

IMPLEMENTATION OF THE TAVI *NURSE* FIGURE: SELECTION, EVALUATION, COORDINATION, PURSUING AND EFFECTIVENESS

Miryam González-Cebrian

RN, MSN, PhD

Cardiology Department, University Hospital of Salamanca, Salamanca, Spain. IBSAL CIBER-CV Instituto de Salud Carlos III (ISCIII), Madrid, Spain

Ignacio Cruz-González

MD, PhD

Cardiology Department, University Hospital of Salamanca, Salamanca, Spain. IBSAL CIBER-CV Instituto de Salud Carlos III (ISCIII), Madrid, Spain

Sara Alonso Meléndez

RN

Cardiology Department, University Hospital of Salamanca, Salamanca, Spain. IBSAL

Elena Olaya González Egido

RN

Cardiology Department, University Hospital of Salamanca, Salamanca, Spain. IBSAL

Rosa Carreño Sánchez

RN

Cardiology Department, University Hospital of Salamanca, Salamanca, Spain. IBSAL

Beatriz de Tapia Majado

MD

Cardiology Department, University Hospital of Salamanca, Salamanca, Spain. IBSAL

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Marta Alonso-Fernández-Gatta

MD, PhD

Cardiology Department, University Hospital of Salamanca, Salamanca, Spain. IBSAL CIBER-CV Instituto de Salud Carlos III (ISCIII), Madrid, Spain

Rosa Ana López Jiménez

MD

Cardiology Department, University Hospital of Salamanca, Salamanca, Spain. IBSAL

Pedro L Sánchez

MD, PhD

Cardiology Department, University Hospital of Salamanca, Salamanca, Spain. IBSAL CIBER-CV Instituto de Salud Carlos III (ISCIII), Madrid, Spain

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Abstract: Transcatheter aortic valve implantation, TAVI, is an effective and safe alternative to cardiac surgery for older patients with severe aortic stenosis (AS) or with high surgical risk.

The success of the procedure, advances in technology, more than favorable clinical results and a reduction in hospital stay are establishing TAVI as the standard in selected patients.

The objective of the work is to describe the development of the TAVI nurse role as part of the reorganization of a specific multidisciplinary program for TAVI patients. The TAVI nurse participates in the TAVI program in the education and preparation of the patient before the procedure, ensuring that the patient arrives in the best conditions for the intervention, as well as in the follow-up after discharge, providing continuity in care throughout the process.

A program that gives importance to quality of life, patient selection, shared decision making, expectations and the patient’s experience during the process. The transition towards a minimally invasive TAVI process, together with the implementation of standardized care protocols and early discharge programs, will allow us to minimize the stay, the use of resources and therefore the costs of the process.

Monitoring the results, both from a clinical point of view and from the patient’s own perceived quality of life, will help detect areas for improvement.

Nursing skills and experiences, maintaining an active role in the process, are ideal to

provide leadership within the TAVI program and make it effective and sustainable.

The nurse understands the clinical and individual needs of each patient and is established in this program as the point of contact for the patient and family. She maintains the focus on promoting the patient's active role and improving their experience by placing them at the center of the process.

Keywords: Aortic stenosis, transcatheter aortic valve implantation, Heart Team, TAVI nurse, TAVI coordinator, TAVI program.

INTRODUCTION

Aortic stenosis (AS) is the most common degenerative valve disease in developed countries. The increase in life expectancy and progressive population aging is increasing its prevalence, estimated at 2.5% and between 7-10% in those over 65 years of age¹⁻⁴. Patients can remain asymptomatic for years, but the disease progresses rapidly after the onset of symptoms, seriously limiting patients' quality of life. If AS is not treated, mortality is 50% at 2-3 years⁵⁻⁷.

There are several treatment options and, although they depend on the patient's clinical profile, they can basically be classified into three alternatives:

- Medical treatment. It helps relieve symptoms, but does not cure the disease.
- Surgical replacement. It is the traditional option and, until a few years ago, the definitive treatment. However, between 30-40% of AS patients are not candidates for surgery due to their comorbidities or high surgical risk.
- Percutaneous aortic valve implantation (Transcatheter Aortic Valve Implantation-TAVI). It is a technique that was developed for the treatment of severe AS in patients at high surgical risk who could not undergo surgery, whose first implantation was performed

in 2002 in France by Dr. Cribier. The rapid evolution of this technique to the present day, places it in the most effective and safe therapeutic alternative for selected patients with high surgical risk and a valid alternative for patients with intermediate and low surgical risk, as shown by different studies (PARTNER II, PARTNER III, SURTAVI or NOTION), proposing a paradigm shift in the treatment of heart valve disease⁸⁻¹⁶.

Improvement in patient selection, evolution of devices and technology, increased experience and evidence, improved health outcomes and prolonged patient survival are the key factors that have contributed to place the TAVI technique as the standard of care in symptomatic older patients or at high surgical risk¹⁷⁻¹⁹.

In our country, the National Registry of Spanish Association of Interventional Cardiology Activity, in 2022, more than 6,000 annual procedures and rapid growth since 2015 (1,500 procedures)²⁰.

In our hospital, the Complejo Asistencial Universitario de Salamanca (CAUSA), this technique began to be used in 2008 and, since then, it has shown exponential growth.

The selection of patients who can potentially benefit most from TAVI, together with the transition towards a minimalist process of the procedure and hospital stay, establishing standardized care and early discharge, minimizes the resources and costs of the process. If this is also accompanied by an increase in the quality of care, safety and patient empowerment, patient satisfaction significantly improves, which is especially attractive²¹⁻²³.

TAVI PROGRAM AND TAVI NURSE ROLE

The increase in the prevalence of AS and its rapid evolution justify the existence of a specific program for patients with AS and an indication to undergo a TAVI procedure. The patient with severe AS is a patient who must be managed by a multidisciplinary team taking into account their comorbidities, but also their personal, family and structural context to guarantee success. For this reason, TAVI programs are emerging. These programs require a multidisciplinary team and place the patient at the center. This is how the Heart Team (HT) appears, specialized in TAVI, defined as a team of health professionals who work together to offer the best possible care. A team, which, although it varies according to the centers, goes beyond the cardiac surgeon and interventional cardiologists, including imaging cardiologists, anesthetists, social workers, geriatricians, palliative services and nurses²⁴⁻²⁶.

In the countries where these programs have been carried out most successfully, such as the United States, Great Britain and Canada, the nurse plays a crucial role in HT, sometimes even being responsible for coordinating the TAVI program. Incorporating nursing into HT has been vital for the development of the nursing role known as “TAVI nurse”, which arises to improve the quality of care and results in TAVI patients. Pioneering nursing professionals wrote recommendations to improve clinical nursing practices in TAVI patients and developed the role of the “TAVI Nurse” and “TAVI Coordinator”²⁶⁻²⁸. In their articles they define the knowledge and responsibilities that a TAVI nurse must have²⁷⁻²⁸ (figure 1).

Based on all the available evidence, a national consensus document was prepared to facilitate the implementation of the TAVI nurse role in our country supported and

endorsed by the Spanish Association of Cardiology Nursing. Document that served as the basis to start our TAVI nurse program project in our hospital²⁹.

TAVI NURSE PROGRAM UNIVERSITY HOSPITAL OF SALAMANCA

TAVI poses a complex paradigm shift in the approach to valvular disease within structural cardiac pathology, which forces the Cardiology and Cardiac Surgery Services to adapt to new ways of working and therefore to reorganize their clinical and operational protocols around this technique. Our TAVI program was traditionally organized into the following phases:

Diagnosis of patients with severe AS and referral to the Cardiology Service, both from the center itself and from referring centers.

Decision making: in medical-surgical session and therefore counting on interventional cardiologists, clinical cardiologists, diagnostic imaging specialists and cardiac surgeons. The decision is made according to the evidence, following clinical guidelines and taking into account the patient's risk profile.

Procedure planning: the patient is included on the waiting list for the intervention.

Performance of the procedure: by the team of interventional cardiologists.

Hospitalization: 24-48 hours in the cardiovascular critical care unit and cardiology ward.

Follow-up after hospital discharge: by the interventional cardiologist in a specialized consultation for structural heart disease.

But once this phase is over, this program must adapt to the challenges that we are not facing:

- The increase in the prevalence of AS and therefore the volume of patients to

Table 1 Competencies and responsibilities of the transcatheter aortic valve replacement nurse coordinator	
Competencies and Core Knowledge	Responsibilities
<ol style="list-style-type: none"> 1. Expertise in cardiovascular care: <ul style="list-style-type: none"> • Cardiovascular nursing • Specialized knowledge of valvular heart disease • Specialized knowledge of TAVR 2. Specialized knowledge of providing care for patients with aortic stenosis: <ul style="list-style-type: none"> • Complex heart disease, multiple comorbidities, and frailty 3. Clinical assessment skills: <ul style="list-style-type: none"> • Comprehensive cardiovascular assessment • Assessment of frailty and functional status 4. Patient and family education: <ul style="list-style-type: none"> • Assessment of learning needs to individualize teaching • Patient and family teaching skills • Conduct of shared decision making 5. Coordination of complex processes of care: <ul style="list-style-type: none"> • Organizational skillset to develop and individualize assessment and procedure planning pathways 6. Clinical leadership: <ul style="list-style-type: none"> • Leadership skills to contribute to the Heart Team • Administrative leadership to develop program efficiencies 	<ol style="list-style-type: none"> 1. Program leadership: <ul style="list-style-type: none"> • Serves as essential and central member of the Heart Team • Supports and leads TAVR program development • Participates in program evaluation and quality improvement to improve outcomes 2. Facilitation of patient-focused processes of care: <ul style="list-style-type: none"> • Develops seamless and patient-centered processes and clinical pathways • Develops evaluation pathways, including diagnostic testing and functional assessment • Conducts clinical triage and wait-list management • Case manages urgent in-patients and interhospital referrals • Facilitates referrals to subspecialty consultants • Facilitates and contributes to multidisciplinary, treatment decision making • Coordination of procedure planning, admission, and follow-up 3. Development of communication pathways: <ul style="list-style-type: none"> • Conducts patient and family education and promotes shared decision making • Leads communication with the Heart Team • Facilitates communication with administration for planning purposes

Figure 1: Competencies and responsibilities of the transcatheter aortic valve replacement nurse/coordinator. Source: Sandra Lauck et al²⁸. TAVR= transcatheter aortic valve replacement.

be treated. The growing evidence and excellent results of the TAVI technique are contributing to an increase in procedures and greater demand from the patient themselves. The technique is increasingly simplified and the overall results are better. In fact, the European Society of Cardiology (ESC) Guidelines for the management of valvular diseases published in 2021 lowers the age of intervention to <75 years in selected patients¹.

- Improve access to treatment and management of our waiting lists.
- Improve the follow-up of patients who have undergone TAVI in our hospital.
- Taking into account these challenges, we consider a reorganization of the TAVI Program, which reinforces the stages

of decision-making and patient follow-up by introducing the role of the TAVI nurse in the different phases of the TAVI process.

- Based on previous experience in other countries and evidence of its benefits, we launched the TAVI NURSE project, developing an advanced practice nursing role for the management of TAVI patients in order to simplify and coordinate the entire process. The TAVI nurse intervenes in the different stages (selection and coordination of patients, clinical and functional evaluation, health education for patients and family environment and post-TAVI follow-up) placing the patient at the center of the process. A multidisciplinary team was created including interventional,

imaging and clinical cardiologists, interventional cardiology nurses, cardiovascular critical and cardiology ward nurses, who form the TAVI nurse group, together with a process engineer as a facilitator and expert in Lean methodology that was applied in this project. The Lean methodology, already widely applied in the standardization of processes in Healthcare, allows achieving operational excellence through the design, implementation and continuous improvement of processes. The goal of Lean is to facilitate access to cost-effective, high-quality and innovative healthcare, putting patients at the center of determining what care is optimal and what essential resources are required to achieve the best outcomes³⁰.

The changes in the TAVI program were established and the TAVI nurse protocol was developed (Pre-TAVI consultation, support during admission and Post-TAVI follow-up consultation), based on an exhaustive literature review.

In addition to the establishment of the TAVI nurse role, an early discharge protocol is implemented to help us facilitate the early discharge of the patient home with good results. The literature demonstrates that early discharge not only does not compromise safety or effectiveness, but also reduces readmissions, complications, and hospital stays²¹⁻²³.

This program is, therefore, a unique opportunity to lead the transformation of the way we care for TAVI patients.

The project was launched in different phases:

STEP I. Development of the content and materials of the nursing consultation, determining what day of the week, where and at what time the TAVI nurse consultation would be carried out. Contact

was made with pioneering international TAVI nurses (Sandra Lauck in Canada and Gemma McCalmont in the United Kingdom) to share knowledge and take advantage of their experience to launch our TAVI nurse role. An educational program was designed for the TAVI nurse consultation that includes a slide presentation, as well as a paper brochure as a reminder of the most important information regarding the TAVI procedure³¹.

For the comprehensive evaluation of the patient, a selection was made of the validated scales that would be assessed in the nursing consultation:

- Frailty: Frail Scale and Essential Frailty Toolset
- Dependency: Katz Scale
- Cognitive impairment: MMSE Minimental state examination scale
- Quality of life: EuroQol 5D Questionnaire
- Socio-family support: GIJON

In addition, three own questionnaires were designed. One to assess the perceived quality and experience of the patient himself during the TAVI process, another to assess the importance that the patient and family give to being informed and participating in their care and a third, on what the patient's expectations were regarding the procedure³¹.

STEP II. Implementation of the Pre and Post TAVI consultation.

STEP III. The project is currently in this phase, which includes the analysis of the results and dissemination of our program at a national and international level.

TAVI NURSE PROTOCOL UNIVERSITY HOSPITAL OF SALAMANCA

1) PATIENT SELECTION:

The program begins with the identification of a patient with severe AS, with an indication for intervention. The HT evaluates the surgical risk of mortality at 30 days after valve implantation using the standard procedure and the patient's comorbidities, for which different scales will be used, including assessment of age and life expectancy. The patient is referred to TAVI if he has an increased surgical risk, if he is over 75 years of age, if he has comorbidities or conditions that make surgery inadvisable.

2) PATIENT EVALUATION:

Our TAVI program begins with that patient with severe symptomatic AS and an increased surgical risk for whom surgery is ruled out, but who is eligible to undergo the TAVI procedure.

The initial patient assessment includes a clinical, functional, psychological and cognitive evolution to determine the patient's suitability, assist in patient selection and facilitate procedure planning.

In our hospital, the clinical evaluation prior to TAVI includes diagnostic tests: computed tomography angiography of the aorta, viability of the vascular access (transfemoral choice), and size of the aortic annulus and coronary angiography or axial computed tomography (CAT) for review of the coronary arteries.

In the functional evaluation, the TAVI nurse will have a leading role. In the nursing consultation she uses different questionnaires, previously selected by our hospital, to evaluate cognitive and social function, quality of life and frailty.

In addition, data is collected to make a brief clinical history and health education for the patient and environment begins

with information about the process of their disease, the steps to follow, diagnostic tests and procedures.

The set of clinical results and the score of the patient's functional questionnaires will be reflected in the individualized report of the TAVI program. With this information, the HT makes the final decision: TAVI, valvuloplasty or referring the patient to the palliative service.

The geriatric assessment of the patient, frailty and quality of life can be key to the patient's acceptance or rejection of treatment, as well as predictors of complications or late discharges. Also serving to identify eligible patients to enter cardiac rehabilitation programs after the TAVI procedure. The concept of futility must not be overlooked, since unfortunately TAVI is not always an option. In this situation, the TAVI nurse will accompany the patient in the transition to palliative care.

In the event that the patient is accepted for TAVI, TAVI NURSE is involved in triaging patients and managing the patient waiting list.

3) PROCEDURE PLANNING:

Once the patient has been selected and the decision to perform TAVI has been made, individualized planning will begin. The TAVI nurse confirms that all diagnostic tests have been performed and recorded in the medical history and that the consent has been signed and makes an appointment with the patient one week before the procedure (2 to 7 days prior).

In this phase, the nurse focuses health education specifically on TAVI. The definition and symptoms of AS are commented and an explanation of the technique (using a video) is provided to the patient and family, through a slide presentation and self-made videos, resolving doubts and providing all the necessary information. It also includes a virtual visit of the different services that the

patient undergoes during his hospital stay in the TAVI process, and the activities and care that will be carried out in each of them so that the patient arrives in the best condition to the procedure³¹.

Likewise, a brochure is delivered with reminders of important information so that he can consult later at home (fasting, medication to take or not to take, time and unit in which is going to be admitted and a contact telephone number)³¹.

Our hospital's protocol for elective TAVI includes admission of the patient on the same day of the procedure at the Cardiology Day Hospital in order to reduce the length of hospital stay and optimize resources, with a mortality rate and complications similar to admission on the same day. prior to the procedure.

It is performed under conscious sedation in cases of transfemoral access or under general anesthesia in other types of access (subclavian, transapical or transcaval...). After the intervention, the patient is transferred to the Cardiovascular Critical Care Unit for a minimum of 24 hours. Afterwards he is transferred to the hospitalization unit, with a total stay that will depend on the risk of atrioventricular block and the absence of major complications.

TAVI NURSE carries out detailed monitoring of the patient from admission to discharge, visiting them in all the units where they pass during their admission to our hospital: Interventional Cardiology, Cardiovascular Intensive Care Unit and Hospitalization. The TAVI nurse in this part of the process:

- Maintains continuity of care
- Evaluates the patient's evolution.
- Participates in the daily session, where the patient's evolution is transmitted.
- Visits the patient and maintains continuous communication with the

patient and family.

- Evaluates the patient's socio-family support as a requirement for discharge.
- Confirms the understanding of the patient and family, in relation to medical prescription and discharge care.
- Upon discharge, the patient will have an appointment assigned for follow-up.

4) TRACKING:

Follow-up in the TAVI nurse's office will be carried out one month after the procedure and, again, you will be scheduled between 6 months and one year after the procedure. If the patient has been included in the early discharge protocol, she will also have an early follow-up one week after the procedure.

The review by the cardiologist will be 3 months after the procedure, unless the need to advance said consultation is identified in the TAVI nurse consultation.

During the TAVI nurse's follow-up consultation, in addition to the patient's clinical evolution, self-developed scales are used to evaluate whether the health results are as expected by the patient and what quality of life is perceived by the patient. Always seeking to promote the active role of the patient and improve their experience.

All this information is taken to the patient's electronic medical record, in an application developed specifically for the TAVI nurse within the computer program of the cardiology service of our hospital.

CONCLUSIONS

Nurses are at the heart of most healthcare teams and can play many different roles. Currently there is a stage of enormous innovation and creativity that nursing must take advantage of and the TAVI nurse role is a good example of this.

The TAVI nurse plays a critical role before, during and after the TAVI procedure. As a profession, the nurse understands the clinical needs and those of the patient, adapting care models to each patient. Nursing skills and experience are ideal to provide leadership within the HT.

Our program has focused on putting the patient at the center through three fundamental aspects to empower the patient to control their disease:

Shared decision making. Sometimes we forget how important it is what the patient thinks, what he wants to do with his life. Their thought, their idea or their decision is vital in our program. This involves developing a climate of good patient-family relationship, shared detailed information, support for making decisions and facilitating the expression of their preferences, thus emerging the figure of the “informed patient.”

Quality of life. Quality of life is relevant to analyze the efficacy and effectiveness of health

interventions. But due to the advanced age and comorbidities of the TAVI patient, it is important to evaluate the quality of life both before the procedure and after it. For this reason, the TAVI nurse evaluates quality of life both in the pre-TAVI consultation and in the post-TAVI consultation. But, in addition, evaluating the Patient reported outcomes measurements, PROMs, which are outcome measures reported by the patient themselves, that is, they define the quality of life perceived by the patient themselves, helps us find areas for improvement.

Patient experience. Evaluating the “Patient Journey” and the patient’s interactions with the health system throughout the process (appointments, diagnostic tests, procedure, admission, health personnel and facilities) allows us to know their experience and satisfaction with the TAVI process, known as Patient reported. experiences measurements “PREMs”.

Therefore, identifying PREMs and PROMs in TAVI patients helps to directly improve healthcare by systematically incorporating the patient into the process. We must measure the experience to improve the TAVI process. Your contributions will serve to improve patient safety and quality of care, but also to improve clinical results³²⁻³⁴.

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