Current status of heart failure management in Vietnam

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ABSTRACT

Heart failure is a growing public health issue with high mortality and hospitalization rates. Comprehensive management programs are needed to improve outcomes and reduce costs.

In Vietnam, there are gaps in guideline-directed medical therapy, lack of a multidisciplinary approach, inadequate patient education, and poor continuity from inpatient to outpatient care. However, management programs are evolving with 29 hospitals having established programs.

Initial results show improved use of medications, reduced hospitalizations and mortality, and better quality of life in some programs. Challenges remain around resources, costs, patient diversity, and lack of standardization.

Standardization initiatives like EuroHeart are working to define common data sets and care standards internationally. Effective programs require optimized hospital treatment, comprehensive discharge planning, structured follow up, and patient self-management support.

Further government support, healthcare professional training, public education, research, and regional collaborations are needed to advance heart failure care in Vietnam.

THE SIGNIFICANCE OF COMPREHENSIVE MANAGEMENT OF HEART FAILURE

Along with the development of the healthcare system, both in primary care and advances in disease management, human life expectancy is increasing. Concurrently, the prevalence of chronic diseases, such as heart failure, is on the rise across the globe. The estimated frequency of chronic heart failure accounts for 1-2% of the adult population in developed countries, and up to over 10% in the group older than 70 years[1-4]. The prognosis of patients with chronic heart failure is worse than most cancers[5,6]. Despite advances in medication therapy, the 5-year mortality rate remains between 40 and 50%[5,6]. Notably, the mortality rate in heart failure patients with preserved ejection fraction is only slightly lower than the reduced ejection fraction heart failure group[7]. These factors have led to an increasing burden on healthcare costs [8], raising the issue of the need to restructure the approach to caring for patients to achieve the best results at the most reasonable costs.

The primary goal of heart failure patient management is to reduce the rate of rehospitalization and mortality. Western countries have reported extensively on this issue in single and multi-country registry studies; at the same time, more and more individual countries in Asia have also provided data from their nations. In the West, the ESC HF Long-Term Registry, an observational, multicenter,

prospective registry enrolling 12,440 heart failure patients and following them for 1 year [9], must be mentioned. This study recorded a high all-cause mortality rate in the acute heart failure population, at 4.9% during hospitalization and 23.6% within 1 year. Over half of the deaths were due to cardiovascular causes. Considering the rehospitalization rate, this study recorded an average figure of 22.2% in 1 year. In one year, the percentage increased to 40.1% when death and rehospitalization caused by heart failure events were combined. This gives rise to concerns regarding the stringent management of patients with heart failure, particularly those who have been hospitalized for acute heart failure. Turning back to Asia, registry studies on heart failure have been emphasized for many years. In 2009, the Japanese Cardiac Registry of Heart Failure in Cardiology (JCARE-CARD) registry study reported follow-up results of heart failure patients with both reduced and preserved EF [10]. Of the 1,692 patients enrolled in the study, 985 patients (58%) had EF <40%. At 1 year after discharge, the all-cause mortality rate was 8.9%, of which 66% were due to cardiovascular causes. Regarding rehospitalization, this figure was 23.7%. After that, 8 years later, we have registry studies from 2 other Asian countries: India and Taiwan. The Trivandrum Heart Failure Registry (THFR) study enrolled 1,205 patients hospitalized with acute heart failure from 18 hospitals in Trivandrum district of India [11] and followed them for 1 year after discharge. The rehospitalization rate recorded was even higher than previous studies, at 30.2%; of those, up to 64 patients (5.8%) were rehospitalized more than once. The cumulative 1-year mortality rate was 30.8%, and highest in the first 3 months after discharge, reaching up to 18.1% - an extremely worrying number. At the same time, Taiwan also reported its data [12]. 1509 patients with reduced EF heart failure admitted for acute episodes at 21 hospitals in Taiwan were enrolled in the study and followed up for 1 year. The rehospitalization rates in this study at 6 months and 12 months after discharge were 31.9% and 38.5%, respectively. Of those, up to 9.7% were rehospitalized more than once. 15.9% of patients died from all causes after 12 months from discharge, and cardiovascular deaths accounted for 10.5%. Most recently, the ASIAN-HF study is the first prospective, multi-country registry study to report heart failure data from Asian countries with regional classification [13]. This study enrolled 6,480 heart failure patients from 46 centers in 11 Asian countries. Of those, Southeast Asia had 5 participating countries: Thailand, Malaysia, Philippines, Indonesia and Singapore. The all-cause mortality rate within 1 year after discharge in the entire population and in the reduced EF heart failure population were 9.6% and 10.6%, respectively. Among reduced EF heart failure patients, Southeast Asia had the highest all-cause mortality rate, at 13.6% compared to 8.9% in Northeast Asia and 8.3% in South Asia. These figures show a worrying fact that, despite much progress in non-pharmacological and pharmacological treatments, as well as research efforts to incorporate into clinical practice new drugs proven to have good impacts on outcomes, mortality and rehospitalization rates remain unchanged.

Over the past decades, many groundbreaking new studies have emerged; from there, associations in countries have developed heart failure patient management programs to improve quality of life while also helping reduce the burden on healthcare costs [8]. In fact, there have been randomized controlled studies comparing multidisciplinary heart failure management with conventional management; the results show reduced rates of rehospitalization and mortality as well as optimized cost-effectiveness in the multidisciplinary group [14-17].

The natural progression of chronic diseases is accompanied by an increase in healthcare services, such as monthly outpatient visits and prescriptions [18]. However, current studies on the impact of management programs on healthcare costs still show inconsistent results (Table 1). Recently, a meta-analysis on the impact on outcomes as well as healthcare costs of an advanced heart failure management program involving 25 primary care centers provided an overview as follows: In terms of cost-effectiveness, management programs involving nurses may be cost-beneficial,

mainly from reduced rehospitalizations [19]. When considering quality-adjusted life years (QALYs), Fergenbaum et al. concluded that nurse-led care would improve QALYs by 11% and help reduce costs[20]. For patients with advanced heart failure, they need more support to improve QALYs, thus increasing costs more. This special patient group may need to be studied independently from the general heart failure population due to unique characteristics and needs.

***Table 1**. Randomized trials assessing the effectiveness of management programs on rehospitalization in elderly heart failure patients*

Author, Year	AHA Heart Failure Stages (Follow-up time)	Key outcomes comparing heart failure management program intervention vs usual care
Douglas, 2005 [21]	A, B, C (1,2 years)	Intervention reduced relative risk of composite outcome (heart failure rehospitalization or death) by 20%, 26.3% vs 31%, P=0.02. Intervention reduced heart failure rehospitalizations.
Laramee, 2003 [22]	A, B (3 months)	Rehospitalization rates were similar in both groups (37%). Mean total inpatient and outpatient costs and mean rehospitalization costs were reduced by 14% and 26% respectively in intervention group. Subgroup analysis of local patients seen by cardiologists showed significant reduction in heart failure rehospitalizations with intervention.
Stromberg, 2003 [23]	B, C (3 & 2 months)	Patients in intervention group had fewer composite outcomes (rehospitalization or death) after 12 months compared to control. Intervention group had fewer rehospitalizations (33 vs 56, P=0.047) and inpatient days (350 vs 592, P=0.045) in first 3 months. At 12 months, intervention was associated with 55% lower hospitalization rate/patient/month and fewer inpatient days/patient/month.
Doughty, 2002 [24]	A, B, C (1 year)	Intervention reduced total hospitalizations and inpatient days. Main intervention effect was due to preventing multiple rehospitalizations. Intervention improved quality of life.
Harrison, 2002 [25]	B (3 months)	In intervention group 23 patients were rehospitalized compared to 31 in usual care, with 35 patients not completing the 3-month study.
Kasper, 2002 [26]	A, B, C (6 months)	Intervention reduced composite outcome (heart failure rehospitalization or death): 43 rehospitalizations and 7 deaths vs 59 and 13, quality of life scores, use of vasodilator therapy and dietary recommendation compliance significantly better in intervention group.
Krumholz, 2002 [27]	A, B, C (1 year)	Intervention reduced composite outcome (rehospitalization or death) 25 vs 36. Intervention reduced total rehospitalizations by 39%. After adjusting for clinical and demographic characteristics, intervention group had significantly lower risk of rehospitalization.
McDonald, 2002 [28]	A, C (3 months)	Intervention reduced composite outcome (heart failure rehospitalization or heart failure death). Heart failure rehospitalizations less frequent in intervention group (25.5% vs 3.9%).
Riegel, 2002 [29]	A, B (3 and 6 months)	Heart failure rehospitalization rates 47.5% lower in intervention group after 3 months and 47.8% lower after 6 months. Significantly fewer heart failure inpatient days in intervention group at 6 months. Cost savings achieved even after deducting intervention costs. No evidence of cost-shifting to outpatient care. Patient satisfaction with care higher in intervention group.
Stewart, 2002 [30]	B, C (4, 2 years)	Significantly fewer unplanned rehospitalizations and composite outcomes (unplanned rehospitalization or death): mean 0.21 vs 0.37 events per patient-month. Mean event-free survival time longer (7 vs 3 months).
Blue, 2001 [18]	A, B, C (1 year)	Intervention reduced composite outcome (heart failure admission or death), fewer all-cause rehospitalizations (86 vs 114, P=0.018), fewer heart failure admissions (19 vs 45, P<0.001) and fewer heart failure inpatient days (mean 3.43 vs 7.46 days).

A review of 47 studies identified common key features of heart failure management programs across different studies: heart failure clinics, non-clinic follow-up, telephone contact, primary care follow-up, and promotion of self-care [31]. Both home visit programs and multidisciplinary clinic programs helped reduce all-cause rehospitalization rates at 3-6 months by 25% and 30%, respectively. Mortality rates during this period were also reduced by 23% and 44%, respectively. Also according to this analysis, telephone support helped reduce mortality by 31%. Based on this evidence, the European Society of Cardiology (ESC) strongly recommends (Class I, Level A evidence) that heart failure management programs should be multidisciplinary (Table 2).

***Table 2**. Current recommendations on heart failure management programs by the European Society of Cardiology 2021, American College of Cardiology 2022, and Vietnam National Heart Association 2022*

	Recommendation Contents	Level of Recommendation and Evidence
ESC 2021 [1]	Patients with heart failure are recommended to enroll in multidisciplinary heart failure management programs to reduce the risk of heart failure hospitalization and mortality.	I A
	Both home-based and clinic-based management programs improve outcomes and are recommended to reduce the risk of heart failure hospitalization and mortality.	I A
AHA/ACC/HFSA 2022 [32]	For high-risk heart failure patients, especially those with reduced EF and recurrent admissions, referral to multidisciplinary heart failure management programs is recommended to reduce hospitalization risk.	1
Vietnam National Heart Association 2022	Patient-centered, multidisciplinary, multifaceted heart failure management programs help prevent recurrent and advanced heart failure.	

CURRENT STATUS OF HEART FAILURE MANAGEMENT IN VIETNAM

Gaps in heart failure patient management

As of now, comprehensive epidemiological data on heart failure in Vietnam is lacking. However, based on analysis of the heart failure situation in Southeast Asian countries, the number of heart failure patients is rapidly increasing, particularly with a trend towards earlier onset and worse outcomes compared to other regions globally [33]. If calculated based on the global incidence of heart failure, it is estimated that in Vietnam there are between 320,000 and 1.6 million people currently facing heart failure. Despite progress in diagnosis and treatment, the reality shows that we still encounterlimitations in the process of managing heart failure patients.

Suboptimal medical treatment compared to current Guidelines

Medical treatment is considered the cornerstone for all heart failure patients, especially those with reduced ejection fraction. The main goals of medical treatment include: (1) reducing mortality, (2) decreasing rehospitalization due to acute decompensated heart failure, (3) improving symptoms and enhancing quality of life. Recommended drugs in heart failure treatment include: angiotensin-converting enzyme inhibitors (ACE-i), beta-blockers (BB), angiotensin receptor-neprilysin inhibitors (ARNI), mineralocorticoid receptor antagonists (MRA), and sodium-glucose cotransporter 2 inhibitors (SGLT2-i). However, there exists a significant gap between recommendations and reality in the utilization of these drugs.

An analysis of 302 outpatient heart failure patients being treated at three hospitals in Ho Chi Minh City (2020) found that the rates of using ACE-i/ARB, BB,

MRA and ARNI were 86.5%, 65.2%, 53% and 4.6%, respectively. Of those, 43.3% of patients were treated with all three foundation drugs. The rates of patients achieving target doses as recommended by the European Society of Cardiology (2016) for ACE-i/ARB, BB and MRA were 12.5%, 6.3%, 53.0%, respectively[34]. Another study at Hanoi Heart Hospital (2018) with 134 outpatient heart failure patients showed that no patient achieved target doses of ACE-i/ARB or BB after 12 months of treatment, although >80% of cases met dose escalation criteria [35]. At An Giang Cardiovascular Hospital, only 15.4% of heart failure patients were treated with allfour foundation drugs, and no patients achieved >50% of target BB dose [36].

Similar to many other Asian countries, the use of devices like implantable cardioverter defibrillators (ICD) and cardiac resynchronization therapy (CRT) in heart failure treatment in Vietnam is still very limited[37]. A report on 500 heart failure patients followed at University Medical Center Ho Chi Minh City recorded only 5 cases with ICD and 2 cases with CRT implantation.

These studies were conducted at leading healthcare facilities with adequate human resources and infrastructure. Therefore, considering lower-level facilities, the proportion of patients accessing proper treatment according to recommendations may be even lower. Figure 1 shows the barriers we are facing in managing heart failure and feasible solutions to these issues.

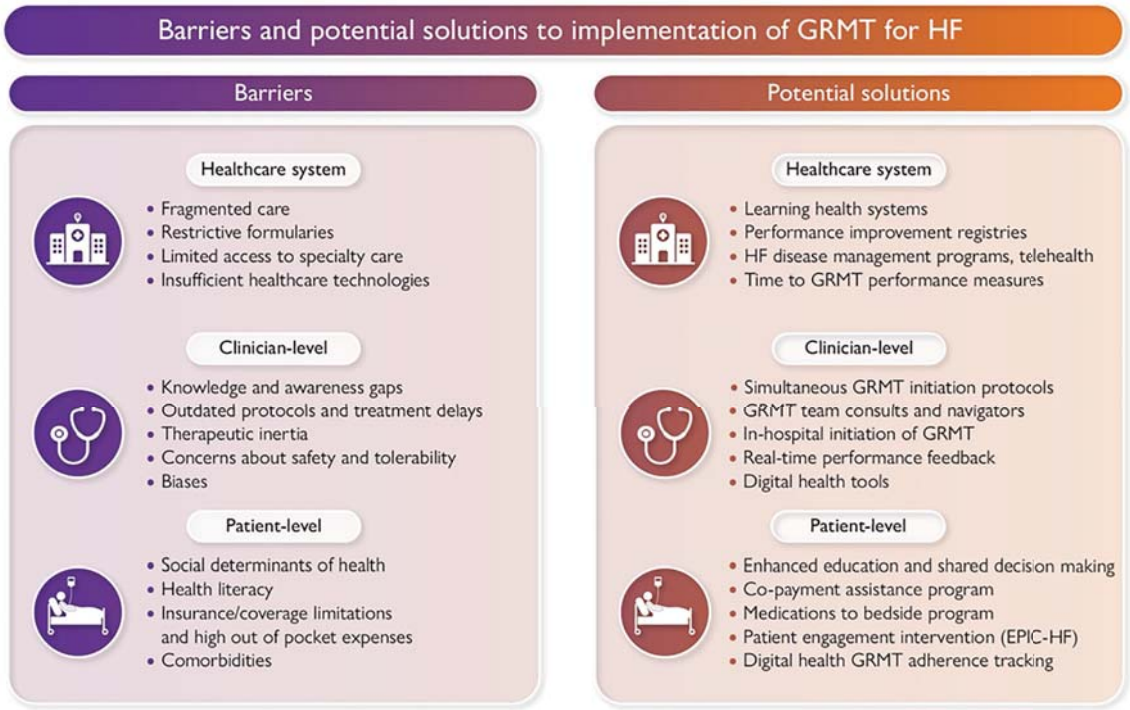


***Figure 1**. Challenges and solutions to guidelined-directed medical therapy for heart failure in clinical practice [38]*

Multidisciplinary approach in heart failure patient management in Vietnam

The multidisciplinary approach in heart failure patient management is still in its infancy and has not yet gained widespread adoption in Vietnam. In this model, the patient is at the center and receives care from healthcare professionals and experts from various disciplines, including general cardiology, interventional cardiology, cardiac arrhythmia, cardiovascular surgery, nutrition, rehabilitation, palliative care, psychological, social and spiritual support, etc. However, the traditional model of one doctor caring for one patient persists in many places. Especially for leading cardiovascular institutes like Ho Chi Minh City Heart Institute or Hanoi Heart Hospital, the coordination of different specialties in

heart failure patient management still encounters numerouschallenges. Specific areas like palliative care, cardiovascular rehabilitation, psychological, social and spiritual support are face shortages in human resources and lack full recognition.

Lack of counseling and health education

Treatment outcomes in heart failure heavily rely on patients' knowledge and self-care skills [39]. Numerous studies show that a majority heart failure patients do not fully comprehend their disease. An analysis of 143 heart failure patients at Vinmec Times City Hospital revealed that only 2.1% of patients correctly understood and properly used medications, while only 9.8% of patients had adequate knowledge of self-care [40]. Another study at An Giang Cardiovascular Hospital demonstrated that even with counseling and education, only 11.1% of heart failure patients fully grasped all knowledge of self-care at home[41]. These studies underscore the importance of effective patient counseling, as it correlates with better behaviors and lower rehospitalization rates[41,42]. Therefore, the development ofcommunity health information networks and enhancement ofhealthcare professionals' awareness and skills in patient education is imperative.

Disruption in outpatient heart failure management

Efforts in heart failure treatment mainly focus on the inpatient stage, with continuous developments in new therapies such as intra-aortic balloon pump (IABP), extracorporeal membrane oxygenation (ECMO), percutaneous coronary intervention, cardiovascular surgery, continuous renal replacement therapy (CRRT), contributing to reduced in-hospital mortality.. However, a significant challenge lies in the lack of close follow-up or the loss of patients after discharge. Factors contributing to this disconnect between inpatient and outpatient care include an uneven distribution of human resources and medical infrastructure, high outpatient treatment costs, mobility limitations in heart failure patients, epidemic situation, etc. The lost to follow-up rate after 12 months at University Medical Center Ho Chi Minh City is around 30%, a trend observed in many other leading hospitals.

Limited scientific research

It is essential to acknowledge the severe shortage of epidemiological to clinical research on heart failure management and treatment. This information is crucial to assess the burden of heart failure on the community, develop policies, strategies and effective interventions to mitigate the impacts of heart failure on patients and society.

From the above analysis, we clearly see the gaps in heart failure patient management and treatment in Vietnam, significantly affecting treatment outcomes. The rates of rehospitalization or mortality within 30 days after discharge remain quite high, from 23.4% to 34.9% [43,44]. Therefore, the development ofa comprehensive management program to address these challenges is extremely necessary and inevitable in the development process.

Evolution of heart failure management programs

In response topractical needs, many healthcare facilities in Vietnam have initiated the development and implementation of heart failure management programs. Initially, these models were rudimentary and spontaneous, then developed into sophisticated and unique models for each hospital. Collaboration among healthcare facilities has been instrumental in supporting and exchanging experiences, fostering the creation of management networks at both central and local levels. The establishment of the Vietnam Heart Failure Society – Vietnam National Heart Association has played a crucial role in fostering connections and advancing cohesive, professional, and effective national heart failure management programs.

The first heart failure management program in Vietnam was established at Ho Chi Minh City Heart Institute in 2016. Initially, the program focused on outpatient visits with the primary aim of increasing the utilization of guideline-directed medical therapy. An international publication in 2019 on 257 heart failure patients with EF <50% in the heart failure management program at Ho Chi Minh City Heart Institute reported over 85% of patients received health education and over 45% had adequate knowledge and adherence to self-care measures.

The rehospitalization rates after 30 and 60 days were 8.3% and 12.5%, and mortality rates after 30 days and 6 months were 1.2% and 6.4% [45]. However, the model had many limitations, including (1) lack of continuity between inpatient and outpatient care, (2) lack of a multidisciplinary approach, (3) lack of standardized management tools, (4) lack of information technology application. The heart failure management program at Ho Chi Minh City Heart Institute was temporarily suspended in 2021 and is currently undergoing a restart.

Hanoi Heart Hospital was the first to implement a heart failure management program in the North in 2017 and finalized the model in 2019. Initially, the program enrolled outpatients then expanded to include inpatients before discharge. Currently, Hanoi Heart Hospital has made further progress in connecting with hospitals in the region and nationwide, becoming a pioneer in supporting the deployment and scaling up of the model for local healthcare facilities.

The heart failure management model at University Medical Center Ho Chi Minh City commenced in 2018 and reached its finalization in 2020. With the advantages of a multi-specialty hospital with qualified human resources and infrastructure, the management model made breakthroughs to become one of the "exemplary" models. For the first time in Vietnam, some concepts in heart failure management were applied such as "management of heart failure patients from inpatient to outpatient", "multidisciplinary approach in heart failure management" and emphasizing the pivotal role of nurses in the model. In addition, it is also the pioneer in applying information technology to patient management, including the Heart Failure Management app for healthcare professionals, the Heart Failure Management app for patients, and using the REDCap (Research Electronic Data Capture) platform to collect digital data. The hospital also organized regular training courses for nurses nationwide to provide knowledge and skills in heart failure management. In the South, University Medical Center Ho Chi Minh City took the lead in connecting and supporting lower-level healthcare facilities to develop a network for heart failure management. Aiming for international integration, the variables, forms and management tools of the program were built according to European standards (2022) (Data standards for heart failure: the European Unified Registries for Heart Care Evaluation and Randomized Trials (EuroHeart)) [46].

At the National Cardiology Congress in October, 2020, for the first time, the heart failure management program was discussed and attracted attention from many healthcare facilities nationwide. Following the initial successes, many units learned, developed and participated in reporting at subsequent Conferences and Seminars. Sessions on heart failure management programs have become regular at most major Cardiology events of the Vietnam National Heart Association, Vietnam Interventional Cardiology Society, Vietnam Society of Hypertension, Ho Chi Minh City Society of Interventional Cardiology, Ho Chi Minh City Society of Geriatrics, etc.

The Covid-19 pandemic has created unprecedented challenges for heart failure management programs, especially the consequences of disruption and changes in healthcare services. However, the program has provided timely solutions to ensure heart failure patients still receive the best care, including telemedicine, enhancing self-care skills through health education, participating in the vaccination program and assisting patients in accessing healthcare services when needed.

In 2023, the Vietnam Heart Failure Society was established, opening a new chapter for heart failure management programs in Vietnam. The Summit "Comprehensive approaches in heart failure management" organized by the Vietnam Heart Failure Society discussed important issues in heart failure management nationwide, with the participation of international speakers. Many hospitals also sent officials to learn from management models worldwide such as those in Singapore, Thailand, Malaysia, South Korea.

Characteristics of heart failure management programs	**Workflow** Most models adopt a patient-centered approach, providing continuous management from inpatient to outpatient. Initially, the main participants were patients with reduced EF heart failure, then expanded to include mildly reduced EF and preserved EF heart failure.		**Key components in the model**	
			Human resources	**Management tools:**
Currently, there is no universal management model that can be uniformly applied across all healthcare facilities. Therefore, based on specific conditions and characteristics, each hospital can develop a heart failure management program at different levels, ranging from basic to advanced. However, most models share some key common features.	*Inpatient treatment phase* - Diagnose, treat acute heart failure and precipitating factors. Efforts to optimize guideline-directed medical therapy before discharge. - Counsel patients to participate in the heart failure management program. - Multidisciplinary approach: Cardiology, Interventional cardiology, Cardiovascular surgery, Cardiac electrophysiology, Nutrition, Rehabilitation, Palliative care, Psychological support and many other specialties. - Health education for patients: diet, exercise regimen, lifestyle changes, self-monitoring at home and recognizing signs of deterioration. - Develop specific treatment plans and schedule follow-up visits.	*Outpatient treatment phase* - Remind patients about follow-up appointments, continue health education counseling. - Counseling, examining and treating remotely (Telemedicine). - Monitor clinical status and optimize guideline-directed medical therapy.	Mainly comprised of doctors and nurses from Cardiology departments (General Cardiology, Interventional Cardiology, Geriatric Cardiology). Nurses play a pivotal role in connecting patients, families and healthcare professionals, requiring training in counseling and health education skills. In some hospitals, the program collaborates with many other Departments/Units such as Nutrition, Rehabilitation, Palliative Care, Clinical Pharmacy, Social Work, etc.	- Heart failure handbook for patients: Almost all hospitals have a handbook specifically for patients. It contains comprehensive knowledge about heart failure, guidance on self-care at home, and tables to record important parameters (weight, heart rate, blood pressure). This handbook also helps clinic doctors adjust medication doses accordingly. - Management forms: Include important variables that need to be collected to monitor treatment and perform statistics. Currently, University Medical Center Ho Chi Minh City has standardized the variable set according to European Society of Cardiology standards (2022). - Information technology application: Enables faster, more accurate management and easy data extraction when needed. University Medical Center Ho Chi Minh City pioneered the development of a heart failure management app for healthcare professionals in 2020, directly connecting to the hospital's electronic medical record system. Currently, to gain international recognition and enhance connectivity, University Medical Center Ho Chi Minh City has utilized the REDCap (Research Electronic Data Capture) digital data collection platform and expanded it to Thong Nhat Hospital, An Giang Cardiovascular Hospital. In addition, some other units also use the management software developed and sponsored by Novartis, including Gia Dinh People's Hospital, Cho Ray Hospital, Xuyen A General Hospital - Ho Chi Minh City, and Dong Do General Hospital. - Heart failure clinic, telemedicine. - Patient clubs, scientific activities for healthcare professionals.

Challenges in heart failure patient management

Challenges from the healthcare system

- Resource scarcity: This is the biggest challenge in heart failure management, including both human resources and medical equipment, especially at lower levels. The uneven distribution in quantity and quality of resources makes it difficult to build management networks from central to local levels. Healthcare professionals lack comprehensive knowledge and skills in patient management. Weak infrastructure affects outpatient management.

- Costs and financing: Developing and maintaining a heart failure management program requires financial resources, a difficult issue for most hospitals, even large hospitals or private hospitals.

- Lack of guidance and specific procedures on developing a heart failure management program.

- Disagreements between leaders and department heads or between department heads and staff.

- Lack of cooperation from other specialties and fields to implement a multidisciplinary approach.

- Health insurance referral system without connectivity between levels leading to "loss to follow-up" of patients at higher level facilities.

- Lack of heart failure clinics.

Challenges from patients

- Disease diversity: Patients have different causes and degrees of heart failure. This requires a flexible program to suit each specific group.

- Disease complexity: Heart failure is often accompanied by various other clinical issues, requiring coordination of different experts. Heart failure patients have many functional limitations affecting treatment adherence.

- Poor public awareness and cultural/religious differences.

- High costs of heart failure treatment compared to average income per capita.

Therefore, to sustain and develop heart failure management programs, it is necessary to adjust the organizational structure suitable for the healthcare system, available resources, laws and policies, and meet the needs of patients in each locality.

Initial results achieved

As of August 2023, 29 healthcare facilities nationwide have established heart failure management programs, operating in an increasingly professional and connected manner (Table 3). Over 800 nurses have participated in training courses on knowledge and skills for heart failure patient education. It is estimated that over 12,000 heart failure patients have participated in management programs across the country.

In November 2022, Vinmec Central Park Hospital (HCMC) and Vinmec Times City (Hanoi) received certification from ACC (American College of Cardiology) on standardization in heart failure management and treatment. The successful program achieved "2 decreases - 1 increase": decreased rehospitalization rate from 18% to nearly 0%, decreased average length of stay from 8 days to 4 days, and improved patients' quality of life. This accomplishment marked Vinmec as the first healthcare system in Asia with two certified hospitals.

Some hospitals have been honored with the Get with The Guidelines – Heart Failure Award from AHA (American Heart Association): Hanoi Heart Hospital (Silver Plus), Gia Dinh People's Hospital, Hue Central Hospital, Hue University Medical Center, Tam Anh Hospital (Bronze Plus).

Many hospitals have reported initial results after implementing the heart failure management program.

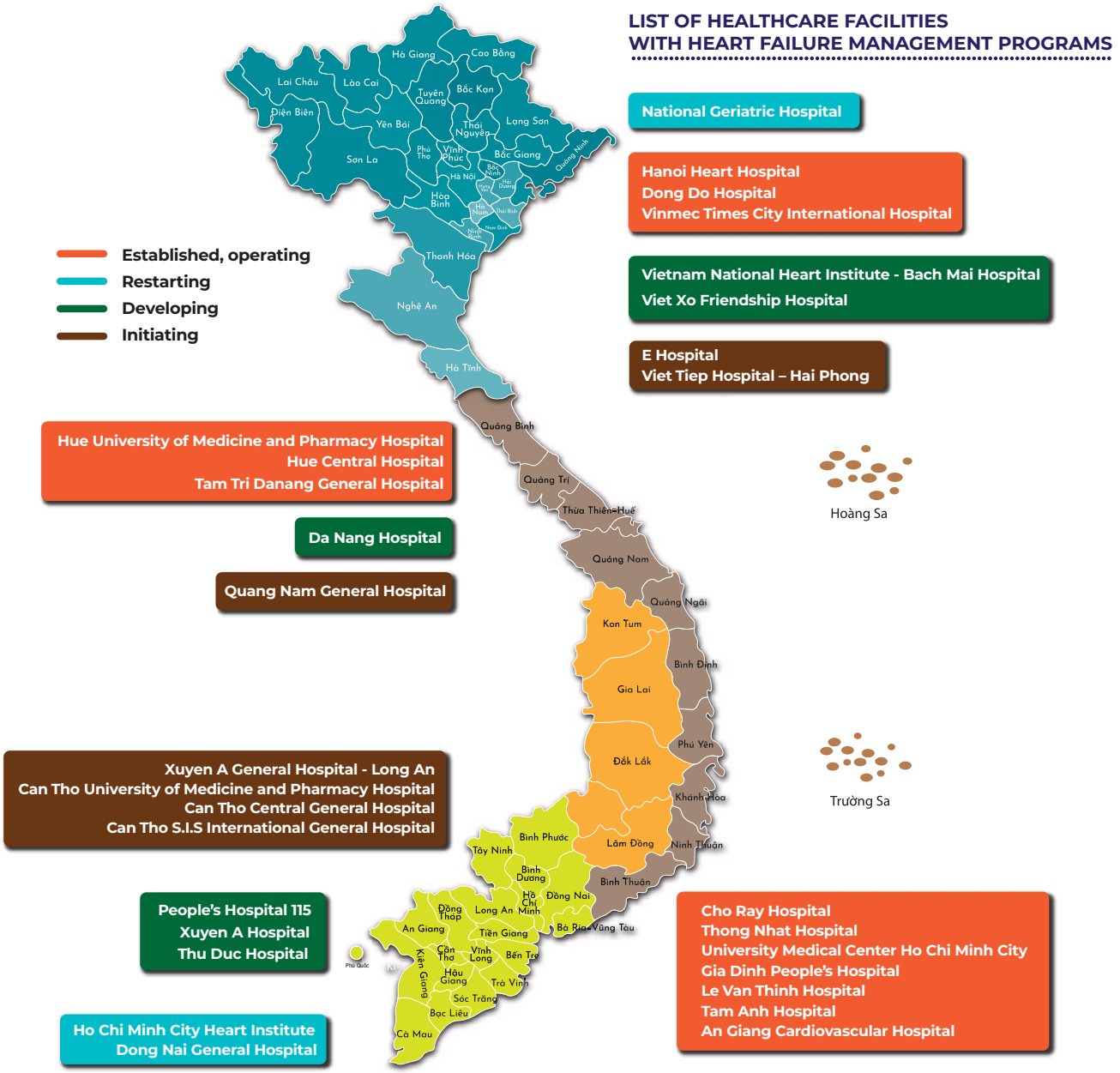
- Hanoi Heart Hospital: From September, 2019 to March, 2021, 1131 patients participated in the heart failure management program. The use rates of BB, ACE-i/ARB/ARNI and MRA were 74.3%, 80.9% and 69.5%, respectively. After an average follow-up of 10.59 months, the medication use rates were 86.7%, 86.5% and 68.9%, respectively. Rehospitalization and mortality rates were 17.8% and 1.9% [47].

- University Medical Center HCMC: As of 08/2023, the total number of patients in the heart failure management program was 918, with 100% of patients counseled and provided health education before discharge. The use rates of ACE-i/ARB/ARNI, ARNI, BB, MRA and SGLT2-I before discharge were 87%, 66%, 74% and 78%, respectively. Of those, the rate of

patients treated with 4 foundation medications before discharge was 50%. The 30-day rehospitalization and mortality rates were 9.6% and 0.5%.

- Gia Dinh People's Hospital: The effectiveness of the heart failure management program is evident through increased use of heart failure medications at discharge and after 3 months: BB (94.2% and 96.1%), ACEI-i/ARB (65.4% and 51.9%), ARNI (21.1% and 44.2%), MRA (82.7% and 86.6%), SGLT2-i (5.8% and 51.9%). The rates of achieving 100% target doses after 3 months for BB, ACE-i/ARB, ARNI and MRA were 23.8%, 26.9%, 5.8% and 57.7%, respectively. NT-proBNP levels decreased significantly (5555 ng/L vs 1983 ng/L, p<0.01), left ventricular ejection fraction improved (29.4% vs 38.1%, p<0.01). The 3-month rehospitalization rate was 21.5%, including non-cardiovascular causes and elective admissions for angiography and PCI.

- An Giang Cardiovascular Hospital: After 4 months, 195 patients participated in the program, mostly mildly reduced EF heart failure. The use rates of ACE-i/ARB/ARNI, BB, MRA and SGLT2-I at discharge were 96%, 5%, 80% and 76%, respectively. The 30-day rehospitalization and mortality rates were 7.1% and 1.4%.



STANDARDIZING THE HEART FAILURE MANAGEMENT MODEL AND FUTURE DEVELOPMENT DIRECTIONS

What actions have been, are being, and will continue to be taken in the world?

The world's real knowledge and data on the importance and impact of heart failure on individual patients and the entire population are key things every country needs to recognize. Despite housing the majority of the world's population in Asia, the majority of the heart failure data at present originates from Europe and North America [48].

In Asia, some of the first registry studies came from Japan [49] and South Korea [50]. The CHART-1 study in Japan enrolled 1,278 heart failure patients with left ventricular ejection fraction <50% or left ventricular end-diastolic diameter >55mm, or at least 1 episode of acute decompensated heart failure. This study recorded 1-year all-cause mortality of 13% in the group with NYHA II-IV and LVEF ≤40%, and 21% in the group with NYHA III-IV and LVEF ≤35%. The study also showed the status of guideline-directed medical therapy use, with 70% and 28% of patients taking ACEI/ARB or BB, respectively [49]. The KorAHF study in South Korea with 2,066 patients after 1 year also showed high in-hospital mortality at 6.1%. For discharged alive patients, all-cause mortality rates at 30 days and 180 days were 1.2% and 9.2%, respectively. Rates of rehospitalization for worsening heart failure at 30 days and 180 days were 6.4% and 24%, respectively [50]. In addition to these registry studies, there is also the multinational ASIAN-HF study enrolling both heart failure patients with reduced and preserved ejection fraction [51]. At the same time, many regions (such as Central Asia and East Asia) as well as many countries (Malaysia, Thailand) have also reported long-term follow-up data on heart failure patients, which are important for us to have a clearer view of current trends and risk factors for heart failure [52, 45].

As previously mentioned, the majority of heart failure management programs continue to be fragmented, inconsistent, and devoid of well-defined strategies. In July 2019, the European Society of Cardiology approved the initial 2-year phase of the EuroHeart program [46]. This is a collaboration between national registry studies and an effort between Cardiology Societies to enable continuous patient care monitoring that benefits patients and the healthcare system of each country. The program starts with standardizing a core data set for the most common diseases, including heart failure. The standardized heart failure core data set was drafted quite meticulously, starting from reviewing 1,715 papers to select 372 eligible ones, from which 189 initial variables were extracted, including 107 from meta-analyses and 82 from clinical practice guidelines. These variables were further analyzed using the Delphi method to finally agree on 84 variables for Level 1 and 79 for Level 2. All these variables are divided into main sections: (i) demographics, (ii) characteristics and comorbidities, (iii) status on admission, (iv) pre-admission medications, (v) health-related quality of life, (vi) clinical and laboratory measures, (vii) in-hospital management, (viii) discharge characteristics, (ix) discharge medications. After the initial 2-year phase, this program attracted 194 centers from 9 countries, including Singapore. The next 2-year phase is underway and expected to expand to a total of 15 countries, forming a large enough network to initiate robust clinical research projects capable of impacting current recommendations.

Determining the effectiveness of the program also requires the implementation of a practical patient follow-up strategy, in addition to the development of a standardized data system. For hospitalized heart failure patients, the transition from inpatient to outpatient is a sensitive period due to the highest risk of heart failure rehospitalization during this time [32]. Having an optimal plan will help reduce rehospitalization and improve quality of life. Higher risk patients should receive follow-up via phone, home visits or clinic visits, or remote monitoring within 72 hours after discharge. After a heart failure hospitalization, patients should have a follow-up appointment within 7-10 days after discharge. At the same time, patients themselves or their families also need thorough counseling on management

plans if any sudden health changes occur [53]. Table 3 summarizes the important components of a care transition plan.

***Table 3**. Important components of a care plan during the pre- and immediate post-discharge period*

A care plan should specifically address the following:
Review precipitating factors causing worsening heart failure requiring hospitalization
Adjust diuretic therapy based on volume status (including weight assessment) and electrolytes
Check safety labs pertinent to medications (like electrolytes after initiation or uptitration of guideline-directed medical therapy)
Optimize guideline-directed medical therapies, including: **- Having a plan to restart medications held during hospitalization** **- Having a plan to initiate remaining medications** - Having an uptitration plan to reach target or maximally tolerated doses
Reassess heart failure knowledge and evaluate adherence to pharmacological and non-pharmacological therapies, including diet and physical activity
Reevaluate high risk factors that may affect post-discharge outcomes such as: **- Comorbidities (kidney disease, lung disease, diabetes, psychological and substance use disorders)** **- Limitations in social support** - Cognitive impairment
Necessity of surgery or device-based therapies; and refer for cardiovascular rehabilitation when appropriate
Transition appropriate patients to palliative care specialists

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