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Value and Impact Assessment of Specialist TAVI Nurses Across the UK and Ireland

Final Report

Jo Setters: Associate Research Consultant
Hannah Ross: Research Assistant
Jo Hanlon: Project Director
12/05/2024

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Acknowledgements

We are very grateful for the contribution of the TAVI nurses who have collaborated in this study and have given their time to respond to our enquiries and participation to several data gathering approaches. While these individuals are happy to be identified as collaborators in the work, no responses are attributed to specific individuals. Input was provided by...

- Lauren Deegan
- Alan Fussey
- Mairead Linnane
- Melanie Neville
- Cath Owen
- Kerry Pena
- Ornella Pih

This report is endorsed by Valve for Life and Heart Valve Voice.

This report has been commissioned by Medtronic Limited

Executive Summary

1. Introduction

Severe aortic stenosis is a disease affecting the heart valves with a growing prevalence in Europe and globally. Transcatheter aortic valve implantation (TAVI) is a treatment for this condition, which is an alternative to open heart surgery, using a less invasive ('keyhole') approach. Around 70% of the specialist TAVI centres in the UK, which offer this procedure, employ a specialist TAVI nurse. However, many of these roles are not on substantive contracts and some of these nurses may be working under heavy burdens given the number of procedures performed by the centre.

York Health Economics Consortium (YHEC) has undertaken a project to assess the potential value that specialist TAVI nurses bring to the patient pathway within the NHS, based on information obtained from TAVI nurses at seven hospitals in the UK.

2. Methods

Both quantitative and qualitative data were collected for analysis from seven participating TAVI centres. Quantitative data were acquired using a data proforma and were also sought from external sources. Qualitative data were collected through a survey circulated to TAVI nurses, as well as interviews with these nurses. Some data on case numbers were acquired from the UK National Audit Transcatheter Aortic Valve Implantation, published by the British Cardiovascular Intervention Society (BCIS).

3. TAVI centre activity

The data on TAVI centres show an increase in the number of cases being treated over the years 2018/19 to 2021/22. Centres with one TAVI nurse were performing around 80 cases per year in the most recent year for which we have data.

An additional TAVI nurse is associated with a more than doubling of the annual numbers of procedures performed. In addition, the inclusion of an administration role in the TAVI team may increase the average cases per year from 79 to 95.4.

4. Centre-based analyses

The centre-based analyses report the responses to the survey and interviews from the seven participating TAVI centres. The findings are summarised in Section 4, drawing out similarities and differences in relation to team structure, referrals and patient pathway processes, the role and impact of the TAVI nurse, and the service development work of the nurse.

For all centres, the TAVI nurse is the main point of contact for patients. They tend to be the focal point of the whole team and pathway, from referral to post-discharge follow-up. As a result, they are ideally placed to be able to identify problems and develop solutions.

5. TAVI nurse resources

Participating TAVI nurses were asked to indicate how much time they typically spend on different tasks and were grouped for analysis into eight categories which reflect the main areas of work of TAVI nurses: triage and admission; clinical work-up; inpatient care; cath lab and intervention; follow-up; administration; service development; and other.

The analysis shows substantial variation in the relative time commitment for different tasks. In particular, there are large variations in the time spent on inpatient care and on administration. There is less contrast between centres in the amount of time spent on triage and admission, and on follow-up.

Where a nurse is required to do a lot of administrative work, it can result in underuse of their clinical skills. In section 5.3.1, a simple economic analysis is presented using one centre as a benchmark and estimates that a hospital could save between £2,500 and £20,000 by employing TAVI administrative support.

There is also a range of tasks TAVI nurses undertake, which would need to be performed by doctors in the absence of a TAVI nurse in the service. In section 5.3.2, a speculative analysis suggests that, if 10 hours of consultant time is being substituted by a TAVI nurse, the savings would be approximately £40,560 per year, per centre.

Together, these analyses indicate that, by designing and allocating tasks appropriately, with a focus on the professional roles and costs of the different team members. This could potentially result in an estimated value of between £43,060 and £60,560 per year.

6. Discussion & recommendations

The number of TAVI procedures undertaken in these centres is increasing over time. This will continue to have an impact on the size and structure of the teams.

The TAVI nurse is the main point of contact for patients and for referrers, and they are responsible for overseeing the whole pathway, from referrals to follow-up clinics. The information gathered from individual TAVI centres shows the broad scope and variation in the roles of the TAVI nurse.

The analyses in this report demonstrate positive returns for having additional TAVI nurses, as well as clear benefits of leveraging the full clinical capabilities of TAVI nurses via the additional employment of administrative support. These benefits are likely to be both economic and in the functioning of the pathway and patients' experience.

7. Recommendations

Based on the analysis presented in this report, several recommendations are made:

- The TAVI nurse is an important element in the delivery of a successful TAVI programme in these centres. The role should be recognised and valued by clinical and non-clinical teams within hospitals and across the network.
- As the main contact for patients and referrers, investment and support should be given to TAVI nurse teams to help identify and reduce obstacles or bottlenecks in the patient pathway.
- A level of around 88 cases per year per TAVI nurse can be used as a point at which an increase in resources for the TAVI centre are necessary.
- Some TAVI nurses are regularly working in excess of contracted hours and have considerable stress related to responsibilities across the TAVI centre. And there should be support system in place for them including enabling them to take time off.
- TAVI centres should consider that they could benefit financially and operationally from the investment in administration support to relieve burden from TAVI nurses. This would free up time for upskill of nurses to undertake some clinical tasks and service development otherwise performed by doctors.
- It would be instructive to undertake detailed pathway mapping (including costs) across a range of TAVI centres. This could be used, alongside specialist clinical input, to develop an 'ideal' pathway that could be used as a template for current and future TAVI centres.
- In addition, and potentially as part of this same process, it would be beneficial to understand the tasks undertaken by Consultants and Fellows, to identify where any of these could be undertaken by appropriately skilled specialist nurses, with additional training.
- Alongside this, there may be benefits from structured communication and exchange of ideas between TAVI nurses so that good practice can be shared. This could be facilitated at a national or regional level.
- Consideration should be given to the potential benefits of a disease-holistic (as opposed to treatment-specific) role such as an "Aortic Valve Nurse" to ensure equal care is provided to all patients on an aortic valve pathway.
- TAVI centres should consider how to implement structured approaches to collect feedback from patients, families and carers, in order to shape the development of services and patient pathways.
- Given the variation in task allocation between centres, an expert multidisciplinary group could take the findings of this report, to provide guidance on the optimal roles and responsibilities within the TAVI nurse team, including administrative support.
- Robust data collection would allow further quantification of the patient- and system- benefits associated with the TAVI nurse team and enable the development of evidence-based recommendations.

Abbreviations

AfC	Agenda for Change
ANP	Advanced nurse practitioner
BCIS	British Cardiovascular Intervention Society
Cath lab	Catheterisation laboratory
CNS	Clinical nurse specialist
CT	Computed tomography
DGH	District general hospital
ECG	Electrocardiogram
Echo	Echocardiogram
HES	Hospital episode statistics
MDT	Multi-disciplinary team
PFO	Patent foramen ovale
PROM	Patient reported outcome measure
PREM	Patient reported experience measure
RGN	Registered general nurse
SAVR	Surgical aortic valve replacement
TAVI	Transcatheter aortic valve implantation
YHEC	York Health Economics Consortium

Introduction

(1.1) Background

Severe aortic stenosis is a disease affecting the heart valves and has a growing prevalence in Europe and the USA due to an ageing population. The condition is degenerative and if left untreated, can cause left ventricular failure and death. Up to 40% of patients die within a year of first noticing symptoms [2].

Transcatheter aortic valve implantation (TAVI) is an intervention for the replacement of the diseased aortic valve, which was developed to provide a minimally invasive ('keyhole') alternative to open heart surgery. The world's first TAVI procedure was performed in 2002. Adoption of the procedure has increased each year, and NICE clinical guidance published in 2021 recommended TAVI as first line care for patients and high surgical risk' - add NICE guideline reference.[3] In 2023 NHS England published an interim position statement confirming that they will commission more TAVI as an appropriate alternative to cardiac surgery given the in-hospital resource benefits to alleviate the pressures of the NHS backlog and support elective performance. [4] However, the number of TAVI procedures carried out in the UK has been lower than most other European nations, with geographical inequality of access to the treatment within the UK. [5]

Based on data from NHS TAVI centres in 2019, the median waiting time from referral to performance of the TAVI procedure was 141 days. Lengthy waits result in both mortality on the waiting list and deterioration of patients' conditions. [5] It has been noted that there is variation in the 'productivity' of TAVI centres, with differences in the numbers of cases seen on a 'list' performed in one day and variation in the use of general anaesthesia. This reflects local resourcing, including the availability of ring-fenced beds, and reported variability in the use of general anaesthesia in place of conscious sedation. [6]

The British Cardiovascular Intervention Society (BCIS) considers a coordinating TAVI clinical nurse specialist to be an essential component of every TAVI centre.[2]

The role of coordinator, which will be a registered nurse or an advanced practice provider, is described as 'the most valuable outside of the physician operator' in the US [8].

At present, the majority of TAVI nurses who are active in TAVI centres in the UK are not in a permanent position. Some are funded from external sources, may be on secondment from other roles and, in some cases, centres have only one nurse. This is despite the number of procedures per centre increasing.

York Health Economics Consortium (YHEC) has undertaken an assessment of the potential benefits that specialist TAVI nurses bring to the patient pathway within the NHS. These benefits may take the form of economic value, pathway efficiencies, patient outcomes and/or patient experience. The findings are laid out in this report.

(1.2) Objectives

A set of methods was designed to support a quantitative and qualitative analysis to facilitate an understanding of the work of TAVI nurses in Centres around the UK. This understanding includes the facilitators and barriers to effective work of the nurses and the TAVI centres more widely, as well as providing some understanding of the costs of TAVI nurses within the NHS.

The objectives of this work were to:

- Obtain data and evidence to identify the costs of TAVI nurses, the typical activity, features and the impacts of the TAVI nurse service.
- Obtain views from TAVI nurses about aspects of the role which work well and what could be improved.
- Summarise the learning about the impacts and perceived value that the TAVI nurse role brings to the service and for patients.
- Perform analysis for individual TAVI centres for contrast and comparison.

Methods

Both quantitative and qualitative data were collected for analysis. Quantitative data were acquired using a data proforma and were also sought from external sources. Qualitative data were collected through a survey circulated to TAVI nurses, as well as interviews with these nurses. The data were collected from seven TAVI centres and analysis performed on these individual centres. The centres have been anonymised for this analysis..

(2.1) Data Gathering and Analysis

The data proforma was developed and distributed by email to participating centres. It requested data on the activities of the TAVI centres and the role of TAVI nurses and other staff. The questions in the data proforma can be found in Appendix A.

Data on the activity of TAVI centres was sought from various sources. The most practical external source for this was the UK National Audit Transcatheter Aortic Valve Implantation, published by the BCIS. This has been used in the report to illustrate the numbers of TAVI cases performed each year by TAVI centres and the changes over the most recent four years for which the data was available.

A survey was created using Qualtrics, a survey tool used by the University of York, and circulated to participating TAVI nurses. The purpose of the survey was to collect qualitative data on the functioning of the TAVI centre and the TAVI nurses that could not be gained from the data proforma. Whilst data was identifiable when collected (to assist with the data collection process), the end results and analysis have been anonymised. The survey asked participants about what worked well about their role and what could be improved. It then asked about the impact and perceived value that the TAVI nurse role had on the service. Finally, participants were asked about the impact on patients and patient satisfaction. A copy of the survey can be found in Appendix B.

Following the data proforma and staff survey, interviews were conducted with the participants. The purpose of these interviews was to gain more qualitative evidence on the characteristics, barriers and enablers of their role. It also allowed some clarification and gap-filling of survey and data proforma submissions. The interview questions can be found in Appendix C.

The quantitative data on TAVI centre activity was used in descriptive statistical analysis to illustrate the context of TAVI activity amongst the participating centres and to reveal similarities and differences between these centres.

The qualitative data, principally from the survey and interviews, was used to prepare centre-based results, illustrating how the TAVI nurses work in each centre and the specific facilitators and barriers to their work. This includes the team structure, the focus of their tasks (e.g. on patient coordination, administration, inpatient care and participation in the TAVI procedure itself) and the amount and type of service development they are involved in.

The data on tasks and time commitments, from the data proformas, has been used to estimate some of the consequences of different working patterns and the impact of having administrative support, for example, in the team structure. This permits some speculative analyses on the economic consequences of the roles of TAVI nurses in these seven centres.

Each of these analyses provides a different perspective on the role and work of TAVI nurses. However, the full story emerges from the combination and linking of all these perspectives. The main themes coming from all the analyses are pulled together at the end of the report with some recommendations for further work.

Overview of Participating TAVI Centres

The TAVI centres have a varying number of nurses, which may impact patient capacity. Figure 3.1 and Table 3.1 indicate the number of nurses and cases at each TAVI centre for the year 2021/22.

Figure 3.1: Case numbers for TAVI centres for 2021/22

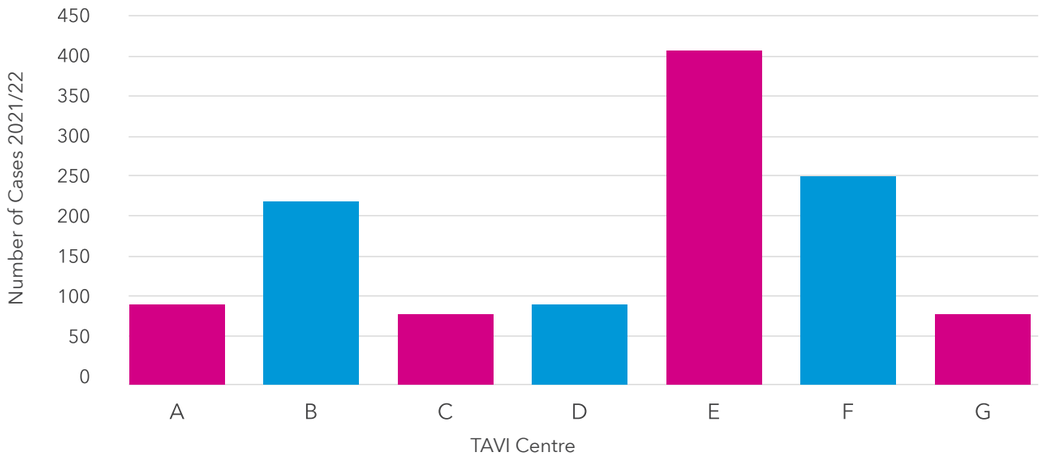


Table 3.1: Nurse and annual case numbers for TAVI centres for 2021/22

Centre	A	B	C	D	E	F	G
Number of nurses	1	2	1	1	4	3	1
Number of cases per year	87	220	75	88	403	249	75
Average number of cases per nurse	87	110	75	88	101	83	75

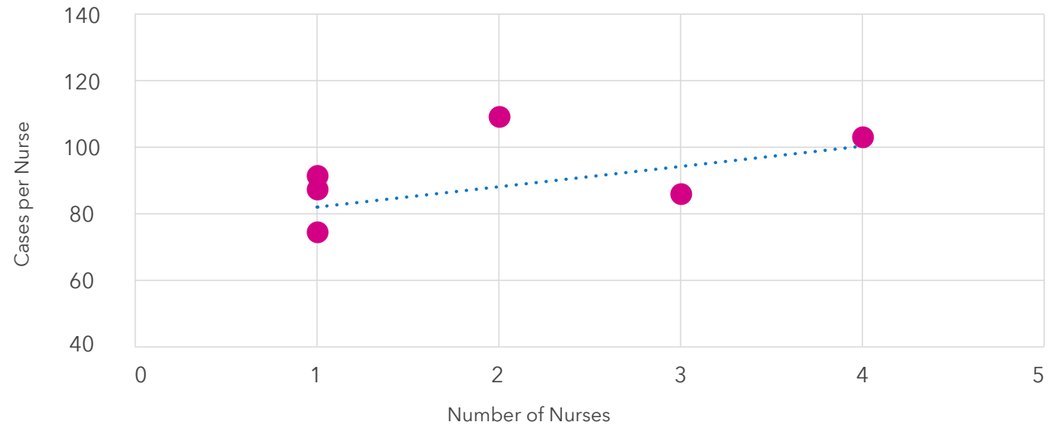
One additional nurse is associated with a doubling, or more than doubling of the case numbers for centres with one nurse.

This data shows, on average, the ratio of cases to TAVI nurses is 88. If a centre is expected to grow beyond this, they should invest in another TAVI nurse.

These data suggest that the capacity of the centre is influenced by the number of TAVI nurses. Figure 3.2 shows the number of cases per nurse across the centres, which illustrates the fact that **one additional nurse is associated with a doubling, or more than doubling of the case numbers for centres with one nurse.** This may be due to the first nurse undertaking a lot of the coordination and administrative tasks, which an additional nurse will not have to duplicate.

A trend line is included in Figure 3.2, but this should be treated with caution due to the small number of observations, as a movement in any one of the points could change the slope of the trend line. **The data appears to show that, on average, the ratio of cases to TAVI nurses is 88. i.e. if a centre is expected to grow beyond this, they should invest in another TAVI nurse.**

Figure 3.2: Number of cases per nurse per year at each TAVI centre



The number of cases per nurse are shown in Table 3.2, which also reveals an average increase in case numbers over time.

Table 3.2:
Mean number of cases per nurse per year for all TAVI participating centres from 2018/19 to 2021/22

	2018/19	2019/20	2020/21	2021/22
Mean cases per nurse	66.2	70.0	83.5	88.4

Another variable is the presence or absence of an administrative worker dedicated to TAVI in the centres.

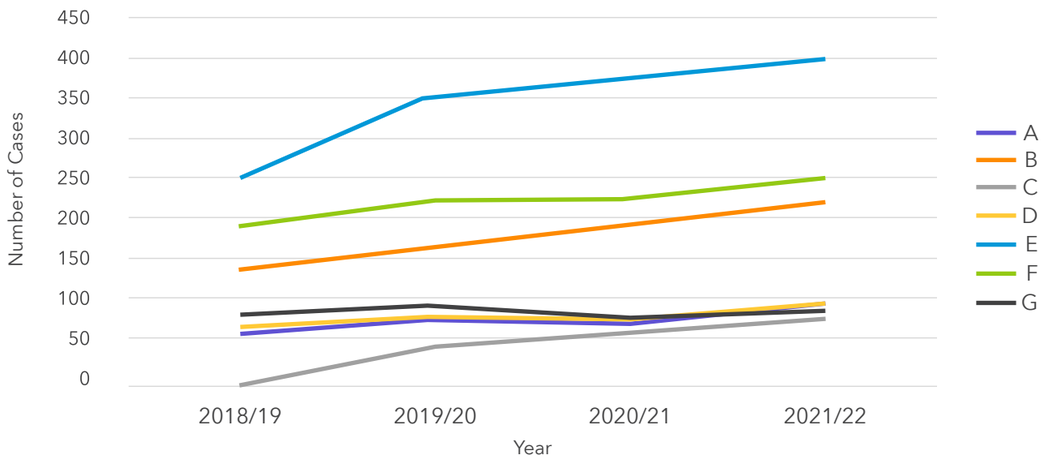
Using the data for 2021/22, the average number of cases per nurse for centres with an administration role (centres B, D, E & F) is 95.4, versus 79 for centres without an administrator. The presence of a dedicated TAVI administrator correlated to an average of 16.4 additional procedures cases per year.

Table 3.3: Number of cases per nurse with and without administrator role

	Administrator role?		
Average number of cases per nurse per year	Yes	No	Difference
	95.4	79	16.4

Figure 3.3 shows the number of cases at each TAVI centre over time. The figure shows an increase in cases at the TAVI centres across the board, except for centre G, which is stable. The TAVI centres that only employ one TAVI nurse appear to have converged in terms of case numbers, which implies a limit in capacity of around 80 cases per year. The capacity of a centre is dependent not only on the number of TAVI nurses, but reflects multiple factors, as described in Section 4. However, the nurse may be instrumental in establishing the overall capacity of a centre to perform TAVI procedures.

Figure 3.3: Number of cases over time for TAVI centres from 2018/19 to 2021/22



* Please note that the case numbers in Figure 3.3 are given per centre, rather than per nurse and hence centre E has around four times as many cases with its four nurses compared with centres such as centre D with only one TAVI nurse.

Centre-Based Analyses

(4.1) Introduction

This section of the report provides results about each of the TAVI centres that has participated in this analysis. The information in the following subsections is taken from all three of the data-capture methods: the data proforma, the online survey and the semi-structured interviews, with an emphasis on the qualitative data from the latter two.

The full accounts for each centre can be found in Appendix D. This section summarises those accounts, drawing out similarities and differences between centres.

(4.2) Team Structures

There is variation in the staff profiles across the centres participating in this analysis, as shown in Table 4.1. Notably, some centres have administrator roles to support the teams, and this can have an impact on the amount of time a TAVI nurse spends on administrative work (see Section 5.3.2 for the financial impact of this).

Where a nurse is required to do a lot of administrative work, it can result in underuse of their clinical skills. Even in centres where the nurse's role is clinically focussed, there may be opportunities for further upskilling of the nurse roles with expansion of the centres' work.

Table 4.1: Staff roles and numbers in the TAVI centres

Role	Centre						
	A	B	C	D	E	F	G
TAVI Nurse	1	2	1	1	4	3	1
Implanting Consultant	3	4	3	4	NR	6	2
TAVI Fellow	0	0	0	0	0	0	1
Administrator	0	1.5	0	2	1	1	1

NR: not recorded.

All but one of the centres have experienced an increase in referrals over recent years, with one centre experiencing a plateauing of case numbers with the current staff structure. In part, this is due to some of the centres having been established fairly recently. However, the increase in referral numbers is expected to continue and the education and awareness raising among referrers, carried out by the TAVI nurses, is a contributory factor in this.

The nurses tend to have a high workload. This is reflected in the reported average hours worked, shown in Table 4.2. All the nurses were contracted to work a standard 37.5-hour week yet most reported working longer, on average 42.7 hours.

Table 4.2: Average hours worked per week, as reported by TAVI nurses

	Centre						
	A	B	C	D	E	F	G
On average, how many hours do TAVI nurses work in a typical week?	42.5	41.5	50	45	40	37.5	42.5

Where TAVI centres report being at or over capacity, a consequence can be that patients wait longer for treatment and then come to the centres with a more advanced condition.

This can result in worse treatment outcomes, as the patients are not at their optimal level of fitness at the point of treatment. In addition, it can increase the anxiety of patients as they have been given a concerning prognosis and then have been obliged to wait for treatment.

In centres that have more than one TAVI nurse, the areas of responsibility appeared more defined, with individual areas of responsibility, such as nurse-led outpatient care, clinical triage, inpatient pathway management, clinical cath lab support etc. With the addition of an administrator, the TAVI nurse role can have a clearer focus on clinical areas. Without this, the burden of managing the service and the pathway can lead to considerable stress.

In general, the TAVI nurses report that they feel valued by the implanting consultants, although often less so by service managers, as shown in Table 4.3. There is a sense that the roles and responsibilities of the TAVI nurse needs to be better understood by service managers and the wider team.

Table 4.3: Self-report of how the role of TAVI nurse is valued

Centre	How valued do you feel the role of TAVI nurse is by the implanters at your centre?	How valued do you feel the role of TAVI nurse is by the service managers at your centre?
A	Extremely valued	Neutral
B	Extremely valued	Extremely valued
C	Extremely valued	Extremely undervalued
D	Extremely valued	Moderately valued
E	Extremely valued	Moderately valued
F	Moderately valued	Moderately valued
G	Moderately valued	Moderately valued

(4.3) Referrals and Patient Pathway

In the TAVI team in each centre, the TAVI nurse is the main point of contact for patients and for referrers. They are responsible for overseeing the whole pathway, from referrals to follow-up clinics. It is clear from interview responses that the quality of referrals

can vary from one referrer to another. When there is missing information or tests to chase up, it can create extra work for the TAVI nurse and delay for patients.

There are also pre-pathway elements of care that can make a difference to patient outcomes. Waiting times from the point of first referral can be lengthy and there is variation in how this is measured. Often a patient is considered to be 'waiting' once they have been referred to the specialist TAVI centre. However, as suggested by one TAVI nurse, patient waiting times should be measured from the point of aortic stenosis diagnosis which often occurs once seen by the district general hospital (DGH) cardiologist. This can have an important impact on the length of measured 'waiting times'.
In all cases, **it is important to consider the level of deterioration a patient may experience and the risk of mortality while waiting to have their procedure, which highlights the importance of TAVI nurses clinically managing patients on the waiting list.**

The length of time to post-procedure follow-up also varies. Follow-up clinics may be held from three months to eight or nine months post-procedure. The reasons for this variation may be due to capacity pressures and availability of doctors and TAVI nurses but could also be influenced by locally established policies.

There are many points where bottlenecks were reported to occur in patient pathways. Some of these are beyond the direct management of the TAVI team itself. Examples include:

- Bed availability for post-procedure recovery. This is the most commonly cited reason and affects cardiology services beyond the TAVI team. This capacity restraint results in a limit to the number of cases that can be performed, even when there is capacity within the team itself. In one centre, it is understood that patients may be referred elsewhere or choose to go to private centres as a consequence of these capacity limitations.
- There may be restrictions on the availability of consultants for clinics and this can be affected by short notice on-call requirements for the consultants.
- Discharge procedures can have an impact on the pathway, where a patient is ready to go home, but a doctor is needed to approve the discharge and a patient has to wait until one is available.
- There are also disruptions to pathways when a patient requires an alternative surgical approach, as opposed to the more common transfemoral TAVI which is used in 93.3% of cases[7].
- The availability of anaesthetists for the procedure. To overcome this, one centre is moving towards doing lists without the requirement of having an anaesthetist present. Although it is notable that 93.9% of TAVI procedures are performed under conscious sedation[7].

The TAVI nurse is the main point of contact for patients and for referrers, and they are responsible for overseeing the whole pathway

It is important to consider the level of deterioration a patient may experience and the risk of mortality while waiting to have their procedure, which highlights the importance of TAVI nurses clinically managing patients on the waiting list

(4.4) Role and Impact of TAVI nurses

Participating TAVI nurses were asked about specific skills they have. Table 4.4 shows that all of them have clinical assessment skills and about half are nurse prescribers.

Table 4.4: Specific skills of TAVI nurses

Skills	Centre						
	A	B	C	D	E	F	G
Clinical assessment	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Nurse prescriber	No	Yes	No	Yes	Yes	No	Yes

For the patient, the nurse is their advocate throughout the pathway, during which they may experience high levels of anxiety.

The nurses are also a main point of contact for other services, engaging with referring hospitals and seeking to improve communication.

The most common way that the role of the TAVI nurse was described was as the main point of contact for patients and for other services. **For the patient, the nurse is their advocate throughout the pathway, during which they may experience high levels of anxiety.** The nurses educate the patient about their condition and treatments and how to manage their symptoms. As well as educating patients, they educate stakeholders on every aspect of the pathway. For patients on the pathway, they respond to phone calls from the patients and their families/carers. These are usually calls about general information as well as requesting specific information on patient progress. **The nurses are also a main point of contact for other services, engaging with referring hospitals and seeking to improve communication with them.**

As part of the TAVI pathway, the nurse's clinical role can include pre-assessment of patients, triage of referrals, participating in ward rounds, participating in multi-disciplinary teams (MDTs), working with the ward staff to achieve early post-TAVI mobilisation, and running follow-up clinics. There is also administrative work, the extent of which varies substantially between centres. This can include substantial time spent chasing up tests and confirming information, organising transfers for CT scans, and outpatient appointments.

As noted previously, where there is more than one TAVI nurse, an apportioning of different tasks can be done, giving different areas of responsibility to each one (as opposed to all contributing to the same tasks). It is common for a TAVI nurse not to participate in the actual procedure but, where there is more than one TAVI nurse, one of them may be assigned the responsibilities of the cath lab.

TAVI nurses indicate that their role has improved patient pathways and the quality of the service offered by the centre.

For example:

- Reducing waiting lists.
- Reducing cancellations.
- Enabling earlier discharge.
- Reducing risks due to proper planning of procedures.
- Improving the outcomes for the centre, by prioritising patients based on clinical need.

In addition, the role of the TAVI nurse frees up the time of consultants to perform other tasks, which increases the number of TAVI procedures that the centre can perform.

As illustrated in Table 4.5, the TAVI nurses are mostly of the opinion that their work has increased the number of cases that their centre treats. However, they all consider that there are unmet needs.

Table 4.5:
Perceived impact of TAVI nurse on number of cases and perception of unmet need

Question	Centre						
	A	B	C	D	E	F	G
Do you think that having a TAVI nurse in your service has impacted the number of patient referrals?	Yes	Yes	Not sure	Yes	Yes	No	Yes
Do you think there are any unmet needs in your service?	Yes	Yes	Yes	Yes	Yes	Yes	Yes

In some centres, the TAVI nurses feel that they are effectively responsible for everything related to TAVI. More than one respondent reported a sense that, in their absence, there would be fewer procedures performed and two indicated that the whole centre would cease to function without them.

Not all TAVI centres have formal patient feedback processes. One centre that does, uses the NHS Friends and Family tool and another centre uses an annual patient feedback questionnaire. One centre is setting up PROMs (patient reported outcome measures) and PREMs (patient reported experience measures). In addition, one centre organises an annual afternoon tea with a group of patients and families with a small presentation from the team. Informal feedback is typically received and recorded, such as at follow-up clinics. The feedback is generally very good and in some cases is considered to have improved since the TAVI nurse began their role. Dissatisfaction was commonly associated with waiting times.

(4.5) Service Development

All the TAVI nurses discussed service development as part of their role. In some instances, this was a key expectation within their defined role and responsibilities. In other cases, there was a sense that this responsibility was left to them, in lieu of other professionals taking it on.

As the TAVI nurses are involved throughout the pathway, as described above, they are ideally placed to identify where improvements are needed.

In general, the service developments that the nurses are carrying out, or hoping to bring about in the future, relate to improving the patient pathway, increasing the resources of the team with an additional nurse or administrator, and improving information and communication for patients.

Examples of Service Developement

The principal barrier to these service developments is the availability of resources including time, staff, financial, trust support and other structural organisational barriers

TAVI Nurse Resources

(5.1) Time Allocation Across Tasks

Respondents were asked in the data proforma to estimate the average time they spent on different tasks per week. There was considerable variation in the responses, highlighting that the roles and responsibilities differ between centres.

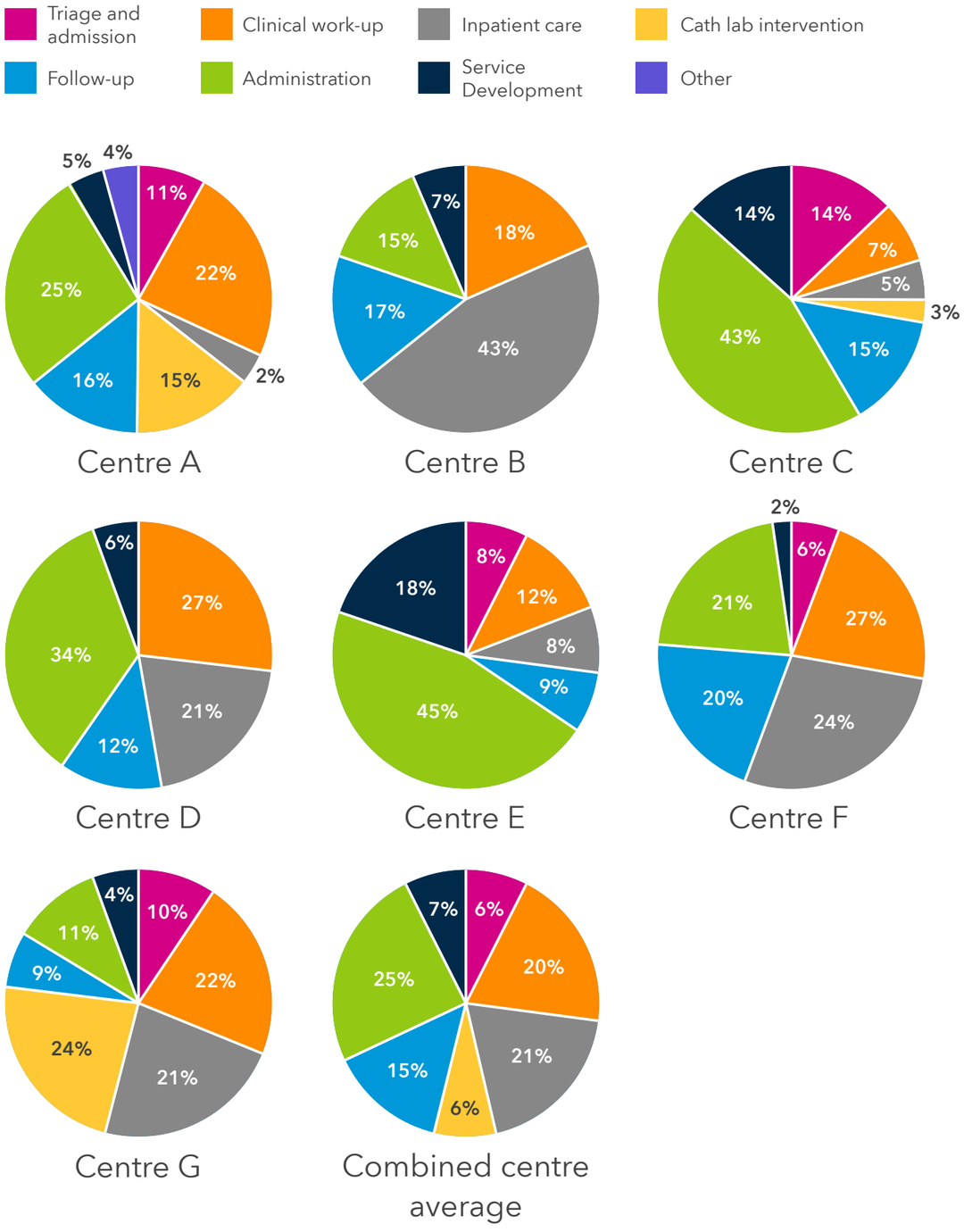
Some TAVI nurses do not participate in daily ward rounds; some do not carry out triage of new referrals. However, participation in MDT meetings and responding to phone calls were common to all respondents. The responses were based on recall and must be taken as indicative only, rather than showing precise amounts of resource.

To make a useful comparison between the centres, the activities have been grouped into the following categories:

Category	Tasks
Triage and admission	Triage of referrals New patients
Clinical work-up	Pre-assessment clinic Analysing CT scans MDT discussion Surveillance clinic (pre-TAVI) Pre-op test results review clinic
Inpatient care	Daily ward round Inpatient reviews Clinical patient review
Cath lab and intervention	Patient support and medication during TAVI Post-TAVI ward handover TAVI conscious sedation (biweekly) Loading the valve
Follow-up	Nurse-led follow-up clinic Post TAVI discharge Remote monitoring/virtual
Administration	Phone messages Administration Database Case listings Cancelling and rebooking procedures
Service development	Service development
Other	Teaching and education Audits Organising cath lab stock, liaising with industry

Figure 5.1 shows the proportion of time the TAVI nurse in each centre spends on these different groups of tasks (average per week), as well as the average across all seven centres.

Figure 5.1:
Percentage of TAVI nurse time spent on each task type (average per week)



This figure shows the variation in how the TAVI nurses spend their time. Of note is the percentage of time spent on administration by the nurses in centres C, D, and E, which are high compared with the combined centre average of 25%. The nurses in centre B devote over double the average percentage of time to inpatient care, with nurses at centre F also above the average in this category. Only in centres A and G do the nurses devote a substantial amount of time to the cath lab and intervention activities, with centres B and C devoting some time to this category, but much less (B devotes less than 0.5% of their time to cath lab and intervention activities). This is borne out in interviews in which some TAVI nurses stated that they do not have any involvement with the TAVI intervention itself. Centres B and D devote no time to triage and admissions whilst the other centres are similar regarding time allocation to this activity category.

There is greater similarity between centres in the amount of time spent on clinical work-up, with only centre C displaying much variation from the combined centre average. There is also a smaller range between centres in the percentage of time spent on follow-up tasks, with all centres falling around the combined centre average.

(5.2) The Financial Allocation of TAVI Nurse Time

To estimate the financial allocation of the time that TAVI nurses spend on the different activity types, the actual time reported has been re-based in each case to the equivalent for a standard working week of 37.5 hours.[1] This is to avoid the distortion caused by imperfect recall by the nurses, resulting in the total time allocated to tasks not being equal to the total time worked.

All the principal nurses are Agenda for Change (AfC) Band 7. The PSSRU estimates that the value of one working hour of a Band 7 hospital nurse time is £64.[2] This figure includes the nurse's salary, employment on-costs, overheads, costs of qualifications and accounts for the proportion of time spent working [1]. Figure 5.2 shows the financial value of the amount of time spent on each group of tasks (using the same grouping as above). Note that the value scale is different for each task group. The specific values for each of these activity categories in each centre are presented for reference in Table 5.1.

Figure 5.2 and Table 5.1 show that there is a relative similarity in the resource devoted to follow-up across these seven centres and, to a slightly lesser extent, to clinical work-up. There is a notable difference in the resource directed to inpatient care and to cath lab and intervention. However, the value of resources directed to inpatient care is generally higher than that directed to cath lab and intervention tasks (except for centres A and G), with three centres devoting no TAVI nurse resource to cath lab and intervention tasks. Inpatient care and administration show the widest ranges of values. For the inpatient care category, the value of nursing resource dedicated ranges from £41 per week to £1,026 of per week. For the administration category, the value of nursing resource dedicated ranges from £255 per week to £1,038 per week. There is also notable variation in the amount of time directed to service development, although the values are lower.

1. The percentage of time spent on each task was calculated from the original data for each nurse. This percentage was then applied to a standard working week of 37.5 hours to produce the re-based figure in hours.
2. Annual and unit costs for hospital-based nurses. Band 7. Cost per working hour

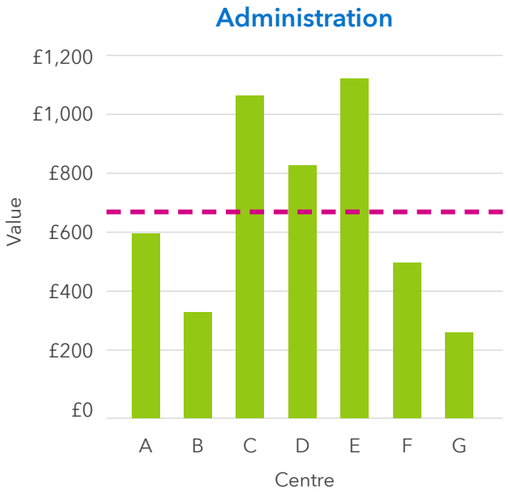
Much of the variation in the resources spent on each type of task will reflect different working practices in the TAVI centres. The TAVI nurses have a focus on different parts of the overall pathway, from admission to follow-up, as evidenced by the survey and interview responses. Only one nurse reported time spent on 'Other' activities: Centre A with a value of £101. As a result, no graphic is shown for this in Figure 5.2.

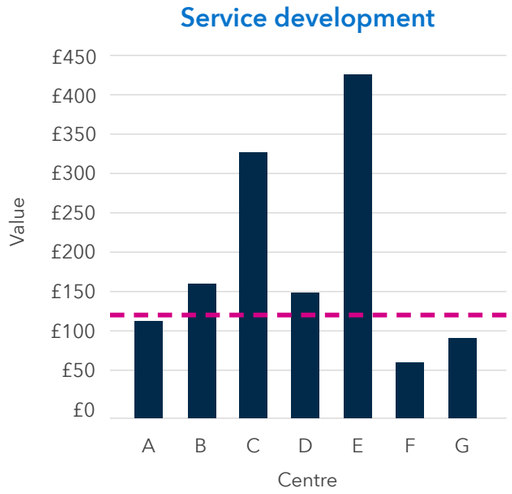
Table 5.1:
Financial allocation of TAVI nurse time spent on each task type, re-based to a 37.5 hour working week

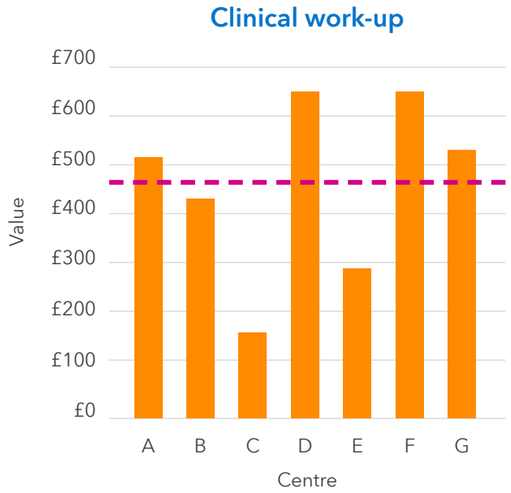
Task category	Centre						
	A	B	C	D	E	F	G
Triage and admission	£274	£0	£324	£0	£183	£142	£233
Inpatient care	£41	£1,026	£130	£495	£189	£568	£511
Clinical work-up	£521	£427	£162	£643	£296	£639	£525
Cath lab and intervention	£366	£5	£65	£0	£0	£0	£584
Follow-up	£384	£419	£357	£297	£218	£483	£204
Administration	£603	£358	£1,038	£816	£1,088	£511	£255
Service development	£110	£164	£324	£148	£426	£57	£88
Other	£101	£0	£0	£0	£0	£0	£0
TOTAL	£2,400	£2,400	£2,400	£2,400	£2,400	£2,400	£2,400

NB. The PSSRU based costs reflect the true cost of employment and not the weekly salary.

Figure 5.2: **Financial allocation of TAVI nurse time wte spent on each task category, re-based to a 37.5 hour working week, with average for each task shown as a horizontal line**







(5.3) Role Substitution

To estimate the financial allocation of the time that TAVI nurses spend on the different activity types, the actual time reported has been re-based in each case to the equivalent for a standard working week of 37.5 hours.

This is to avoid the distortion caused by imperfect recall by the nurses, resulting in the total time allocated to tasks not being equal to the total time worked.

(5.3.1) Administrators

A comparison of different centres allows us to undertake some benchmarking of resources. Centre G devotes the lowest nursing resource to administration (£255 for the figures re-based to a working week of 37.5 hours). This centre has two TAVI nurses and one administrator.

We have used this as a benchmark for how much other centres could reduce the administration tasks of their nurses and calculate the economic impact of such a change. The hourly cost of a Band 7 nurse is £64 and the equivalent for a Band 4 member of hospital staff is £34,[3] giving a difference of £30 per hour [1].

This is to avoid the distortion caused by imperfect recall by the nurses, resulting in the total time allocated to tasks not being equal to the total time worked.

3. Hospital-based scientific and professional staff. Band 4. Cost per working hour

Table 5.2: Potential savings in TAVI nurse time spent on administration, compared to benchmark

Centre	Time shifted to administration staff (hrs/week)	Cost of nurse time per week	Cost of Administrator time per week	Potential saving per week	Potential saving per year
A	5.2	£335	£178	£157	£8,156
B	1.6	£103	£55	£48	£2,515
C	12.2	£783	£416	£367	£19,074
D	8.8	£561	£298	£263	£13,679
E	13.0	£833	£442	£390	£20,298
F	4.0	£256	£136	£120	£6,238

This shows that, **using inter-centre comparison as a benchmark, there are potential savings of up to just over £20,000 per annum available from shifting tasks from TAVI nurses to administration staff.** This only reflects the economic value of the shift of tasks. If this were to be done, there would also be up to 13 hours per week (676 hours per year) available for a TAVI nurse to do other tasks, which would also have a value in potentially improving the patient pathway and, possibly, enabling more cases to be treated.

This comparison is based on savings per nurse, so these savings could be multiplied in centres that have more than one nurse. However, caution should be taken in assuming this, as the centres with more than one nurse have the possibility of organising roles and responsibilities in different ways and as noted earlier, the TAVI nurses have different roles in different centres, so all comparisons should take this into consideration.

Using inter-centre comparison as a benchmark, there are potential savings of up to just over £20,000 per annum available from shifting tasks from TAVI nurses to administration staff.

(5.3.2) Consultants/fellows

The TAVI nurses have reported[4] a range of tasks they undertake, which would need to be done by doctors in the absence of a TAVI nurse in the service. These are as follows:

- Reviewing patients in the day ward and in clinic – follow-up and monitoring.
- Coordinating the TAVI list on a weekly basis and prioritising patients.
- Liaising with different departments and organising tests (e.g. radiology, outpatients department, coronary care unit, cath lab).
- Triaging referrals and managing the active TAVI waiting list.
- Planning and attending MDT meetings.
- Acting as the point of contact for the patient.
- Preventing admissions by managing patients in the community with GP support.
- Dealing with referrals from other consultants/ hospitals.
- burden from TAVI nurses, thus freeing up time for upskill of nurses
- Educating nursing staff.
- Inpatient management.
- Coordinating with industry.

As these are tasks that the TAVI nurses are not consistently performing at present, the average time spent on them per week it is not known. However, if we take a nominal time requirement of 10 hours per week that might be spent on these activities, we can consider the potential cost implications of doctors having to spend time on these tasks in the absence of a TAVI nurse.

A Band 7 nurse has a cost of £64 per working hour (see above). From the same source [1], a consultant has a cost of £142 per working hour.[5] This gives a difference of £78 per hour, which is £780 per week, and £40,560 per year, for a substitution of 10 hours of time per week. This is entirely speculative and further research on consultant and fellow activities in TAVI centres would need to be undertaken to gain a more robust understanding.

Together, the analyses in 5.3.1 and 5.3.2 indicate that there may be considerable scope for improvements in resource use, by designing and allocating tasks appropriately, with a focus on the professional roles and costs of the different team members. This could potentially be to an estimated value of between £43,060 and £60,560 per year.

There were no instances where a TAVI nurse reported that they were doing tasks that ought to be done by a consultant or fellow. However, there were examples in the survey and interviews where nurses indicated that they might gain additional skills to undertake further tasks currently undertaken by doctors. These included:

- Analysing CT scans.
- Post TAVI discharge, including medication.
- Providing patient support and medication during the TAVI procedure.

There were no instances where a TAVI nurse reported that they were doing tasks that ought to be done by a consultant or fellow. However, there were examples in the survey and interviews where nurses indicated that they might gain additional skills to undertake further tasks currently undertaken by doctors. These included:

- Analysing CT scans.
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- Providing patient support and medication during the TAVI procedure.

Together, the analyses in 5.3.1 and 5.3.2 indicate that there may be considerable scope for improvements in resource use, by designing and allocating tasks appropriately.

4. Information obtained via a separate enquiry, not from the data collection
5. Annual and unit costs for hospital-based doctors. Consultant: surgical proforma.

Discussion

6.1 TAVI Centre Activity

The activity data show that the numbers of TAVI procedures is increasing. Some of the centres in this analysis only began performing the procedure in the last few years and so have been establishing themselves, which will influence their case numbers.

Nevertheless, the trajectory is clearly towards higher numbers, which has implications for the size and structure of the teams required in the future. **On average, the number of cases per TAVI nurse is 88. The data analysed here show that an additional TAVI nurse is associated with a more than doubling of the annual numbers of procedures performed.**

6.2 Role of the TAVI Nurse

In the TAVI team in each centre, **the TAVI nurse is the main point of contact for patients and for referrers, and they are responsible for overseeing the whole pathway, from referrals to follow-up clinics.**

Beyond this, the information gathered from individual TAVI centres shows the broad scope and variation in the roles of the TAVI nurse.

The TAVI nurses all take on an extensive list of tasks as part of their role. These include managing waiting lists, liaising with referring centres, acting as the main point of contact for patients throughout the pathway, running nurse-led clinics, participating in ward rounds, and organising and participating in MDT discussions. **These activities extend far beyond individual patient care and beyond the TAVI centres themselves, including work with referring centres and educating other practitioners.** There is some sense that the importance and extent of these tasks is not fully understood by colleagues in NHS trusts.

Whilst this can make for an interesting and rewarding role for TAVI nurses, it can also result in significant burdens, as the nurses are relied upon to do many of the tasks that are essential to the functioning of the centre and the patient pathway, without appreciation of the skills and time this

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requires. There are also cases where nurses are routinely working longer than their contracted hours and feel pressure not to take time off.

One important part of the role that came up repeatedly was the TAVI nurse being the main point of contact for patients throughout the pathway. This is greatly appreciated by patients and appears to be related to improved feedback on the services. The nurse can be the only person involved across the whole patient pathway, from referral to post-procedure follow-up. This gives them **a key role in service development and improving the pathway as they can see where any problems and opportunities might be.**

There appears to be a general sense that some TAVI nurse roles do more administration work than others. **Where a nurse is required to do a lot of administrative work, it can result in underuse of their clinical skills.** However, there is a lot of coordination within the roles of most of the TAVI nurses who participated in this analysis. Some may consider these tasks to be 'administrative' and others may consider them to be assisting the patient pathway - for example, booking appointments or chasing up investigations. The results about 'administrative' work in this report should be read with this in mind.

The structure of the wider team, including the numbers of consultants and fellows, may have an impact on the appropriateness of different tasks for the TAVI nurses. Furthermore, there is also a question as to whether the role of the TAVI nurse should be expanded to cover other structural heart condition pathways, such as SAVR. This is happening in at least one centre and may indicate a future direction of travel more broadly. As noted previously, with a team of TAVI nurses the service can benefit from each nurse having ownership of specific tasks which can contribute towards improved pathway management, patient satisfaction and TAVI service growth and development.

In relation to the structure of teams, there are clear benefits for considering the role of an administration post to redistribute some work from the TAVI nurses. This may bring economic benefits in team costs, by reducing the cost of activities currently undertaken by nurses, particularly as most TAVI nurses report working above their contracted hours, and an hour of TAVI nurse time is roughly equivalent to two hours of administrator time. **TAVI centres could also benefit operationally from the investment in administration support, by freeing up time for upskilling of nurses to undertake some clinical tasks and service development otherwise performed by doctors.** There may be considerable scope for improvements in resource use, by designing and allocating tasks appropriately, with a focus on the professional roles and costs of the different team members. This could potentially be to an estimated value of between £43,060 and £60,560 per year.

Increasing the capacity of TAVI nurses by reallocating administrative tasks may also facilitate an increase in the number of cases that can be treated. This is important when considering the level of deterioration a patient may experience and the risk of death while waiting to have their procedure. It also highlights the importance of having TAVI nurses to clinically manage patients on the waiting list. In the case of the tasks undertaken by consultants and fellows, there may be scope for more detailed enquiry into these roles and consideration of how some tasks may be undertaken by appropriately skilled TAVI nurses.

6.3 Limitations

There are some limitations to this analysis, as follows:

- The availability of data on the activity of TAVI centres was more restricted than we had anticipated, and we were not able to acquire robust data on length of stay, waiting times and numbers of procedure cancellations. The data we obtained on case numbers cover a shorter period than we had hoped. The length of stay data that we could obtain covered only a short period, which included the period affected by the Covid-19 pandemic and, as a results, was not adequate for revealing trends.
- All the information in the centre-based analyses is the subjective view of the TAVI nurses who participated in this work. It was not possible, within the scope of the work, to ascertain the opinions of other individuals in the same centre.
- The participants in this analysis were self-selecting and their views may not reflect the views of the wider community of TAVI nurses.
- The number of participants is relatively small, which may also limit the wider applicability of these results.

6.4 Recommendations

Based on the analysis presented in this report, some recommendations are made here for future work to support the TAVI centres:

- The TAVI nurse is an important element in the delivery of a successful TAVI programme in these centres. The role should be recognised and valued by clinical and non-clinical teams within hospitals and across the network.
- As the main contact for patients and referrers, investment and support should be given to TAVI nurse teams to help identify and reduce obstacles or bottlenecks in the patient pathway.
- A level of around 88 cases per year per TAVI nurse can be used as a point at which an increase in resources for the TAVI centre are necessary. Some TAVI nurses are regularly working in excess of contracted hours and have considerable stress related to responsibilities across the TAVI centre and there should be support system in place for them including enabling them to take time off.
- TAVI centres should consider that they could benefit financially and operationally from the investment in administration support to relieve burden from TAVI nurses, thus freeing up time for upskill of nurses to undertake some clinical tasks and service development otherwise performed by doctors.
- It would be instructive to undertake detailed pathway mapping (including costs) across a range of TAVI centres. This could be used, alongside specialist clinical input, to develop an 'ideal' pathway that could be used as a template for current and future TAVI centres.
- In addition, and potentially as part of this same process, it would be beneficial to understand the tasks undertaken by Consultants and Fellows, to identify where any of these could be undertaken by appropriately skilled specialist nurses, with additional training.
- Alongside this, there may be benefits from structured communication and exchange of ideas between TAVI nurses so that good practice can be shared. This could be facilitated at a national or regional level.
- Consideration should be given to the potential benefits of a disease-holistic (as opposed to treatment-specific) role such as an "Aortic Valve Nurse" to ensure equal care is provided to all patients on an aortic valve pathway.
- TAVI centres should consider how to implement structured approaches to collect feedback from patients, families and carers, in order to shape the development of services and patient pathways.
- Given the variation in task allocation between centres, an expert multidisciplinary group could take the findings of this report, to provide guidance on the optimal roles and responsibilities within the TAVI nurse team, including administrative support.
- Robust data collection would allow further quantification of the patient- and system- benefits associated with the TAVI nurse team and enable the development of evidence-based recommendations.

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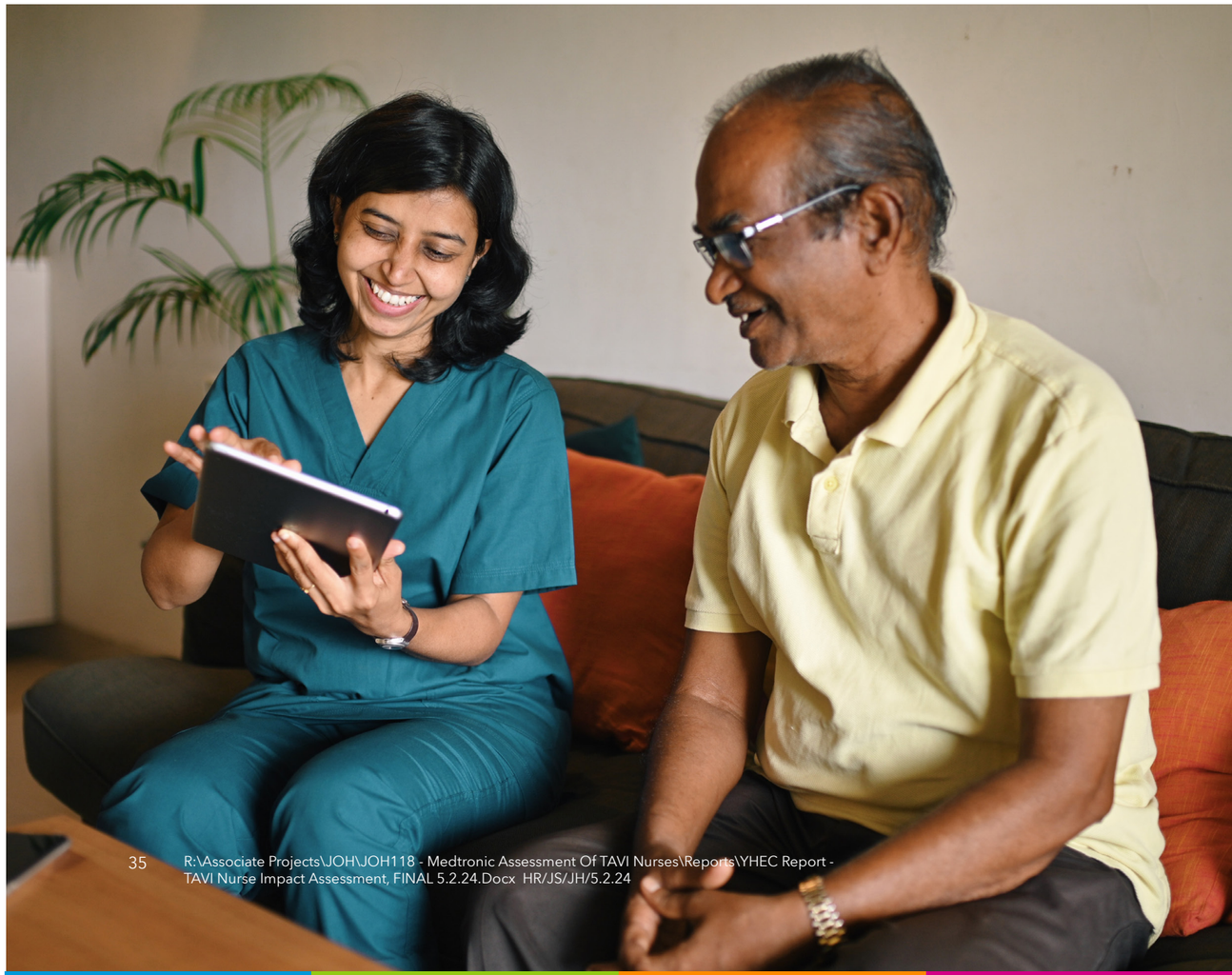

Appendix A
Data Proforma

The data proforma was distributed to participating centres and requested data on the activities of the TAVI centres and the role of TAVI nurses and other staff.

For each activity currently performed by TAVI nurses, participants were asked if this was included in the job role, the mode of conducting the task, the time per task, and which staff role would ideally be performing the task. They were also asked who performs these tasks when a TAVI nurse is unavailable. This was conducted for each TAVI nurse in the centre.

The activities covered were:

- Triage of referrals.
- New patients.
- Nurse-led follow-up clinics.
- Pre-assessment clinics.
- Daily ward rounds.
- Inpatient reviews.
- Results review clinics.
- MDT discussion.
- Phone messages.
- Post-TAVI discharge.
- TAVI conscious sedation.
- Clinical patient review.
- Patient support and medication during TAVI.
- Post-TAVI ward handover.
- Administration.
- Other tasks not included in the job description.

Phone call activity was also enquired about as well as the hours contracted for TAVI nurses versus the number of hours actually worked. Over a ten-year period, annual figures were collected for:

The activities covered were:

- Number of each staff role that are part of the service.
- Number of procedures.
- Average waiting times.
- Length of stay for elective patients (mean and median).
- Number of cancellations.

Appendix B
TAVI Nurse Survey

York Health Economics Consortium (YHEC) has been commissioned by Medtronic to explore the importance of the TAVI nurse role in TAVI centres.

This work will attempt to quantify the potential benefits that specialist TAVI nurses bring to the patient pathway within the NHS.

As part of this work we are asking about the context and functioning of TAVI nurse roles. This survey asks about the TAVI nurse roles in your centre. All responses will be anonymised, and no person or centre will be identified by name in the project report.

About You

Name:

Role:

Centre:

Do you have clinical assessment skills?

Are you a nurse prescriber?

About Your Role

What aspects of the TAVI nurse role work well?

What aspects of the TAVI nurse role do not work well?

If you had extra time available, what would you do with it?

If you had extra work time available, what system and patient benefits could this have?

About the Service

Do you think your service has an adequate number of TAVI nurses? If not, how many do you think are needed?

Have there been any efforts to expand the TAVI nurse team? If so, how was this approached?

What barriers are there, if any, for your TAVI centre to employ TAVI nurses?

Are there any other resources missing from the TAVI service? If so, what?

How valued do you feel the role of TAVI nurse is by the implanters in your centre?

- Extremely valued/Moderately valued/Neutral/ Moderately undervalued/Extremely undervalued

Can you provide an implanter opinion, outlining their perception of the value of the TAVI nurse role? (Optional)

How valued do you feel the role of TAVI nurse is by the service managers in your centre?

- Extremely valued/Moderately valued/Neutral/ Moderately undervalued/Extremely undervalued

Can you provide a service manager opinion, outlining their perception of the value of the TAVI nurse role? (Optional)

What is your role in liaising with the referring centres?

Do you think that having a TAVI nurse in you service has impacted the number of patient referrals? If so, how?

In your opinion, what would be the impact on your TAVI centre if there were no TAVI nurse(s)?

About Patients

Who is the main point of contact for TAVI patients at your hospital?

Do you think there are any unmet needs in your service? If so, please specify.

Do you collect patient satisfaction data? If so, how do you collect this?

Have you seen a change in patient satisfaction over time? If so, what changes have you seen?

Do you feel the TAVI nurse role impacts patient outcomes? If so, which outcomes?

Thank you for completing this survey. We will be in touch to arrange an interview with you in the next few weeks.

Appendix C
Interview Schedule

This interview schedule sets out the topics we want to cover, in the form of questions or prompts. The interviews will seek to elaborate on these, with more detail and context, in order to understand how the role of the TAVI Nurse is working.

Activity

Is your TAVI centre at or near its capacity, in terms of patient numbers, or is there additional capacity?

Are you aware of unmet needs for TAVI patients (i.e. patients who do not access the service, and can you quantify)?

How well does the whole pathway work for your patients, including referral information, getting test results, pre-op assessment, coordinating discharge, etc.

Are there any bottlenecks or breakdowns in the patient pathway?

What kind of feedback do patients give you and has this changed over time?

Staff

Are there any staff you think your centre should have but does not have?

What are the barriers to developing the service, for example with additional TAVI nurses? Prompt for detail and history of attempts and specific issues with funding.

How much are you involved in service development and is this enough? Prompt for detail and history.

Role

Do you feel the tasks assigned to you are appropriate for your role?

How is your time split between administrative and clinical tasks, and is this appropriate?

What changes, if any, would you make to your role?

Are there any tasks that are not adequately done in your centre?

Is there anything else you would like to say about your role as a TAVI nurse?

Appendix D
TAVI Centre Analyses

TAVI Centre A

This TAVI centre has one TAVI nurse and three implanting consultants. The nurse is an AfC Band 7 Structural Heart Clinical Nurse Specialist (CNS). They have clinical assessment skills but are not a nurse prescriber. The centre has an agreement for a second TAVI nurse on a 12-month secondment which is being funded from the budget for the catheterisation laboratory (cath lab).

They are hoping to make this secondment permanent by developing a business case during the year. As the additional nurse will enable an increase in patient numbers, it is hoped that the additional income this will attract will be sufficient to make the business case for the value of this post to the Trust.

The centre has had a steady increase in patient numbers, which the TAVI nurse predicts will continue to 107 in 2022/23, around 150 patients in the current year and possibly 200 per year beyond that. This will only be possible with the additional nurse secondment.

Team structure

The TAVI service is at capacity with the current staff profile. At present, the TAVI nurse feels that there is too much reliance on them alone: "If I am off sick or on annual leave, everything comes to a standstill".

The nurse believes there is unmet need due to under-referral of potential cases. They estimate this to be in the region of 50 to 100 cases per year. This is partly due to patients not being diagnosed with having severe aortic stenosis, or potentially GPs or general cardiologists deciding to medically manage older patients.

The TAVI nurse estimates that they work two to eight hours per week more than their contracted time. In addition to the additional TAVI nurse on secondment, they would benefit from having an administrator in the centre, who could take on some of the tasks currently done by the nurse. The Consultants also rely on the nurse for tasks which may not be part of their role: at times acting as their PA as well as the coordinator, and sending patients' computed tomography (CT) results off to be analysed. The nurse reported, however, that the majority of their tasks feel appropriate to their role.

The TAVI nurse feels extremely valued by implanters but considers service managers to be unaware of what the role does. The nurse feels a team is needed to achieve everything that is expected. If there were a team, and tasks shared appropriately, then their role could be developed into more of an advanced nurse practitioner role. This would enable them to, for example, have more input on the wards with inpatients and assist with early discharge. In this scenario, an additional TAVI nurse would devote more time to the cath labs.

Referrals and patient pathway

The TAVI nurse is the main point of contact for patients in the centre. They receive the referrals for outpatients and inpatients and liaise with referring centres. At times, the wrong referral process is made, meaning a patient is seen by a general cardiologist rather than a specialist valve cardiologist, therefore delaying the process. The TAVI nurse believes that this could be improved by providing education and more information to referrers or by using a single point referral process.

Whereas some centres will send good quality referrals with all the necessary information, which expedites the patient's pathway, some other centres or GPs send what were described as 'very poor' referrals. This means that the TAVI nurse can spend weeks chasing up data or information, which creates a delay in the pathway. This is identified as a need for improvement. The TAVI nurse updates referrers on the patient journey, including after the TAVI procedure, and they liaise with referrers for continued follow up.

At present, the TAVI nurse is struggling with the numbers of cases, which they attribute to the fact that they have to run the follow up clinics as well as conduct

their other duties. They believe that the implanting Consultants may not be aware of this restriction as they are not involved in the follow-up clinics. Therefore, they may see capacity only in terms of their own resources and not appreciate how the need for follow-up clinics limits capacity. In the TAVI pathway, patients should be seen three months after their procedure. The TAVI nurse indicates that this may be pushed back towards six to nine months.

The TAVI nurse reviews the patients and can tell the doctors if they can be discharged from hospital or not. However, a doctor who does not know the patient is responsible for the discharge summary and the TTOs ('To Take Out': the prescription for the medications that a patient goes home with). Waiting for this doctor can mean, for example, that the TAVI nurse may see a patient at 10am, decide they can go home, and then they could be waiting till 5pm for a junior doctor to do the paperwork and get the tablets sorted. If the nurse could prepare the discharge summary, it would remove this delay.

There are also shortages of other resources beyond the TAVI centre itself, which affect the patient pathway. For example, there is a shortage of cardiac physiologists, which can result in delays with receiving the results of echocardiograms. It would also help the TAVI pathway if there were ring-fenced beds for these patients, so they do not have to compete for beds with other patients.

There is no valve surveillance clinic, which means that some patients with moderate aortic stenosis will be discharged back to their GP. This can mean that, five years down the line, these patients will present again, as an emergency, with severe aortic stenosis. If there were a proper surveillance clinic, those patients would be being monitored and would be progressively worked up for the procedure, rather than as an urgent inpatient.

Role and impact of TAVI nurse

The TAVI nurse is the point of contact for patients throughout their pathway. The nurse believes their role has improved the patient experience by means of improving the patient pathway and has reduced the waiting list. The waiting time for the initial clinics and for the post-TAVI clinics has improved, and the number of cancellations has also been reduced.

Risks are reduced due to proper planning of procedures. Patients can also be prioritised based on clinical need, which improves the outcomes for the centre. Another consequence of this is that the nurse has more dedicated time to spend with patients. They believe they have improved the patient experience and enable patients to go home sooner.

The role of the TAVI nurse frees up the Consultants to perform other tasks and this has had the effect of increasing the number of TAVI procedures that the centre can perform. Despite this, the TAVI nurse spends a substantial amount of time on administration and phone messages, which are mostly from patients, addressing a range of topics.

Although the centre does not collect patient feedback formally, when the nurse started, they had a lot of complaints from patients due to lack of communication, or not knowing who to contact. The TAVI nurse now receives many thank you cards and emails, plus verbal thanks in the follow-up clinics. The feedback is "usually pretty good and which has been a big change since when I started". A big part of this positive impact of the TAVI nurse role on patients is ascribed to the fact that it provides a clear point of contact.

Service development

The TAVI nurse is involved in service development, but "it's more of the issue that a lot of it is kind of left to me and I don't have time to do it". They have increased communications with referring centres since they started and have also been instrumental in getting a new hospital to start referring to the centre. Attempts have been made to recruit an administrator for the TAVI centre. At present the secretary to the consultants helps with administration, but the TAVI nurse is obliged to take on a lot of it.

The TAVI nurse would like to provide additional clinics (both pre-procedure and follow-up). They would like to update guidelines and patient leaflets and improve the ways that patient can access information. They would provide increased education and training for other team members and increase audits and service improvement.

Barriers to service development are a lack of funding and office space. It took a long time to get funding for the current TAVI nurse, for example. To make a case for additional staff, it is necessary to gather evidence to prove that they are needed. There is high staff turnover generally. Issues have been escalated to management and the TAVI nurse has been put on the risk register due to lone working.

The TAVI nurse finds it to be "a fantastic role" and very rewarding. The nurse believes that it has had a very big impact on the experience of patients. "It just becomes very hard when the numbers increase, and you don't have time to do everything properly".

TAVI Centre B

This TAVI centre has two TAVI nurses, one AfC Band 7 and the other AfC Band 6, with both currently undertaking masters programmes. There are four implanting Consultants based at this centre and another who manages the patients in the local DGH but does TAVI implants in the centre.

There are also one full-time and one part-time administrators who manage the multi-disciplinary team (MDT) and a database of patients, although these roles have only been in place for 12 months. Prior to this, the TAVI nurses were very administration-based, and they had little time available for the pre-assessment of patients, so their clinical nursing skills "were going to waste".

The principal TAVI nurse (AfC Band 7) is a Lead Structural Heart CNS with assessment skills and is a nurse prescriber. The lead nurse generally works a few hours above their contracted time. Since the first TAVI nurse began their role in 2018, there has been an increase in referrals into the service, to over 200 in the last year.

Team structure

At present, the Band 7 nurse manages the outpatients, and the Band 6 nurse currently manages the wards. The Band 6 nurse has also had to support the cath lab recently as there were significant staffing shortages there and this delayed the instigation of her support for the TAVI pathway.

The nurse considers that there is sufficient nursing resource in the TAVI centre at present. However, this will need to increase as the service and their roles develop. They do not currently have a Fellow attached to the team, however. If they did, this role would help with managing the ward patients and enabling more prompt discharge. The nurse explained that the consultants are very busy and can be difficult to get hold of.

The TAVI nurse acts as the main point of contact for referrals and, along with the administrators, is also the main point of contact for patients. They are setting up a single point of referral at present and are also working with the team to initiate same-day admission. This will increase the numbers of cases on their TAVI lists.

Referrals and patient pathway

There are five general hospitals that send patients to this TAVI centre and the referral process is felt to be working well. Patients tend to be properly worked up by the time they arrive at the TAVI centre.

The surgical lists are prepared a month in advance. There is always a bit of flexibility in the list if an urgent case arises, or someone needs to be brought in at the last minute, or if lists are cancelled. The TAVI nurses contribute to streamlining the pathway and minimising delays, highlighting patients to the Consultants when they are deteriorating. The TAVI nurse would like lists to be planned two months in advance, but they "haven't quite got to that yet".

There has been a change to how the waiting list is considered. Previously, the TAVI centre only considered patients to be 'waiting' once they were sent to the TAVI centre. However, the TAVI nurse considered that, given that these patients are symptomatic when they go to see their DGH cardiologist and so have been on the aortic stenosis pathway for a long time, this period should also be accounted for. As such, this was changed, and patients were considered to be on the cardiac pathway (waiting) from when they visit the DGH, which resulted in the centre having quite long waiting times. However, they have now managed to get this partially reduced.

The principal current capacity constraint is bed availability. The footprint of the TAVI service within the hospital and lab space is not adequate to accommodate all their lists, and they have recently had to cancel several lists due to bed capacity. In addition, the inpatient TAVIs tend to spend longer in hospital and so tend to impact on the bed capacity and patient flow.

They have tried getting designated beds for TAVI patients. They had a four-bedded bay, separated from the general hospital beds, in the surgical unit during the Covid-19 pandemic. However, it has been difficult to get this established beyond the temporary arrangement. Cardiac surgery has also moved to a different centre, so they no longer have access to the cardiac surgery beds, where they could potentially place TAVI patients. They recognise that the present situation is difficult for all of cardiology, not just the TAVI service.

The TAVI centre aims to have next-day discharge for patients. The TAVI nurse estimates that they probably achieve this successfully in about 60% to 70% of cases currently, and the goal is to achieve this for 80% of cases. Within the TAVI centre, one task that takes up a lot of time is uploading CTs to valve companies for analysis. This takes the nurses away from their clinical role.

Role and impact of TAVI nurse

The TAVI nurse is responsible for pre-assessment of patients, daily ward rounds, the MDTs, working with the ward staff with regards to early mobilisation post TAVI, and for follow-up clinics, which were carried out virtually during the Covid-19 pandemic. They prepare patients for the procedure, helps prepare the Consultants' lists and maintains a centralised database. The daily ward rounds and the MDTs require a lot of nurse time.

The TAVI nurses continue to be a point of contact for patients post procedure when they are still experiencing symptoms of breathlessness, palpitations, etc. They offer prompt review in clinic, initiating new medications, reviewing echos (echocardiograms), and arranging further referrals to other services where required.

In addition, the TAVI nurse deals with a lot of phone calls from patients and their families/carers, which are concerned with general information and specific information on patient progress. However, the administrators help with administration. The TAVI nurse believes that their role enables patients to move through the pathway more promptly and efficiently.

According to the nurse, the patients are all elderly and are very grateful for the help they receive. A lot of them will ring the nurse for a chat because they are living alone. Some of them will ring ostensibly with a problem, but it transpires that actually they just wanted to talk. The nurse has "a low threshold for seeing these patients in clinic" and will book them in. They are in the process of setting up PROMs (patient reported outcome measures) and PREMs (patient reported experience measures) to gather the views of patients on the TAVI pathway.

Service development

Because of all the changes that have been made recently, the TAVI nurse would like to consolidate and optimise those changes before taking on anything else. However, they would like to look at the echocardiography process and being able to analyse the CT scans themselves, with support from the consultant team. The CTs currently get uploaded to external companies for analysis and it is the nurses who do that.

The presence of the administrators has enabled the TAVI nurse to make changes to the centre and this has resulted in an increase in positive feedback from patients: "without having the administrators, I wouldn't be able to undertake any of the changes". The nurse would also like to help the band 6 nurse to develop their CNS skills, and more perform more teaching, both on the local wards and externally. They would like to develop the nurses' roles in general and, in the future, get an additional nurse in the centre.

The TAVI nurse would like to develop satellite clinics with the referring centres to carry out pre-assessments and follow ups. At present, many patients must travel a long way to get to the city, then find somewhere to park and find an unfamiliar clinic area in an unfamiliar hospital. A satellite clinic would remove this burden for elderly patients having to travel for hospital clinic visits.

The nurse believes that the service could be streamlined further to improve the pathway, which could minimise delays in the system. In addition, they believe that there could be more communication with patients and their families and there is a need to improve on this information provision.

The nurse has recently put together a small team of TAVI champions on the wards and in the cath lab. They educate and disseminate information to the wider nursing group. This seems to be working quite well. In the future, the nurse would like to develop other structural heart services such as the patent foramen ovale (PFO) service and the MitraClip service.

TAVI Centre C

This TAVI centre has one TAVI nurse and three implanting Consultants. The TAVI nurse is a band 7 Registered General Nurse (RGN). They have clinical assessment skills but are not a nurse prescriber. The nurse estimates that they generally work at least ten hours per week more than their contracted time.

The TAVI centre started in 2019 and since then the number of cases has gradually increased. In the last full year (2021/22), over 70 TAVI procedures were performed, which are carried out in fortnightly clinics. Currently, there are not enough slots to perform all the implants required, so there is a sense that the centre is over capacity. The average waiting time for patients in the current year is estimated to be around 200 days.

Team structure

The TAVI nurse feels they are responsible for managing everything in the centre. This includes the triage, patient referrals, right through to post-procedure follow up. They feel that "I not only manage the patients, I also manage the service as well". As a result of this, there is a problem if they are absent for any reason. This results in a feeling of pressure, that "I have the whole service upon my shoulders".

As a result of this, there is a perceived need for at least one other TAVI nurse at this centre as well as administration support. This is being addressed in the creation of a new business case, but it appears uncertain if and when this may come about. In addition, the TAVI nurse perceives that there is a shortage of anaesthetic resources for the centre. If these additional staff were in place, the TAVI nurse believes they would be able to devote more time to contacting patients who are on the waiting list.

Referrals and patient pathway

The TAVI nurse is the contact point for both referring centres and patients. They deal with more than 40 phone calls a week, the majority of which come from patients and their families/carers. These calls cover topics from general advice to chasing test results and enquires about patients' conditions.

The TAVI centre accepts all the referrals that are sent to them, because of which they currently have a backlog of patients who are waiting for their first appointment. The number of patients on the waiting list continues to increase over time.

The TAVI nurse feels that the pathway they have is good, in itself. Evidence for this is provided by the fact that they have very few cancellations at the pre-assessment stage. However, the nurse believes that the pathway itself needs to be reduced so that there can be capacity to treat more patients and treat them more quickly.

The nurse reports that there are various bottlenecks and breakdowns in the patient pathway. The first bottleneck is that there are about 50 patients waiting for a first clinic appointment at the present time. The nurse estimates that one of the main causes of this is probably the result of low consultant clinic availability. The centre schedules two clinics every other week, so if the cardiologists are on call, for example, the clinics will be cancelled, and the centre can go four weeks without a clinic.

However, the underlying issue for all of this is, in the opinion of the TAVI nurse, the fact that the centre works to an 'original business case' which designates the need to have a vascular surgeon and an anaesthetist present when carrying out the TAVI procedure. At present there is insufficient availability of vascular surgeon and anaesthetist resources and, as a result, this imposes a limit on the number of procedures that can be done.

A result of these issues is the perception that the work of the TAVI nurse is "just constant firefighting with patients, admissions, transfers from other centres, acutes, and they all affect the scheduling".

Role and impact of TAVI nurse

The principal roles that the TAVI nurse considers to be working well in the centre are providing patient support and clinical prioritisation. This includes formulating lists as well as managing and prioritising the waiting lists. For their role, the nurse states that, in addition to their nursing skills, they need to have organisational skills, diplomatic skills and time-management skills. They state that "anything with the word TAVI in it comes to me". Whilst the TAVI nurse feels highly valued by the implanting consultants, they feel extremely undervalued by service managers.

The sense that the TAVI nurse is expected to manage everything feels very stressful and it is difficult for them to be able to take time off. The nurse spends a large proportion of their time (almost half) on administrative work. It appears, therefore, that an administration role could take a lot of this work off the nurse. In addition, the post-procedure follow-ups could be taken on by an additional nurse.

The TAVI nurse feels that the centre is able to offer a better-quality service as a result of their role. The centre gets feedback from patients using the NHS Friends and Family Test, in which patients are asked whether they would recommend services to friends and family in need of similar care. As they currently do all the patient follow-ups, the nurse also gets feedback that way and this is documented. The feedback they get is very good and has been consistent, with no change perceived over time.

Service development

For the development of the team and roles within this TAVI centre, there have been many previous attempts to expand the nurse team "through conversation and email". However, the principal barrier to implementing any of these developments appears to be financial.

The nurse does not feel that there is any possibility of change or development until the original business case is rewritten, which is currently in progress. The current TAVI nurse understands that the business case will create additional administration support for the centre and an additional TAVI nurse. In addition, it will specify the implementation of weekly rather than fortnightly TAVI clinics.

The TAVI nurse has been involved in the development of the business case, at least in the sense that they have been providing information about their role and what will be needed in future, including how it could be divided up between clinical and administration tasks. In addition to the work on developing the team, there is currently work underway with the DGHs to develop a single point of access for the TAVI centre.

TAVI Centre D

This centre has one TAVI nurse, with four implanting consultants. The nurse has clinical assessment skills and is a nurse prescriber. The centre is felt to be operating over its capacity. There were about 100 people on the waiting list on the day of the TAVI nurse interview and this situation had been building up over the previous six months.

The service is currently expanding, which is making all aspects of the role challenging due to the resulting workload. The TAVI nurse has been working to develop a business case and job plan for another nurse, and they were expecting to advertise the role in the week following the interview.

Team structure

The nurse and implanters are supported by two administrators. The nurse is the main point of referral for patients, including urgent referrals. They are also the point of contact for patients and their families and carers at all points on the TAVI journey. They manage the waiting list, clinics, the MDTs and do ward rounds, along with the consultants. The TAVI nurse feels extremely valued by the implanting consultants, but less so by service managers.

Referrals and patient pathway

The TAVI nurse has become the main point of contact for urgent referrals, and they feel that the referrals process could be improved. As mentioned previously, a substantial waiting list has developed over the previous six months. However, the nurse believes that, once a patient is accepted into the TAVI centre, the pathway works reasonably well. As an example, patients do not have to wait long for a CT scan or an appointment.

The TAVI nurse feels, however, that the pathway is somewhat elongated at the moment. For example, the centre continues to have separate referrals for SAVR and TAVI. However, they are currently developing a single point of referral system, where all patients will be referred to a central point and then each one triaged to TAVI or other procedures, as appropriate. The nurse hopes that this will help to improve the pathway.

There is a bottleneck in the pathway which is caused by the lack of post-procedure monitored beds. The patients need to go to a monitored bed after the TAVI procedure and the lack of these beds is creating a restriction on the number of procedures that can be done. Consequently, whilst there may seem to be scope to put patients 'on the list', it is ultimately dependent on the availability of these monitored beds.

In addition, most of the lists are currently done with an anaesthetist present. However, the centre is moving towards doing lists without an anaesthetist present and this should help to make the pathway work more smoothly as well.

The nurse reports that, at present, follow-up is not problematic. They acknowledge that this may be due to the limits on capacity mentioned above. An unintended benefit of these limits is that the number of follow-up patients remains manageable.

Role and impact of TAVI nurse

The TAVI nurse is the point of contact for patients and families at all points on the TAVI journey. The nurse does both administrative work and clinical tasks in their role. They are responsible for managing the waiting list, the clinics, and the MDT. In addition, they perform ward rounds with the consultants. However, they do not help in the cath lab with the actual TAVI procedures.

Although no formal feedback from patients is gathered at present, it is known that recently there has been dissatisfaction at the waiting times, which have grown due to the changes that have been happening in the centre. The nurse reports that the patients are always grateful once they have had their procedure done, they are just not keen on waiting.

Service development

The main areas for service development highlighted by the TAVI nurse are providing education and training and developing additional clinics. The nurse would like to provide more education and training both within the hospital and with the local DGHs that refer into them.

If the pathway were made smoother, this would create an increase in capacity for patients. This improvement of the pathway would lead to an improved patient experience. The TAVI nurse reports that, previously, there were financial barriers to service development. However, these appear to have been overcome, as a new TAVI nurse is being recruited. They are of the opinion that the TAVI service cannot expand without this additional nurse.

There are regular meetings where service development is discussed, which include the TAVI team and the matron. The Clinical Director and the Operations Directors are all aware of the need to expand the service, according to the nurse: "it's just getting the time to do it I think and hopefully with the new TAVI nurse that should help".

TAVI Centre E

The interviewed TAVI nurse for this centre is a cardiac valve specialist and nurse team lead. The team consists of themselves and three other nurses. They have assessment skills and are a nurse prescriber.

In this centre the nurse has been in post for nine years. For all that time, demand has outstripped capacity. Over this period, the service has improved a lot and awareness of the aortic valve condition has increased, contributing to the increasing numbers of referrals.

The nurse believes that the limited capacity in the TAVI centres means that they are always unable to meet all the demand in their population. A result of this is that patients wait longer for treatment and come to the centres with a more advanced condition. This, in turn, results in worse treatment outcomes as the patients are not at their optimal fitness level.

Team structure

The nurse is a 'valve nurse', rather than a TAVI nurse. They believe the role should not be called TAVI nurse, which is treatment-specific, rather than disease-specific. They should cater for all of the aortic valve patients who come to the centre and triage them to the SAVR or TAVI pathway, as appropriate. In making this change, they have found it difficult to "change the mindset of the surgical department that we are not TAVI nurses, but we are valve nurses", which means advocating for all patients who have aortic valve disease.

The nurse would like to have more administrative support for the team. Although there are three other valve nurses as members in the team, there are still some administrative aspects that could be delegated to administration support staff, so that the nurses can perform more clinical tasks. In this way, they could also take some clinical tasks off the cardiologists or the consultants. The nurses could keep up-skilling so that they could take on those tasks, freeing-up the consultants, ultimately to perform more TAVI procedures.

Referrals and patient pathway

The nurse believes that their centre has a very good pathway for aortic valve patients. They are aware of bottlenecks and work to improve them. As one stage of the pathway is improved, other bottlenecks appear.

The valve nurse works to make sure that they get a good quality referral. The next step is to process them, getting all the investigations, discuss them in the MDT meeting and identify the best option for each patient. MDTs will involve different consultants, cardiologists, surgeons, nurses, and the research team. The coordination of this is complex. There are also staffing issues in the cath labs and in the theatres and onwards, affecting nursing staff, physiologists and radiographers.

One part of the pathway that the nurse believes is not getting sufficient attention is rehabilitation, which is not currently commissioned, as far as the nurse is aware. Recovery is important to restore patients' quality of life but, at present, only the SAVR patients receive this. However, funding from the commissioners has been secured for a TAVI rehabilitation pilot, involving a community cardiac specialist team with specific cardiac rehabilitation nurses and physiotherapists. They are hoping that this pilot will be extended, with further funding.

Once this has been established, pre-habilitation will be the next focus. Pre-habilitation addresses the issue that, before patients get have the procedure, they are deconditioned because their symptoms have affected their activities; they have slowed down and become frail. Ideally, patients should be at the optimal level of fitness for the procedure so that their recovery will be as good as possible.

This TAVI centre has the highest number of cases per year of all the centres in this analysis. The nurse believes that additional staff are required to support this high volume of cases. In addition, the nurse reports that there is a lack of IT infrastructure needed to support the TAVI centre

Role and impact of TAVI nurse

The nurse role in this centre has evolved to cover other structural heart conditions as well as TAVI. The nurse is the main point of communication, dealing with different departments, engaging with referring hospitals and seeking to improve communication with them. They educate stakeholders on every aspect of the pathway. They are also the main point of contact for patients, providing continuity of care and a fail-safe if a patient deteriorates.

The nurses spend a lot of time on triage of referrals, the pre-assessment clinic, and the nurse-led follow-up clinic as well as the MDT discussions. They get a lot of phone calls from patients and also from referrers. These tend to be about pathway status and chasing tests, but also about waiting list/times and general advice. The nurse feels extremely valued by the implanting consultants, but less so by service managers.

The nurse team has a weekly rota for clinics and the nurses also rota themselves to be in the MDTs. They educate the patient about their disease condition and treatments and managing their symptoms. Patients may have high levels of anxiety, having been given a prognosis of worsening health and then having to wait

around six months to be seen. In addition, the nurses rota themselves to post-aortic valve treatment to run nurse-led follow up clinics.

At every stage of the pathway, they have a contact point either by phone or by email, and the team roster themselves to respond to phone calls. In response, they assess patients over the phone and decide on the best course of action, which may be giving advice, telling the patient to see their GP, or getting them admitted earlier.

This centre uses a patient feedback questionnaire and patient engagement meetings. Once a year, they arrange a meeting with a group of their patients who have had their procedures for afternoon tea, where they can also bring their families and watch a small presentation from the team. They also send a questionnaire for patients to fill out. They look at all the feedback and take it into consideration and this is how they improve the service. There had been a lot of negative feedback which has led to improvements. The patients report high satisfaction on the overall TAVI pathway experience.

The nurse reports that the most rewarding part of the job is to see a patient walking without feeling breathless and regaining their independence.

Service development

Having been involved throughout the pathway, the nurse believes they know where things are lacking. They feel that they are given the responsibility, trust and confidence of management and colleagues. Their inputs are acknowledged and appreciated whenever they feel that there are some improvements that need to be made.

Support from the management is important. As a team lead, the nurse has been able to collect data showing aspects of the service which were less good, due to the lack of resources, and have been able to discuss this with the management team. One example of this was data on how many patients had been hospitalised in the previous six months compared to the previous year, as the service had been growing. With enough resources, such as nursing staff, they could have prevented hospitalisations or, in the worst-case scenario, the deaths of patients on the waiting list.

The nurse would like to continue to improve the pathways for all aortic valve patients. They would like to address inequality between the TAVI and SAVR patients. At times, lack of funds has been an obstacle. In this the nurse feels they are a victim of their own success. They started as a TAVI nurse dealing with TAVI patients but saw the inequality amongst the aortic valve patients. Historically, there had never been a surgical aortic valve nurse specialist. Therefore, SAVR patients were not getting the same service as TAVI patients.

For patients on the SAVR pathway, the main point of contact is not the consultant or the surgeon, it is the secretary, with limited knowledge and expertise. The nurse believes that a valve nurse should deal with these patients as well as the TAVI patients. To address this, they are developing their skills in the SAVR pathway.

The nurse would like to increase the capacity in this centre. They would also like to do more in educating colleagues both in their trust and in referring hospitals, and eventually in primary care. This would focus on how this condition can be easily detected and treated effectively, to encourage referrals to the centre.

TAVI Centre F

This TAVI centre has three TAVI nurses, six implanting consultants, and one TAVI administrator. However, this administrator is leaving soon. The nurses are all Band 7 Clinical Nurse Specialists.

The centre has had a steady increase in patient numbers up to nearly 250 in 2021/22. The mean length of stay for patients has hit a peak of around 14 days, according to the BCIS audit data and the median length of stay is 5 days.

Team structure

The TAVI nurse who was interviewed has clinical assessment skills but is not a nurse prescriber. Staff numbers in the centre have grown steadily over the last ten years. Whilst there are not any registrars included in the team, there are registrars who sometimes assist them.

The TAVI nurses do not tend to work more than their contracted hours. The TAVI nurse feels moderately valued by both implanters and service managers. However, they feel that consultants and managers may not really understand the amount of work that TAVI nurses do.

The TAVI nurse felt that more staff are needed in their centre. Most important of these additions would be a fourth TAVI nurse. However, more administrative staff and a TAVI Fellow for the team would also be helpful.

Referrals and patient pathway

When patient referrals are received, it is the job of the TAVI nurses to ensure that outpatient appointments are booked, that investigations are chased up and that patients have been seen in clinic and had investigations performed. This means that a large part of the TAVI nurse role has become administrative. The TAVI nurses act as the main point of contact for patients throughout the pathway.

Patients are usually seen two to three weeks after their referral is received by the centre. Patients receive a CT scan after another two to three weeks and are then discussed at an MDT meeting. It is the waiting time after this period that is the main delay in the pathway; the wait for the TAVI procedure can be between four to six months. This can be a cause of anxiety for patients because it is explained in clinic that there is a risk of a major incident within the next 18 months. Despite the feedback on this long delay, the centre still receives a lot of positive feedback.

The main reason for the bottleneck in the patient pathway is bed capacity. The hospital as a whole has very few monitored beds. This means there are often no post-procedure beds, so the centre cannot admit the patient in for their procedure.

The number of referrals received are beginning to decline, which the nurse believes is due to the lack of capacity. Patients will be referred elsewhere or choose to go to a private clinic, and this can sometimes happen after a patient has been referred. The TAVI nurses are in charge of both scheduling patients and cancelling appointments, so this increase in patients moving around creates further work for them.

Role and impact of TAVI nurse

TAVI nurses play a key role in liaising with referring centres. They must make sure that images and other relevant information are sent over. For some patients, the TAVI nurses must organise transfers for CT scans and outpatient appointments.

The amount of time spent on different tasks was similar for each TAVI nurse. However, one big difference is that two of the nurses are not yet trained to perform follow-up or pre-assessment clinics, meaning that one nurse spends a significant amount of time with these tasks. Other time-heavy tasks were daily ward rounds, MDT discussions, and administration. This administration is performed on top of the work performed by the administrative staff member and so will likely increase once this staff member leaves. The nurse believes that many of the tasks they performed would have to be done by doctors if there were not TAVI nurses available.

Whilst there are no specific tasks that the TAVI nurse does, which they do not feel are appropriate for their role, they feel like the doctors expect them to take on a higher workload than is appropriate. This is mostly due to the volume of patients that each nurse has to deal with.

The TAVI nurse believes their role has a significant impact on patient outcomes. They are the first and main point of contact in the TAVI process. They speak to patients before, during, and after the procedure. They also highlight any issues in the pathway that can impact on outcomes. If there were no TAVI nurses, they

would lose the capacity for booking and cancelling procedures, preparing MDTs, pre-assessing patients, and running the phone lines.

Last year when one TAVI nurse was new and the lead TAVI nurse was on annual leave, they felt like everything in the centre came to a halt. Because of new TAVI nurses, the nurse-led clinics have been unable to run recently as the lead TAVI nurse is needed to support these new colleagues through their training and development. It is felt that there is some lack of understanding by other staff of the importance of the TAVI nurse role.

Service development

The TAVI nurse interviewed was the lead nurse at the centre and, as a result, they are quite involved in service development. As mentioned above, bed capacity is one barrier to improving the service. Another barrier is the need for an extra TAVI nurse as well as a TAVI Fellow and administrative staff.

The TAVI centre has attempted to expand in the past. The lead consultant made a business case, and the plan was discussed with management. However, a lack of funding meant that recruitment was frozen, and no action was taken. The TAVI nurse explained that there is a lack of understanding of service needs and the income that TAVI can generate for the Trust.

If the time and resources were available, there are many aspects of the service that the TAVI nurse would like to work on. Examples include running the nurse-led clinics for post-TAVI patients again, nurse-led sedation and learning how to valve crimp. Overall, they would like to get more involved in the clinical aspects of the role. They would also like to increase the information available to patients about the service, to make them feel more comfortable.

They believe that the improvements outlined would reduce cancellations from not having an anaesthetist or operating department practitioner. It would also increase clinic capacity, which would reduce waiting times both for procedures and for follow-up sessions.

TAVI Centre G

This TAVI centre has one TAVI nurse, two implanting consultants, one TAVI fellow, and one TAVI administrator. The centre has had a relatively steady number of cases, with no overall increase in recent years, implying that it has been at a plateau with the current staff numbers. However, the centre recently doubled their number of available slots per week which has had a significant impact on their capacity.

The nurse believes they are on track to complete 120 procedures by the end of the current year, which will be a significant increase on last period's total of 75. The centre is planning to submit a business plan to fund an additional CNS.

Team structure

The nurse is a CNS and is on track to becoming an Advanced Nurse Practitioner (ANP). The TAVI nurse feels that the team requires an additional CNS. This is needed to maintain the recent growth in case numbers.

The nurse feels moderately valued by both service managers and implanters. This nurse can work between two to seven hours per week more than contracted. The TAVI nurse believes the service should also have an additional coordinator and a division of tasks now that it has begun to grow. Not being able to distribute some of these tasks means that time cannot be invested in educating staff at the centre. This is a task which falls under the TAVI nurse role but is not currently performed.

Referrals and patient pathway

The TAVI nurse acts as the main point of contact for patients throughout the TAVI pathway. They are in charge of coordinating with referring hospitals regarding tests and procedure dates. They review the referral letters sent and patients are categorised by the severity of their condition and are directed to the appropriate pathway. The high priority patients are sent to the day ward on cardiology where they meet the TAVI nurse and receive their CT and angiogram and the nurse explains the TAVI procedure. The TAVI nurse manages the procedure lists, ensuring the highest priority patients are treated first.

The time from referral to the procedure is around six to eight weeks. Most patients remain overnight in the hospital and receive an echo and pre-discharge clinic. They are then followed up in another six to eight weeks. The TAVI nurse feels that the pathway works quite well given the resources they have and there are no major bottlenecks.

The centre is trying to create a nurse-led post-procedural clinic to address the increase in procedures that they are performing. This would be run by a TAVI nurse, as patients have already been reviewed by a consultant. Two of these clinics have been trialled this year to alleviate pressure on outpatient appointments, but the centre is limited by physical space to run these clinics.

The main delays occur when patients require special treatment. Most of their TAVIs are transfemoral, but when a patient presents needing an alternative approach, such as transcarotid surgery, the centre must delay their operation to ensure that extra team members are available to perform a general anaesthetic. There may also be a delay in finding a vascular surgeon. This can disrupt the routine of the cath lab by requiring a separate slot, which has sometimes caused delays of two to three months. The centre only takes on these more complex cases because they have become experienced enough to manage them effectively.

There are also some capacity constraints affecting the booking of echocardiograms, as this department is under significant pressure. Despite this issue, they have been able to maintain a waiting time of six to eight weeks for routine TAVI procedures.

Role and impact of TAVI nurse

The TAVI nurse spends much of their time analysing CT scans, providing patient support and medication during TAVI, and responding to phone calls. Many of these phone calls are from family and carers who account for around 40 calls per week. Overall, the most common subjects for phone calls are waiting times and chasing up tests.

The TAVI nurse acts as the link between the service and patients on the waiting list and for consultants at referring hospitals, which has enabled them to reduce waiting times. Learning how to analyse CT scans has relieved some pressure from consultants. They have also developed a TAVI information booklet during their time in the role.

The TAVI nurse carried out an audit on waiting lists which involved a patient satisfaction survey. This was performed a year ago and was being repeated for comparison at the time of this interview. Patients generally report that they are very happy with the service they receive. Because the procedure is done under local anaesthetic, it can be difficult for some patients. However, even those who found it to be a tough procedure say they would recommend it to others. Patients are happy with effectiveness of the service and 95% of them are discharged the next day.

The TAVI nurse stated that if there was no TAVI nurse in the service that there would be fewer procedures occurring each week. This is due to the significant amount of work that they perform for the service. This would affect waiting times and, therefore, patient satisfaction.

Service development

The nurse believes there are service developments required to maintain and grow the capacity of the service. The current roles of the TAVI nurse need to be shared with other staff and an additional coordinator is required to manage the lists that are currently managed by the nurse. The centre is waiting to submit a business plan for an additional ANP, as a result of growth.

The TAVI nurse would like the time to provide additional education sessions to nurses on the wards about pre- and post-operative care of TAVI patients. Since they do not currently have the time to address this, they feel that it should be assigned to a different clinical facilitator.

Providing these additional sessions should allow nurses to feel more competent and confident in managing TAVI patients effectively.

Several barriers to service development were identified by the TAVI nurse. The main barrier was funding, with a lack of money to invest in developments. The second barrier for the service is access to general anaesthesia, which has caused delays in the complex cases. As a temporary solution, funding has been provided to take one list per month to a private clinic to provide this service. Whilst this allows them to provide a service that is needed for patients, waiting times are still much longer than for standard cases.

The TAVI nurse stated that they really enjoy their role. They have learnt a great deal and feel they provide a good service for patients despite it being very busy. They would like to learn from other TAVI centres about how to improve their service further, to provide the best possible experience for patients.

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