THEMATIC REVIEW

EDUCATIONAL SERIES ON THE SPECIALIST VALVE CLINIC

What is a valve clinic?

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This paper is part of a series on specialist valve clinics. The Guest Editors for this series were Richard P Steeds and John B Chambers.

Abstract

The prevalence of heart valve disease is increasing as the population ages. A series of studies have shown current clinical practice is sub-optimal. Some patients are referred for surgery at advanced stages of disease with impaired ventricular function or not even considered for surgery. Valve clinics seek to improve patient outcomes by providing an expert-led, patient-centred framework of care designed to provide an accurate diagnosis with active surveillance of valve pathology and timely referral for intervention at guideline directed trigger points. A range of different valve clinic models can be adopted depending on local expertise combining the skill set of cardiologist, physiologist/scientist and nurses. Essential components to all clinics include structured clinical review, echocardiography to identify disease aetiology and severity, patient education and access to both additional diagnostic testing and a multi-disciplinary meeting for complex case review. Recommendations for training in heart valve disease are being developed. There is a growing evidence base for heart valve clinics providing better care with increased adherence to guideline recommendations, more timely referral for surgery and better patient education than conventional care.

Key Words

- heart valves
- clinics

Purpose and rationale

The prevalence of valve disease increases with age (1). The Oxvalve study found 6.4% of participants over the age of 65 years had moderate or severe valve disease (2). Therefore, as life expectancy improves, the prevalence of valve disease is likely to increase with a resultant increase in the burden of valve disease.

Several studies have assessed the standard of routine clinical care and found patients receive intervention late in the course of disease and often do not get referred at all despite indications for intervention (3, 4, 5). The Euro Heart Survey found nearly one-fifth of patients with aortic stenosis undergoing intervention had reduced left ventricular ejection fraction (<50%) (3). In addition, nearly 50% of those patients with severe, symptomatic mitral regurgitation received only medical therapy (4). Bach *et al*. examined the outcomes of patients with significant mitral regurgitation at a tertiary medical centre (5). Only 53% of those with primary mitral regurgitation underwent intervention. Of those unoperated, the majority (74%) had a guideline directed indication for intervention. Therefore, there is a need for a care pathway which provides diagnosis and appropriate follow-up so intervention can be performed at the optimal time.

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The purpose of a heart valve clinic is to improve patient outcomes by providing an accurate diagnosis and timely follow-up and treatment of heart valve disease. Particular importance is placed on patient education, guideline triggers for intervention and discussion of complex cases within a heart valve team.

Organisation and models

Heart valve clinics can be organised using several different models depending on the patient group and local expertise (6, 7, 8). A comprehensive valve clinic will be centred on a physician-led valve clinic (Fig. 1). Clinics should ideally provide complete care for the valve patient including diagnosis of valve disease, follow-up of patients, referral for intervention (including discussion at valve multi-disciplinary meeting) and follow-up after intervention. Hybrid models can include a nurse and/or physiologist/scientist-led clinics which are run in conjunction with the cardiologist-led valve clinic (9, 10, 11). The role of nurses and physiologists/scientists can be adapted according to local expertise. Figure 2 shows a possible clinic structure for physiologist/scientist and nurse-led clinics. A key difference between the two clinics is a physiologist/scientist will both perform a clinical assessment of the patient and perform an echocardiogram, whereas the nurse will perform a clinical assessment and obtain an echocardiogram performed by an expert physiologist/scientist if indicated. The nurse-led and physiologist/scientist-led clinics may see specific patient groups (mild, moderate or severe native valve disease, post-valve intervention or endocarditis follow-up) and refer patients who develop complication into the physician clinic (Fig. 3). A structured proforma for the clinic including history, symptom status, clinical examination, echocardiographic findings and patient education (documentation of dental surveillance, anti-coagulation checks, pregnancy and infective endocarditis advice) can be useful for standardisation. Additional functions of the valve can include telephone/web-based follow-up, post-surgical care for example sternal wound monitoring.

The majority of specialists reviewing patients in the valve clinic will be cardiologists. However, additional models may include running parallel cardiothoracic

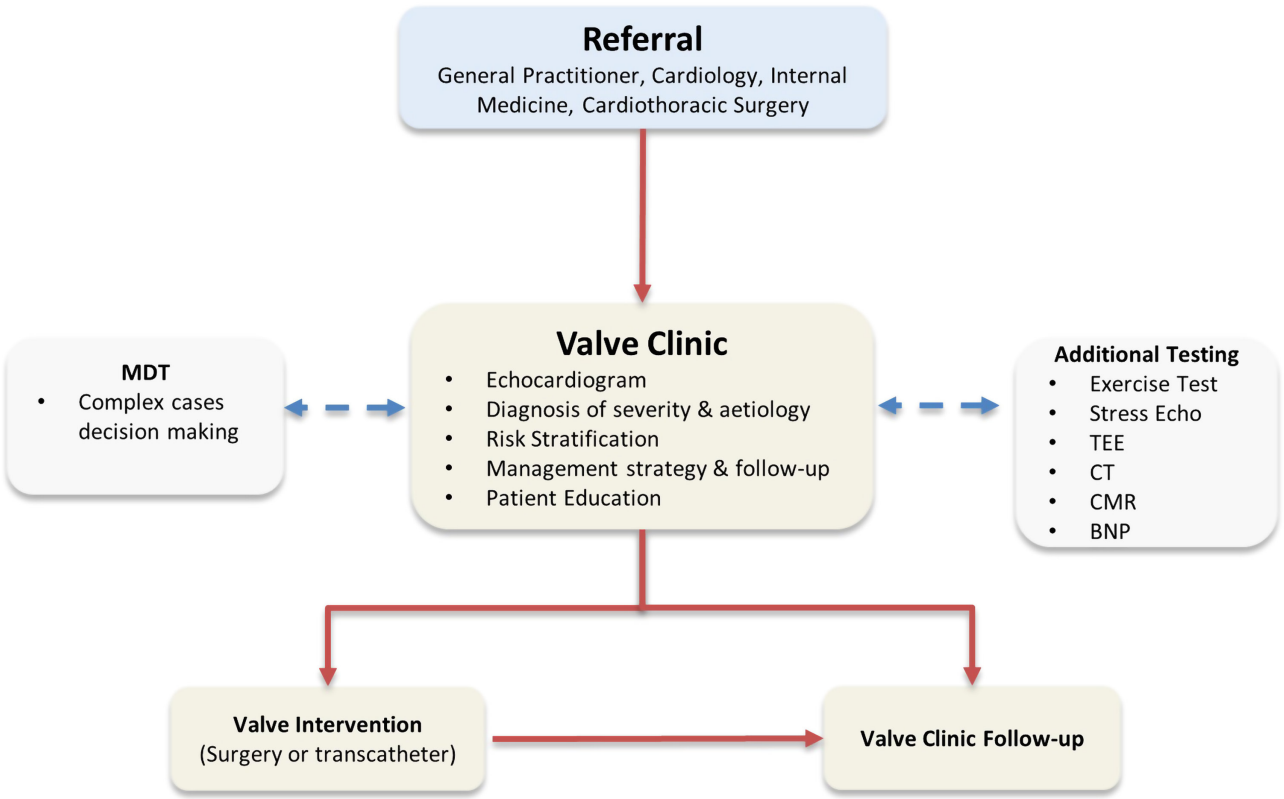

Figure 1
Organisation of heart valve clinic pathway. BNP, brain natriuretic peptide; CMR, cardiac magnetic resonance; CT, computed tomogram; MDT, multi-disciplinary meeting; TOE, transoesophageal echocardiogram.

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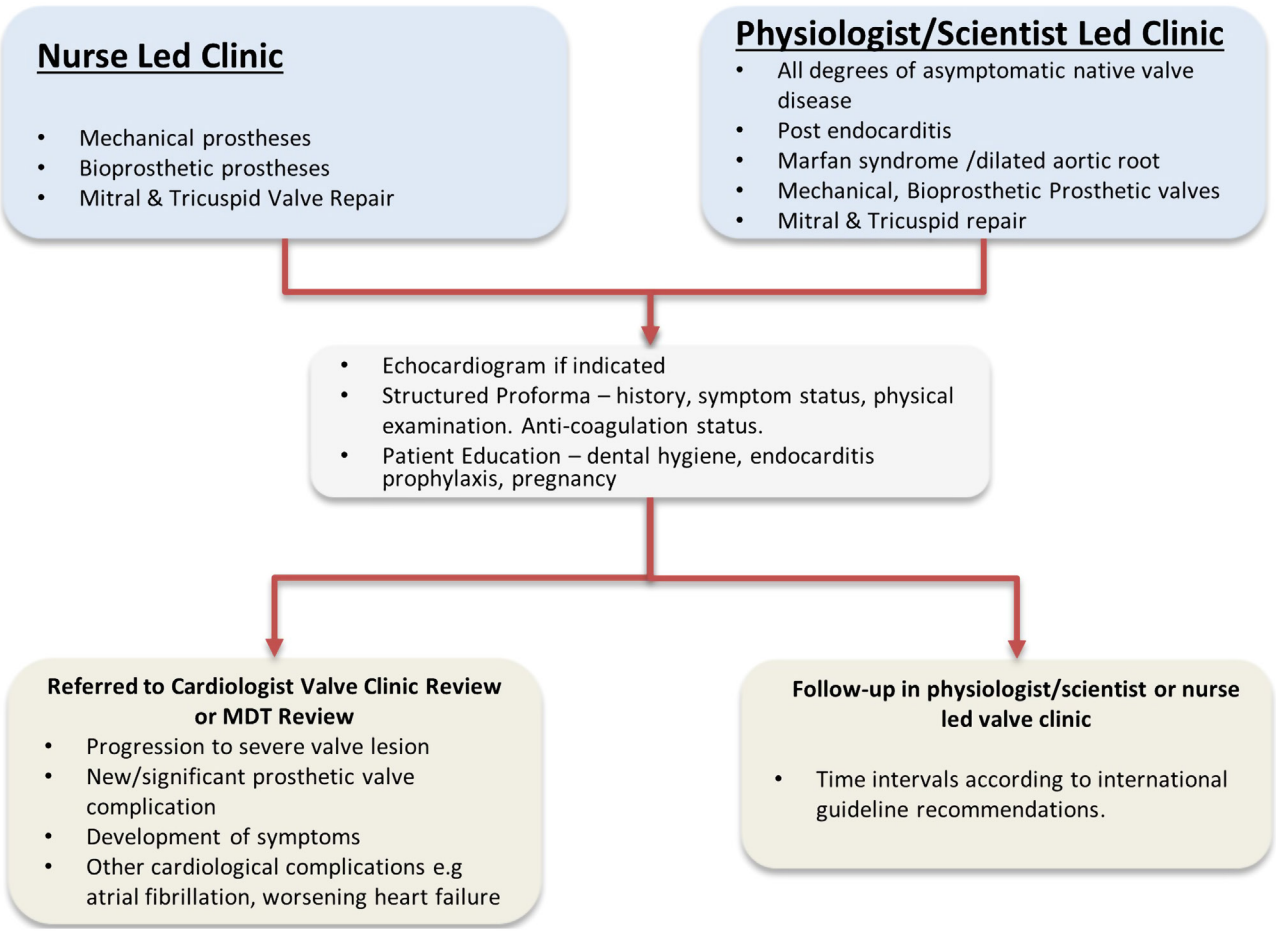

Figure 2
Organisation of physiologist/scientist and nurse-led valve clinic pathway.

or structural intervention clinics. These can provide the additional benefit of review and decision making in patients being considered for intervention who are complex/high risk or where feasibility of valve repair is being considered. In addition, complex valve disease clinics such as those for patients with heart valve disease related to neuroendocrine tumours, rheumatological and radiation valve disease may require additional input from relevant specialties.

Valve clinics can be run in a range of different settings including community clinics, secondary and tertiary hospitals. If clinics are set-up in the community or secondary hospitals, links to tertiary centres should be established to allow for complex case discussion and

Inclusion Criteria	Exclusion Criteria
Pre-intervention Native valve disease Infective endocarditis – medically managed. Marfan/aortic root surveillance **Post Intervention** Valve repair Bio-prosthetic valve replacement Mechanical valve replacement Trans-catheter valve procedures	Significant co-morbidities where valve intervention (surgical or percutaneous) would not be considered appropriate.

Figure 3
Inclusion and exclusion criteria for nurse and physiologist/scientist-led valve clinic.

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onward referral for intervention. This could be achieved in several ways and may include the use of videoconferencing to join multi-disciplinary meetings or by having visiting surgeons or cardiologists provide clinical support to the clinic.

Diagnostic investigations

Decision making in valve disease is heavily dependent on access to and interpretation of echocardiography. Therefore, same day echocardiography should be available for all patients attending valve clinic. Additional data may be required to grade the severity of aortic stenosis in low flow states, objectively assess symptoms in patients who claim to be asymptomatic or identify dynamic changes in the severity of valve disease where there is a discrepancy between symptoms and the severity of valve disease at rest (12). Therefore, additional exercise testing and advanced imaging (stress echocardiography, transoesophageal echocardiography, computed tomography, magnetic resonance imaging) should be available within a short timeframe to allow timely risk stratification and decision making.

Patient types

The main indication for seeing patients in valve clinic is for the initial diagnosis, follow-up and management of native valve disease (6). Predominately, this will be primary valve pathology for example mitral valve prolapse. Patients with secondary valve pathology for example functional mitral regurgitation due to ischaemic cardiomyopathy could be followed up if potentially suitable for valve surgery or trans-catheter therapies. If intervention was not going to be considered they should be followed up primarily in general/speciality cardiology clinics for treatment of the primary pathology. In addition, follow-up of patients with prosthetic valves (mechanical and bio-prosthetic) and those with repaired valves is appropriate. Several more specialist clinics may be part of or run in conjunction with the valve clinic and may include aortopathy clinics and endocarditis follow-up.

Patients with valve disease, particularly, those in older age groups may have multiple cardiac and non-cardiac co-morbidities. The role of the valve clinic is focussed and therefore patients requiring intensive heart failure management or coronary artery disease optimisation should be co-managed with other cardiovascular sub-specialists. However, every effort should be made to streamline patient care and avoid patients being seen in multiple clinics without clinical need. Clinicians may be uncertain of most appropriate clinic to refer an individual patient to. Therefore, a generic valve helpline or e-mail for advice may be a useful resource to provide clinical advice and triage patients.

Multi-disciplinary meeting

The majority of patients with valve disease can be identified, followed up and managed according to guideline recommendations. However, uncertainty regarding the severity of disease, timing of intervention in asymptomatic patients or patients with advanced disease or significant co-morbidities may require review and discussion in a heart valve multi-disciplinary meeting. A regular scheduled meeting should be convened for this purpose including other cardiologists, cardiothoracic surgeons, structural interventionalists with additional support from anaesthetics, geriatrics and other specialists as needed (13).

Patient education

The valve clinic should educate the patient about the nature, natural history and management of their condition (7). The level of detail will relate to the aetiology and severity of pathology. For example in asymptomatic patients with severe valve regurgitation and stenosis particular emphasis on reporting changes in symptoms should be given together with discussion of likely valve intervention when symptoms develop. Information regarding endocarditis prophylaxis, dental hygiene, anti-coagulation and pregnancy (if relevant) should be provided. Patient information leaflets relating to each valve pathology should be available.

Training

There are no formal training requirements for becoming a specialist in heart valve disease. The European Society of Cardiology includes skills and knowledge relevant to heart valve disease in the core competencies required for the general cardiologist. The British Society of Heart Valve disease publishes a core syllabus for heart valve disease. Both these curricular provide a useful

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framework for clinicians wanting to train in heart valve disease. Achieving these competencies will require attendance at heart valve clinics, review of in patients with valve disease and attendance of multi-disciplinary valve meetings (14). Future formal training fellowships in heart valve disease would be the optimal method of both providing access to training and assessment of competency in valve disease. Attendance at continuing professional development courses related to heart valve disease is necessary for core knowledge, maintaining practice and keeping up to date.

Nurses and physiologists/scientists will require similar training. However, depending on previous experience, may require additional clinical practice training focussed on clinical history taking, physical examination and cardiovascular care. These areas of skills/knowledge may already be covered within their specific training curriculum at MSc/PhD level. For those individuals who are not currently participating in an active academic programme, there are relevant clinical modules within other recognised advanced practice courses available as stand-alone learning opportunities. An assessment of competencies is advised prior starting as a valve clinic practitioner. This may take the form of a review of the prospective valve practitioner's clinical assessment and proposed management plans for a set number of patients.

Audit and research

Quality improvement is central to patient care (7, 8). There are no published audit standards for heart valve clinics. A programme of audit of valve clinics and pathways should be focussed on patient-centred outcomes. General valve clinic audits should focus on patient education, patient satisfaction, referral times, adherence to guidelines for follow-up and intervention. Specific patient group audits could be focussed on individual valve pathology. For example, audits could focus on the outcomes of patients with primary mitral regurgitation under surveillance.

The level of evidence for management of valve disease is improving with more prospective randomised trials and large international multi-centre registries being created. Despite this, there remain major areas of uncertainty. Valve specialists are in an ideal situation to design studies and identify patients for future research studies.

Cost effectiveness

All healthcare needs to be cost-effective in addition to improving patient outcomes. The use of hybrid physiologist/scientist and nurse-led clinics in conjunction with a physician led valve clinic has been shown to be

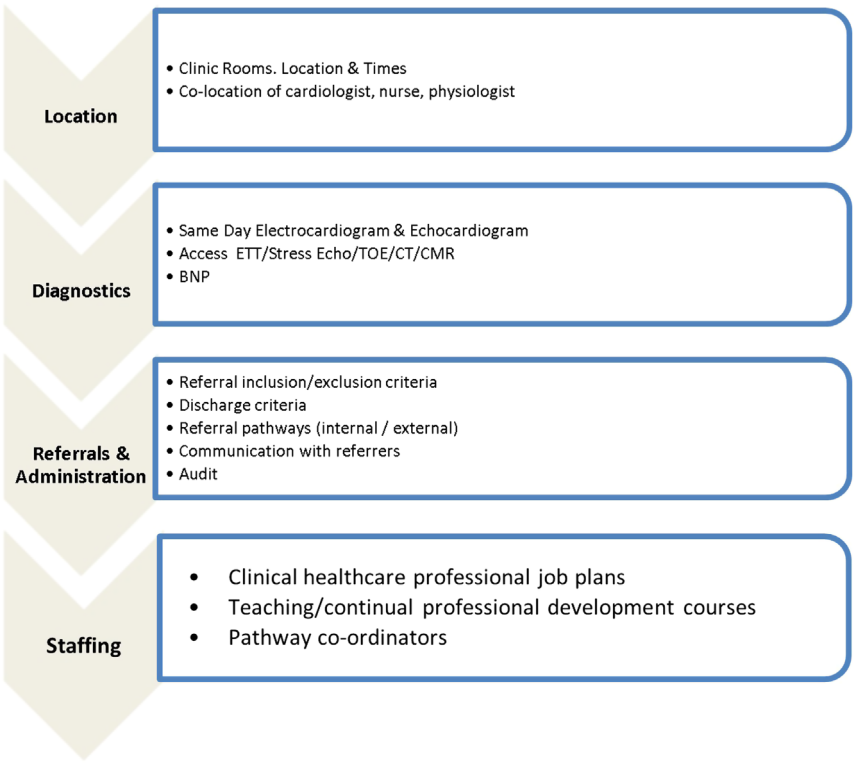

Figure 4
Checklist of key resources required for valve clinic.

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cost-effective. Ionescu *et al.*, in a cost effectiveness model, showed despite a slight increased cost of new patient appointments, there is an overall reduction in the cost of patient follow-up compared to conventional non-valve clinic follow-up (15). This primarily stems from more appropriate guideline-derived follow-up resulting in lower number of follow-up visits and lower number of echocardiograms being performed during follow-up. A checklist of key resources required for setting up a valve clinic are provided in Fig. 4.

Evidence base

There is an evolving evidence base for valve clinics. Taggu *et al*. examined the effect of a hybrid physiologist-led valve clinic with physician support on quality metrics (9). Compared to pre-valve clinic, there was an increase in adherence to valve guidelines (41 vs 91%) and improvement in patient education (endocarditis prophylaxis increased from 88 to 93%).

One of the major roles of a valve clinic is follow-up of patients with timely referral for valve intervention at guidelines recommended cut-offs (16, 17, 18). Zilberszac *et al*. compared the characteristics of patients previously followed up in general internal medicine/cardiology clinics and had an indication for valve surgery to those of patients followed up in a valve clinic monitoring programme (16). Patients referred from the general clinics had significantly more advanced symptoms and a longer delay between symptom onset and reporting of these symptoms than patients in the monitoring programme who developed indications for surgery. The same group showed the outcomes of patients with severe asymptomatic mitral regurgitation followed up by active surveillance in a heart valve clinic were excellent with good surgical outcomes and long-term survival (18).

Conclusion

Heart valve clinics provide a structured pathway for the diagnosis, follow-up and management of all patients with heart valve disease. The valve clinic provides a mechanism to improve patient outcomes by improving patient education, timeliness and adherence to guideline recommendations for valve intervention and follow-up. In addition, implementation of heart valve clinics is cost-effective particularly if hybrid models utilising nurse and physiologist/scientist-led clinics are utilised.

Declaration of interest
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