was demonstrated with the number of percutaneous coronary intervention centres increasing from 91 in 2006 to 119 in 2016. Patients that are treated with this technique have a mean age of 65 years and, on average, 75% are male (British Cardiovascular Interventional Society (BCIS), 2016).

The number of electrophysiology procedures performed in the UK increased from 131 ppmp in 2007 to 267 ppmp in 2013, demonstrating an increase in activity of 103.8%. Complex procedures for atrial fibrillation that require more time than traditional procedures have increased by 342.9%, with 553 procedures being performed in 2007 and 2449 procedures in 2013. Indeed, 65% of electrophysiology procedures are now for atrial arrhythmias, and atrial fibrillation ablation is now the single commonest procedure. The British Heart Rhythm Society (2014) notes that demand for procedures outstrips capacity to undertake the procedures owing to poor provision of ablation services in some areas. It demonstrates that ablation is under-provided in the UK compared with the rest of Europe, with the UK achieving 291 ppmp compared with the European average of 309 ppmp for all procedures and equalling the European average of 100 ppmp for atrial fibrillation procedures, despite the UK economy being considered larger than many.

Severe symptomatic aortic stenosis in patients who are considered unsuitable for conventional surgery because of severe comorbidities can be managed with transcatheter aortic valve implantation. The development of this technique started in France in 1993. The first prototypes were tested in 2000 with the first live human implantation performed in 2002. By 2012, more than 50,000 patients had benefited from implantation worldwide (Cribier, 2012). Transcatheter aortic valve implantation was introduced to the UK in 2007 and is a growing treatment option performed in the cath lab, with 3250 performed in 2016, up from 781 in 2010 (BCIS, 2017).

As complex care and clinical skills are required in the cath lab, a range of staff, including doctors, nurses, radiographers and cardiac physiologists, is employed. Each member of the multidisciplinary team brings vital skills and the cath lab cannot currently operate without any one of them. Using this model of staffing makes the workplace vulnerable to fluctuations of personnel within any of these disciplines. This is made particularly acute by the national shortfall in cardiac physiologists. Furthermore, training capacity for this profession is insufficient to meet the growing demand. Increasing pressure to provide a comprehensive and modern service that is able to match current trends and meet the public’s expectations cause cath lab managers to experience significant challenges in keeping cath labs operational with regards to adequate staffing levels and skill mix (British Cardiovascular Society and the Society for Cardiological Science and Technology (BCS/SCST), 2015).

Current UK data highlight a shortage of cardiac physiologists as the primary cause of cath lab closures. While there are many justified concerns around recruitment and retention of nurses, the recently published ‘Integrated Health and

Social Care Workforce Plan for Scotland' (Scottish Government, 2019) outlines this issue, the shortage of cardiac physiologists, and the threat it presents to cardiac services in Scotland.

Overtime, nurses have moved towards an advanced practice model of care. There have been many attempts at advanced practice within the cath lab such as nurse angiographers (NHS England, 2018) but there is no national strategy for advanced cath lab nurse practice.

Therefore, the aim of this paper is to examine the factors associated with staffing and skill-mix challenges and determine the suitability of enabling nurses to expand their scope of practice into a much-needed direction. This could mitigate the national shortages of cardiac physiologists and ensure the cath lab remains operational so that patients can receive the timely treatment that their cardiac condition dictates.

This is not a simple solution; frequently nurses are available but are unable to assist because of a lack of appropriate training and skills. Furthermore, the national shortage of nurses is of great concern (NHS Providers, 2019), and there are perceived issues of increased stress over new roles as a result of excessive workload. Perhaps role expansion for cath lab nurses should not be viewed as a burden or an issue that will require more nurses or will increase stress level. Investing in staff through education and training and offering a new career path of advanced practice may be a potential solution to address issues of burnout, recruitment and retention, and to increase job satisfaction and attractiveness.

Methods

Establishing the scope of information associated with a broad question requires an equally broad type of review that is inclusive and inductive, rather than a highly focused systematic review targeting a specific question. For this reason, this scoping review is structured and reported using the framework proposed by Arksey and O'Malley (2005). This includes progressive steps of examining the extent, range and nature of research literature, determining the value of undertaking a full systematic review, summarising research findings and identifying gaps in the literature and knowledge base.

This methodology was selected because the purpose was to explore the broad question of the expansion of the nurse's role within the cath lab, while allowing an inductive exploration of ideas and concepts through discoveries within the literature. The breadth and differing nature of studies meant that a scoping study that identified themes and allowed description of them in a narrative representation seemed most appropriate.

Search strategy

This review was undertaken in five stages:

- Stage 1: identifying the research question
- Stage 2: identifying relevant papers from electronic databases (the Cumulative Index to Nursing and Allied Health Literature (CINAHL) and Medline, Google Scholar and Google Search), reference lists, hand-searching of key journals, existing networks, relevant organisations and conferences
- Stage 3: selection of papers for review
- Stage 4: charting the data and identifying author, title, document type and key findings
- Stage 5: collating, summarising and reporting the results.

A search strategy was formulated for each database searched, which included building up and combining search terms in order to garner a comprehensive list of results (**Table 1**). A flow diagram of the review process is demonstrated in **Figure 1**.

Databases searched for this review were CINAHL and Medline; Google Scholar and Google Search were used as a supplementary resource. The core concepts of the search were 'cardiovascular nursing' and 'clinical nurse specialists' along with 'cath lab' and 'multi-skill'.

Searches were performed on each database to improve functionality and allow tailoring of search terms and limits to meet each database's specifications.

The search and review procedure were conducted systematically as follows:

- Ran search in databases individually
- Removed duplicates within databases
- Removed duplicates between databases
- Papers screened for relevance by title
- Papers screened for relevance by abstract
- Papers screened for relevance by full text
- Accepted papers presented for analysis.

Table 1. Search strategy and terms		
CINAHL	Query	Results
S1	MH 'Cardiovascular Nursing'	2661
S2	MH 'clinical nurse specialists'	6103
S3	'cath* lab*'	869
S4	'multiskill*' OR 'multi-skill*' OR 'multidiscipline*'	52 665
S5	S1 AND S2	70
S6	S3 AND S4	33
S7	S5 OR S6	103
Medline	Query	Results
S1	'Cardiovascular Nursing'	501
S2	'clinical nurse specialists' OR 'nurse practitioners' OR 'nurse clinicians'	26 508
S3	'cath* lab*'	5496
S4	'multiskill*' OR 'multi-skill*' OR 'multidiscipline*'	75 602
S5	S1 AND S2	16
S6	S3 AND S4	34
S7	S5 OR S6	50
Google Scholar	Query	Results
S1	Cath* Lab* Multiskill*	74

Inclusion and exclusion criteria

Both quantitative and qualitative studies were included in this review. Papers were excluded if they were not written in English, were non-cardiac or involved children. Papers from the developing world were excluded to allow focus on workplaces that are somewhat homogenous in nature, to be able to extrapolate a true sense of the situation. A subjective judgement of 1988 was made as an age limit with papers older than this excluded, as percutaneous coronary intervention was in its infancy at that time so papers before that may lack relevance. Inclusion and exclusion criteria were developed using the 'PICO' framework of Population, Intervention, Control and Outcome (**Table 2**).

Search outcome

A total of 20 papers were found, including 16 from the UK, one from the United States, two from Europe and one from Australia. Overall, nine were quantitative and 11 were qualitative in nature. The authors found seven overarching themes (**Table 3**). A summary of the papers and their key points can be found in **Table 4**.

Quality appraisal

All the papers for final review were quality appraised by all four authors. There is very little written about this subject and so it was felt that it was important to give a voice to some of the work that was relevant to the field. It was noted that there were no control studies and that the bulk of the information was qualitative in nature and consisted of reflective accounts and pedagogical apparatus.

Data abstraction and synthesis

Owing to the heterogeneous nature of information gathered, a statistical meta-analysis was not appropriate. Therefore, the results were synthesised using an approach outlined by Arksey and O'Malley (2005).

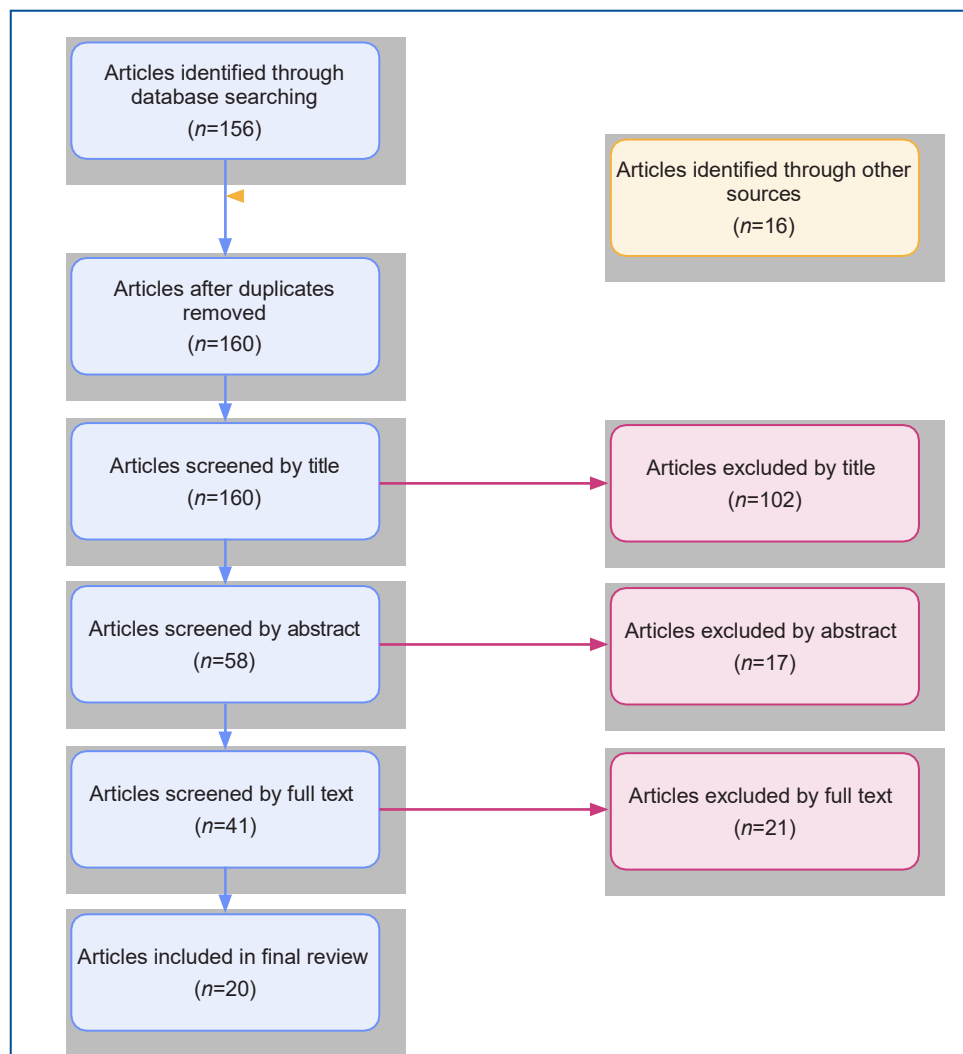


Figure 1. Flow chart of review process

Table 2. Inclusion and exclusion criteria	
Inclusion criteria	Exclusion criteria
Population	Population
Adult cardiac healthcare	Non-cardiac healthcare; children
intervention	intervention
Development of the expanded nurse's role	Any article not discussing the expansion, challenges, facilitators or barriers of the nurse's role
Control	Control
Not necessary	Studies from the developing world
Outcome	limits
Drivers for change Facilitators and barriers to expanded roles Measurements and indicators of effectiveness	Non-English language papers Pre-1988 papers

Theme	Sub-theme
1 Drivers	Staff shortages
	Suboptimal utilisation
	Increasing complexity
	Increasing patient numbers
	Increasing lab supply
2 Principles	Role shift – shared role
	Specialisation – role vs task
	Multidisciplinary teams
	Ensuring quality standards
	Regulations
3 Developing workforce	Education and training
	Support in developing training programmes
	Framework and themes
	Peer support
	Benefits to change
	Investment
	Registration
	Evolution
	Role flexibility
4 Change management	Models for change
	Negative issues with change
5 Recommendations	System change
	Adopt new technology
	Recruitment
6 Facilitators and barriers	Relationships
	Flexibility
	Role clarity, erosion and boundary issues
	Patient impact
	Lack of education and support
	Increased stress
	Extra work
7 Outcomes	Expanding scope of role
	Increased utilisation
	Positive perception

Results

The scoping review followed an iterative process of reviewing and refining the key components into seven main themes and their associated subthemes (**Table 3**). Key components were extracted and documented (**Table 4**).

Table 4. Key points of papers selected for review	
Author(s)/Working Group	Key points
Dunkley and Tagney (2013) A balancing act: the challenge of juggling dual roles	Discussion of the challenges of working as a ward nurse and a clinical nurse specialist
Griffiths and Meredith (2011) Arrhythmia nursing: technical, clinical, collaborative	Discussion of clinical nurse specialist roles in relation to patients with arrhythmias and in particular, patients undergoing ablation for atrial fibrillation in the cath lab
Stuart-Jones (2009) Considering new models of care	Discussion of the specialist nurse role, focusing on acute coronary syndromes and percutaneous coronary intervention while working in the catheter lab by taking on more of the routine work, the specialist nurses can free up time for the doctors to focus on complex cases
Smith (2002) Increasing roles for nurses	Discussion on how roles for nurses has increased and what the challenges and pitfalls are in role expansion in areas including the cath lab
Cole and Meldrum (2011) Joined-up working for nurses and physiologists: does it work?	Discussion on the team's experience of a collaborative approach to cardiac rhythm management, with specialist nurses taking on some of the role of cardiac physiologists
Callaghan (2015) Junior doctors' perceptions of the specialist nurse role in acute cardiology	Interview of doctors to ascertain their perceptions of clinical nurse specialists
Sherrill and Keels-Williams (2005) Mapping competencies for the multi-skilled health care professional: an allied health curriculum reform project	Formulation of a competency curriculum for multiskilled practitioners
Arnold (2008) Multi-skilling the non-medical catheter laboratory workforce	Announcement of the development of a multiskilling programme for cath lab staff
Pattenden and Ismail (2012) Setting up clinical nurse specialist services: what does our research tell us?	Review of the British Heart Foundation evaluations of cardiac nursing services and the lessons they hold for establishing new services
Mathieson et al (2017) The rapid access chest pain clinic and the role of the cardiac physiologist	Discussion on how cardiac physiologists are becoming involved in a service previously occupied by clinical nurse specialists
Griffiths (2008) The winding road to becoming an arrhythmia nurse specialist	Description of author's role as a clinical nurse specialist in the care of patients with electrophysiology-related problems and the challenges in this career path
Jones (2005) Role development and effective practice in specialist and advanced practice roles in acute hospital settings: systematic review and meta-synthesis	Report of a study that aimed to identify and synthesise qualitative research studies reporting barriers or facilitators to role development and/or effective practice in specialist and advanced nursing roles in acute hospital settings
British Society of Echocardiography (BSE) et al (2016) Cardiac physiology workforce options analysis	Report of multiple societies representing cardiac physiologists, detailing the challenges facing the profession
BCS (2007) Non-medical catheter laboratory staffing working group report	Report detailing the challenges facing the cath lab and suggestion of a potential pathway of multiskilled workers
Leach et al (2011) Impacts to diagnostic procedures and treatment as a result of Catheter Laboratory staff being multi-skilled after completing the Graduate Certification in Adult Cardiac Catheter Practice. Year 2 Evaluation Report	Evaluation report, commissioned by the British Heart Foundation, examining the multiskilled practitioner course hosted at London South Bank University and supported by the British Heart Foundation
Astin et al (2015) A core curriculum for the continuing professional development of nurses: Developed by the Education Committee on behalf of the Council on Cardiovascular Nursing and Allied Professions of the ESC	Description of a newly developed core curriculum aimed at cardiovascular nurses

Table 4. Key points of papers selected for review (continued)	
BCS/SCST (2015) Strategic review of cardiac physiology services in England	Report from two societies, including one that represents cardiac physiologists, detailing the landscape of cardiac physiology, its challenges and future planning
Whitfield (2006) Changing roles and practice in the cardiac cath lab	Radiographer's account of their experience of role expansion in the cath lab
Carter et al (2010) Evaluation of workforce and organisational issues in establishing primary angioplasty in England	Report for NHS England, detailing organisational and workforce issues that need to be addressed to achieve an efficient and sustainable service, including multiskilling and the ability to work across traditional boundaries
White et al (2018) Consensus statement of standards for interventional cardiovascular nursing practice	Consensus statement from the interventional nurses council based in Australia and New Zealand

The themes were stratified into a hierarchical structure of (1) drivers for change, (2) principles, (3) developing workforce, (4) change management, (5) recommendations, (6) facilitators and barriers, and (7) outcomes. A narrative summary of the search results identifying key points and housed within each theme is presented.

Drivers for change

The major reported drivers for change were staff shortages and suboptimal use of the cath labs. These were coupled with increasing patient complexity and increasing patient numbers as well as greater supply of labs (Smith, 2002; BCS, 2007; Arnold, 2008; Stuart-Jones, 2009; Griffiths and Meredith, 2011; Dunkley and Tagney, 2013; BCS/SCST, 2015; BSE et al, 2016).

Principles

The principles reported with a change in practice were primarily associated with roles shifting towards a more shared role and issues around specialisation (Smith, 2002; Sherrill and Keels-Williams, 2005; Arnold, 2008; Cole and Meldrum, 2011; Griffiths and Meredith, 2011; Dunkley and Tagney, 2013). These authors also discussed multidisciplinary team working, ensuring quality standards and regulations.

An important point raised by Smith (2002) was that the development of new roles must avoid fragmentation of the nurse's role as was noted in the early development of nurse practitioners in the United States who felt they were taking over devolved tasks at the expense of holistic patient care.

Developing workforce

Factors associated with developing a workforce were primarily focused on:

- Education and training, and supporting and developing training programmes (Smith, 2002; BCS, 2007; Arnold, 2008; Carter et al, 2010; Griffiths and Meredith, 2011; Pattenden and Ismail, 2012; Dunkley and Tagney, 2013; BCS/SCST, 2015; BSE et al, 2016)
- Discussions of framework and themes (Astin et al, 2015)
- Peer support (Griffiths and Meredith, 2011; Dunkley and Tagney, 2013)
- Investment (BCS, 2007; BCS/SCST, 2015)
- Registration (Mathieson et al, 2017)
- Evolution of roles (BCS/SCST, 2015)
- Role flexibility (BCS, 2007; Dunkley and Tagney, 2013)
- Benefits of change (Whitfield, 2006; Arnold, 2008).

Change management

The subject of change management was reported, with discussions focusing around various models for change (Griffiths and Meredith, 2011; Leach et al, 2011) and the possible negative aspects of change (Leach et al, 2011; Callaghan, 2015).

Recommendations

The identified subject of recommendations focused on changes to systems, the adoption of new technologies and techniques, and recognising issues regarding recruitment of cath lab staff, including cardiac physiologists (BCS, 2007; BCS/SCST, 2015; BSE et al, 2016).

Facilitators and barriers

There were reported factors that facilitated new working practices, such as enhanced professional relationships and role flexibility (Jones, 2005; Carter et al, 2010; Dunkley and Tagney, 2013). It was felt that better communication would be experienced as the practitioner would have a greater knowledge base and be better equipped to answer any questions. It was also noted that practitioners felt that the patient would be unaware of new roles. Therefore, from their perspective, the change in practice would go unnoticed and hence their experience would be unchanged. (Leach et al, 2011). Tied in with this were some factors reported as barriers to change, including questions of role clarity, role ambiguity, role erosion and boundary issues (Smith, 2002; Cole and Meldrum, 2011; Callaghan, 2015). The impact to the patient was reported as being a barrier to change if it was implemented without appropriate funding and training (Sherrill and Keels-Williams, 2005). Patient safety concerns regarding haemodynamic instability were highlighted by White et al (2018), as were increased stress and workload (Carter et al, 2010).

Outcomes

Finally, the outcomes that were reported as a result of this change in practice were an expanding scope of role for the nurse, along with an increase in use and an overall positive perception from other professionals (Smith, 2002; Arnold, 2008; Carter et al, 2010; Cole and Meldrum, 2011; Leach et al, 2011; Callaghan, 2015; Mathieson et al, 2017).

Discussion

Staff shortages and suboptimal use

The Strategic Review of Cardiac Physiology Services in England (BCS/SCST, 2015) recommended urgent action to address the deficit in the cardiac physiology workforce. Findings from the review emphasised that the current workforce is inadequate to meet existing demand and will struggle to meet the future challenge of delivering planned NHS changes, including the introduction of 7-day services. There appear to be three aspects associated with staff shortages and suboptimal use: the existing deficit in cardiac physiology workforce, the decline in numbers entering the workforce and an increased demand.

Existing deficit in cardiac physiology workforce

There was a predicted rise of 15.7% workforce demand from 3155 whole-time equivalent posts in 2013 to 3650 posts in 2019, and with a fall in workforce supply resulting in a shortfall of 663 posts (BCS/SCST, 2015). The results of this can be seen in an inability to provide the services required, such as urgent echocardiography, 7-day work provision and cath lab services.

Decline in numbers entering the workforce

The numbers of trainees entering the cardiac physiology workforce at a level able to deliver specialist physiology services is insufficient to meet the current shortage or projected retirement of 20% of the workforce by 2020 (BSE et al, 2016). Moreover, not all who complete their training end up working in an NHS cardiac physiology department, with losses to agencies, overseas employment and other sectors, including private industry.

Increasing demand

There is increasing demand on cardiac physiology services, particularly in the use of echocardiography, which has seen a 43% increase in demand over the last 6 years (BSE et al, 2016).

More patients, more complexity and more labs

The population in the UK grew from approximately 61 million in 2008 to approximately 66 million in 2018 (Office for National Statistics, 2019). It was noted that with the increasing age of the population, with an associated prevalence of cardiovascular disease and a rising expectation of medical care, demand for percutaneous coronary interventions and cath lab capacity would also increase (BCS, 2007). An increase of 25.8% in overall percutaneous coronary intervention procedures in the UK was noted (BCIS, 2016). More complex procedures have been taken on as routine as technology and operator skill has improved. In previous years, significant coronary disease was managed surgically, but this has declined as demonstrated with the increased number of percutaneous coronary interventions carried out, coupled with a drop in coronary artery bypass grafting of 20 000 in 2006 to 15 000 in 2016 (BCIS, 2017). There has been a significant increase in the number of cath labs offering percutaneous coronary intervention, from approximately 50 in 1996 to approximately 120 in 2016 (BCIS, 2016). The three factors of more patients, more complex procedures and more labs, combined with the challenges faced by the cardiac physiology workforce present major issues in how cardiac services will be managed in the future.

Facilitators and barriers

The ability and willingness of nurses to expand their role to meet the demands of the service has resulted in a wide variety of advanced practice roles throughout healthcare. The benefits of enhancing their responsibility, accountability and professional autonomy can be met with barriers that must be overcome and enablers that may be used. Expanding practice through advanced roles can garner benefits to the clinical environment, patient outcomes and the practitioner themselves (Elliott et al, 2016).

Continuing professional educational development is seen as vital in enabling nurses to engage in advanced practice (Fealy et al, 2015). Although there are frameworks for advanced practice in the UK, such as the advanced clinical practice framework from NHS Health Education England (2019) and the advanced nursing practice document from the Scottish Government (2017), it was felt that the lack of a definitive term for advanced practice nursing has resulted in confusion (Gardner et al, 2007), as does a lack of understanding of the advanced practice role and disparities between healthcare settings (Heale and Rieck Buckley, 2015). A major barrier seen in the international setting is the lack of statutory mechanisms for regulating advanced practice, as well as disparities in educational requirements and role titles (Carney, 2016).

Cath lab advanced nurse practitioner

The project to multiskill the cath lab workforce documented by Arnold (2008) was a potential solution to this issue. There were varied levels of successful implementation of this model throughout the UK, as evaluated by Leach et al (2011).

Nursing comprises many different and varied roles; nurses occupy an incredible diversity of skill and ability that is demonstrated in every part of healthcare. They perform a variety of tasks and many are in specialist positions through experience, training and education. Nurses truly are the multiskilled practitioners of our healthcare system.

While there have been attempts to initiate advanced practice models in the cath lab, they have been disparate and localised projects. An option may be to look to expand the role of the cath lab nurse into an area of demand seen in the gap left by the shortfall in cardiac physiologists. This natural progression may be more successful and sustainable, as some skills that the cardiac physiologist demonstrates in the cath lab, such as electrocardiogram and haemodynamic monitoring, intra-aortic balloon pump management and temporary cardiac pacing, are also within the skillset of nurses working in, for example, coronary care units and intensive care units.

This could be achieved by developing advanced practice modules specific to the cath lab and delivering them alongside existing advanced nurse practice education and training initiatives. Specific cath lab educational components and competency management could use a framework approximating the European Society of Cardiology's core curriculum for the continuing professional development of nurses (Astin et al, 2015) and a cardiac catheterisation laboratory core curriculum for the continuing professional development of nurses and allied health professions (Hinterbuchner et al, 2017).

Throughout any shift in working practice, it would be vital to maintain the fidelity and integrity of the nurse's role and endeavour to avoid repeating concerns voiced by practitioners in the United States. This was noted by Smith (2002), who felt that the development of new roles was at the expense of holistic patient care. It would be essential in establishing new roles to maintain a highly patient-focused approach that highlights fundamentals in care and nursing leadership.

What do patients think?

There was little evidence of patient's perceptions of role identification in the cath lab. It was noted that some practitioners felt that the patient would be unaware of new roles and, therefore, from their perspective, the change in practice would go unnoticed and their experience would be unchanged. However, no data to support or refute this were found in the present review.

It may be valuable to gain some insight of what service users feel about professional roles, what is their expectation around the delivery of care and what is their performance metric? Is equivalence of outcome enough or is there an expectation of traditional role boundaries?

How much does this cost?

Advanced practice roles can offer an economic benefit in relation to healthcare costs, by redirecting services away from more costly professionals to the more cost-effective nurses (Fealy et al, 2018). As nurses are trained in large numbers and qualify as such, compared to the very small numbers of cardiac physiologists, they are more cost-effective. This advantage of the economy of scale offers a financial benefit over other, more specialised, professions. Coupled with the ability of the nurse to undertake many different roles, it makes for a service that offers much for a reasonably small investment.

Previous studies point toward the need for higher-quality economic evaluations of advanced nurse practitioner and clinical nurse specialist roles to inform optimal professional role use and allocation of funds (Marshall et al, 2015). Owing to the unique nature of advanced roles, models of care, domains of practice and the specific effects on patient and provider outcomes, an economic evaluation can prove challenging. There may be scope to evaluate the economic impact of operational inefficiencies and staff shortages, and to offer cost projections regarding a potential improvement in workforce strategy.

Conclusions

While the literature demonstrates advanced roles and role expansion for nurses, there is very little regarding advanced practice in the cardiac cath lab. There is strong evidence to support a change in working modality, with well-documented staffing issues being a major driver. Themes relating to role expansion have been noted, with enhanced intra-professional relationships and improved flexibility being promoted, while role erosion and role confusion have been identified as obstacles. The changing nature of the current healthcare environment is also a factor, with an increase in patient numbers coupled with more complex procedures and more cath labs requiring staffing. The concept of multiskilling the workforce has been explored, with mixed results. It may be worthwhile to re-examine this workforce strategy by underpinning it with strong competency-based education programme and a clearly defined scope of practice.

Limitations

The purpose of this review was to identify sufficient papers across diverse perspectives to inform the current situation and future challenges. The resulting diverse focus meant that a statistical meta-analysis or such like would not have been appropriate. Previously established search strategies were not available, thus necessitating the development of new approaches. As with all reviews, there is no guarantee that all papers were found, but the thorough strategy that was used was sufficient to garner confidence in the results. Most of the papers were from the UK as it is felt that this is where the challenges facing cardiac physiology are felt most acutely, along with the fact that many other countries have different working practices, negating the need for exploration of this topic.

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