

Pielęgniarstwo w opiece długoterminowej
Kwartalnik międzynarodowy

LONG-TERM CARE NURSING
INTERNATIONAL QUARTERLY

ISSN 2450-8624
tom 8, rok 2023, numer 1, s. 3-10
DOI: 10.19251/pwod/2023.1(1)

e-ISSN 2544-2538
vol. 8, year 2023, issue 1, p. 3-10

Paulina Maria Jakubowska^{1,B-E}, Iwona Bieniek^{1,B,D}, Paweł Grzelakowski^{1,C,E}

**POST-INFARCTION HEART FAILURE -
A MULTIDIMENSIONAL APPROACH TO THE PATIENT**

Pozawałowa niewydolność serca - wielowymiarowe podejście do pacjenta.

¹Klinika Kardiologii i Kardiochirurgii, 10. Wojskowy Szpital Kliniczny z Polikliniką w Bydgoszczy, Polska

A - Koncepcja i projekt badania, B - Gromadzenie i/lub zestawianie danych, C - Analiza i interpretacja danych, D - Napisanie artykułu, E - Krytyczne zrecenzowanie artykułu, F - Zatwierdzenie ostatecznej wersji artykułu

Abstract (in Polish):

Choroba niedokrwienna serca, która jest najczęstszą przyczyną przewlekłej niewydolności serca, odpowiada (według danych Światowej Organizacji Zdrowia na rok 2019) za największą ilość zgonów w Polsce i na świecie [1].

Niniejszy artykuł powstał w związku z aktualizacją wytycznych ESC (European Society of Cardiology) dotyczących diagnostyki i leczenia niewydolności serca w 2021 roku. Przesłanką do stworzenia niniejszego opracowania była potrzeba zwięzłego przedstawienia tego zagadnienia, ze zwróceniem uwagi na kompleksowe i długofalowe podejście do opieki. Skupiono się w nim szczególnie na pozawałowej niewydolności serca, natomiast większość zaleceń odnosi się do niewydolności serca w ogóle, niezależnie od jej przyczyny.

Pacjenci z rozpoznaniem przewlekłej pozawałowej niewydolności serca wymagają kompleksowego i wielokierunkowego podejścia lekarzy, pielęgniarek, fizjoterapeutów. Powinno ono obejmować farmakoterapię, leczenie niefarmakologiczne, a w wybranych przypadkach - elektroterapię, przeszczep serca oraz leczenie paliatywne.

Abstract (in English):

Ischemic heart disease, which is the most common cause of chronic heart failure, is responsible (according to World Health Organisation data for 2019) for the highest amount of deaths in Poland and in the world [1].

This review was created in accordance with the update of the ESC (European Society of Cardiology) guidelines for the diagnosis and treatment of heart failure in 2021. The need to present this issue concisely, with attention to a comprehensive and long-term approach of care, was a cornerstone for this work. It focuses specifically on post-infarction heart failure, while most of the recommendations refer to heart failure in general, regardless of its cause.

Patients diagnosed with chronic post-infarction heart failure require a comprehensive and multidirectional approach of doctors, nurses, physiotherapists. It should include pharmacotherapy, non-pharmacological treatment, in selected cases - electrotherapy, heart transplantation and palliative treatment.

Keywords (in Polish): pozawałowa niewydolność serca, wielowymiarowa i długoterminowa opieka, wielokierunkowa i długoterminowa opieka.

Keywords (in English): post-infarction chronic heart failure, multidimensional and long-term care, multidirectional and long-term care.

Received: 2023-02-28

Revised: 2023-03-10

Accepted: 2023-03-10

Final review: 2023-03-09

Short title

Post-infarction heart failure - approach to the patient.

Corresponding author

Paulina Maria Jakubowska

Klinika Kardiologii i Kardiologii, 10. Wojskowy Szpital Kliniczny z Polikliniką w Bydgoszczy, Powstańców Warszawy 5, 85-681, Bydgoszcz, Polska; email: pmjakubowska@gmail.com, Phone: 662230049

Authors (short)

P. Jakubowska, I. Bieniek, P. Grzelakowski

Introduction

Heart failure is a complex of signs (e.g. dyspnoea on exertion and orthopnoea, low exercise tolerance, swelling around ankles, cough) and symptoms (including crepitation over the lung fields, heart murmur, peripheral oedema, tachycardia, tachypnoea), caused by disorders of the structure and/or function of the heart. These disorders lead to increased intracardiac pressure and/or insufficient cardiac output in relation to the metabolic needs of the body tissues [2].

Heart failure is currently the only cardiovascular disease whose total number of new cases and incidence in the general population is constantly increasing. This is mainly due to the aging of societies and as a distant consequence of modern treatment of myocardial infarction or hypertension [2].

Currently, the prevalence of diagnosed heart failure averages 1-2% of the adult population [3].

In developed countries the main causes of heart failure are coronary artery disease (including acute coronary syndromes) and hypertension [2].

The diagnosis of heart failure requires the presence of signs/symptoms and echocardiographically confirmed left ventricular ejection fraction (LVEF): 41-49% for mildly reduced ejection fraction heart failure or $\leq 40\%$ for reduced ejection fraction heart failure. The third phenotype, heart failure with preserved ejection fraction, is characterized by signs/symptoms, LVEF $\geq 50\%$, additional echocardiographic markers and elevated natriuretic peptides in laboratory tests [2].

The basic classification used in medical and nursing practice is the NYHA classification (New York Heart Association) of heart failure severity. It groups patients by the severity of symptoms (such as fatigue, shortness of breath and palpitations), depending on the type of activity during which they occur. Grade I - defines symptoms that surface during normal activity, grade IV - symptoms that appear even at rest [3].

Revascularization

The key initial aspect of therapy in acute myocardial infarction is the coronary revascularization. The degree of myocardial damage and consequently development of heart failure depends on its time frames and effectiveness. According to the ESC guidelines, it is recommended to base the revascularization strategy (ad hoc culprit lesion angioplasty / multi-vessel coronary angioplasty / coronary artery bypass grafting) on the clinical status of the patient. Decisive is the type of myocardial infarction: an ST-elevation and non-ST-elevation (STEMI/NSTEMI), comorbidities, as well as severity of coronary artery disease [4].

Pharmacotherapy

In the post-myocardial infarction chronic heart failure (especially with reduced ejection fraction), the basic essential drugs are:

1) Dual antiplatelet therapy is based on:

- the P2Y₁₂ receptor inhibitor: ticagrelor/prasugrel. (In case of their unavailability or in individual indications - clopidogrel). Such treatment is usually applied for a period of 12 months after myocardial infarction.
- acetylsalicylic acid at a dose of 75-100mg/d taken chronically.

Depending on the method of revascularisation and the risk of bleeding, the ESC guidelines clearly specify the type and duration of dual antiplatelet treatment [4].

2) Drugs which reduce the risk of hospitalisation for heart failure and death, used chronically:

- beta-blockers -especially in patients with EF <40%
 - angiotensin-converting enzyme inhibitors (ACEIs) or a combination of sacubitril and valsartan (in patients intolerant to the aforementioned, angiotensin receptor antagonists are recommended)
 - mineralocorticoid receptor antagonists
 - flozines (empagliflozin/dapagliflozin)
- 3) In the case of fluid overload and conductivity - diuretics (that act symptomatically) to reduce the risk of hospitalisation.

Other groups of drugs (e.g. ivabradine, digoxin, vericiguat, hydralazine with isosorbide nitrate) despite being characterised by a lower class of recommendations have their legitimate indications in selected patient groups [2].

Prevention and treatment of diseases that can lead to the development of heart failure of ischaemic aetiology (such as diabetes, hyperlipidaemia, hypertension, obesity or nicotineism) should not be neglected, as they contribute to the reduction of the incidence of chronic heart failure. [6,11]

Implantable devices

Another intervention with documented efficacy in clinical trials is the implantation of devices: implantable cardioverter-defibrillators (ICDs) and cardiac resynchronisation therapy (CRT). There is a confirmed reduction of the risk of sudden cardiac death and overall mortality - for the ICD and symptomatic improvement and reduction in morbidity for CRT. These devices are designed to interrupt potentially fatal arrhythmias and bradycardia (ICDs) and improve myocardial contraction mechanics by correcting intra- and interventricular contraction dyssynchrony (CRT) [2, 3].

The indications for implantation of an ICD are:

1. Secondary prevention, meaning the occurrence of sudden cardiac arrest or haemodynamic instability in the course of ventricular arrhythmias, if these conditions occurred > 48 h after myocardial infarction [2].
2. Primary prevention, meaning the implantation of the device in a specific group of patients, such as: patients with heart failure of ischaemic aetiology (> 40 days after myocardial infarction) and sustained EF <35% with accompanying clinical symptoms in NYHA class II/III, despite optimal pharmacotherapy for at least 3 months or in patients with heart failure of non-ischaemic aetiology - if they meet the same criteria [2].

When qualifying patients for ICD implantation, it is important to remember that the life expectancy should be min. 1 year and patients with NYHA class IV should not be candidates for this type of intervention. These exclusions do not apply to candidates for implantation of resynchronisation therapy.

Indications for a CRT are symptomatic heart failure with EF <35%, sinus rhythm and ECG QRS complex width > 130ms, despite optimal pharmacological treatment. It is also recommended to implant a CRT instead of a pacemaker in heart failure patients with reduced ejection fraction and a high degree of atrioventricular block [9].

Non-pharmacological management

According to the current guidelines, non-pharmacological management of patients with heart failure, including post-myocardial infarction, should be based on multispecialty heart failure treatment programmes that primarily aim to reduce the risk of hospitalisation and death [2].

This multispecialty care should include both - outpatient and inpatient treatment, as well as cardiac rehabilitation and palliative care. It requires the participation and close collaboration of general practitioners, physicians from other specialities (internists, cardiologists and cardiac surgeons), nurses, palliative medicine physicians, physiotherapists, psychologists or social workers [6].

One of the most important elements of multidisciplinary management is the education of the patient and his or her family. This is due to the fact that non-compliance, irregular compliance or ignorance about the disease is a patient-dependent negative factor affecting the course of heart failure and increasing hospitalisation rate [6].

A patient who is aware of a disease plays a vital role in active therapy. There are many websites that present in an accessible way the basic issues and recommendations for both pharmacotherapy and non-pharmacological management. Especially the latter, including diet, physical activity and self-monitoring in patients with heart failure nourishes patient's self-awareness. The ESC guidelines recommend the English-written website www.heartfailurematters.org. The portal recommended by the PTK (Polskie Towarzystwo Kardiologiczne, pol. Polish Cardiology Association) is slabeserce.pl, that has been operational in Poland since 2016.

Among many recommendations for non-pharmacological management, the most important aspects are:

1. Regular (preferably daily) weight control - in case of sudden and unexpected weight gain >2 kg within 3 days, the patient should increase the diuretic dose on his/her own, notifying the physician [3].
2. Following an easily digestible diet, with restriction of fats, simple sugars and sodium (<5g/d). Diet should be adjusted so that body weight is close to the advised normal [BMI (Body-mass index) = 20-25 kg/m²], taking into account that in heart failure energy requirements are increased due to an increase in basal metabolism (increased catabolism) [3].
3. Avoiding excessive fluid intake. In patients with severe heart failure - limited to 1.5-2 litres of fluids per day. In addition, careful recognition of situations of increased fluid requirements (e.g. during hot weather, with diarrhoea or vomiting) [6].
4. Regular physical activity to improve physical fitness and quality of life (in all patients who are able - independent exercise, in patients with more severe disease and frailty syndrome - supervised cardiac rehabilitation programmes). Exercise leading from mild to moderate fatigue (feeling out of breath) is recommended, such as walking, general exercise or cycling [2, 3, 6].
5. Avoiding or limiting alcohol consumption to 10-20g/day (equivalent to 1-2 glasses of wine per day). In patients with alcoholic cardiomyopathy - categorical cessation of alcohol consumption [3].
6. Cessation of smoking and the use of other psychoactive substances (especially in patients with post-myocardial infarction heart failure - where smoking is the primary risk factor for myocardial reinfarction).

To support and motivate the patient to fight his/her addiction, an expert multidisciplinary help according to the 5A's principle (ask, advise, assess, assist, arrange) is desirable. A convincing scientific fact for this may be the 36% reduction in mortality in patients with coronary heart disease who quit smoking cigarettes [8].

7. Avoiding the use of certain medications (especially in heart failure patients with reduced EF), such as NSAIDs (non-steroidal anti-inflammatory drugs), glucocorticoids, glitazones (antidiabetic drug), class I antiarrhythmics, verapamil, diltiazem, tricyclic antidepressants, lithium salts, alpha-blockers or anthracyclines [6].
8. Annual influenza and pneumococcal vaccination - to prevent hospitalisations for heart failure [3].
9. Avoiding travel to locations >1500m above sea level or very humid and hot areas. For long-distance journeys, choosing air transport to avoid prolonged immobilisation. The presence of implantable devices is not a problem at airport security checks, but it is important to inform the security controller that you have them. When travelling by air, it is advisable to pack your medication in your hand luggage, have a list of medications and dosage rules [6].
10. Adapting sexual activity to the current NYHA class. In class III-IV there is a high risk of decompensation of heart failure. In lower classes, the risk is moderate. Sexual activity should be undertaken in stable heart failure, after rest, adjusting positions according to current fitness level [3].

Advanced heart failure

Many patients progress to the advanced heart failure stage characterised by persistence of symptoms despite maximal treatment. Importantly, at this stage a reduction in EF is common but not required for diagnosis [2].

Depending on life expectancy and quality of life, patients with advanced heart failure may continue to be treated and followed up regularly at a local level, referred to specialised centres for the treatment of advanced heart failure (where they are qualified for appropriate circulatory support devices or heart transplantation), or qualified for palliative care [2].

Patients with advanced heart failure and a potential indication for mechanical circulatory support are classified according to the seven INTERMACS (Interagency Registry for Mechanically Assisted Circulatory Support) profiles, which describe patients' clinical parameters and determine the need for appropriate advanced treatments [2].

Mechanical circulatory support can be divided into:

1. Short-term mechanical circulatory support - by ECMO (extracorporeal membrane oxygenation) or Impella pump- mainly in patients in cardiogenic shock, until the haemodynamic state is stabilised.
2. Long-term mechanical circulatory support, using devices such as LVADs (left ventricular assist device), BiLVADs (biventricular assist device) or TAHs (total artificial heart).

These devices (LVAD, BiLVAD, TAH) are indicated when:

- conservative treatment is insufficient,
- short-term mechanical circulatory support has not led to an improvement in heart function,
- patient must be kept alive until heart transplantation,
- patient are not eligible for heart transplantation - as a destination therapy [2].

Heart transplantation

In 2022, 173 heart transplants were performed in Poland. There are currently 381 people on the transplant waiting list (as of 12.2022) [5].

The one-year survival rate after transplantation is 90% and the median survival is 12.5 years [2].

The main indications for heart transplantation are advanced heart failure and inability to use other treatments [2].

Contraindications include: active infection, severe peripheral arterial or cerebral vascular disease, malignancy associated with poor prognosis, drug-resistant pulmonary hypertension, irreversible hepatic or renal dysfunction, systemic disease with multiple organ involvement, alcohol abuse, BMI > 35 kg/m² and psychological instability [2].

Related to either efficacy or side effects of immunosuppression. The list includes: graft rejection, infections, cardiac allograft vasculopathy, late graft dysfunction, development of malignancies, diabetes, hypertension, arterial and renal failure [2].

Given the numerous contraindications and possible complications following surgery, the decision pathway leading to heart transplantation is never straightforward and is always unique to the individual patient [2].

Prognosis

The prognosis of heart failure is closely related to the stage defined according to the NYHA functional classification. Annual mortality ranges from 10% in NYHA class I, to 40-90% in NYHA class IV.

A poorer prognosis characterises patients with an ischaemic aetiology of heart failure, with EF <40% and patients whose symptoms of severe heart failure persist despite optimal treatment.

In the general population of patients with heart failure, it is estimated that 43% of deaths are due to sudden cardiac death, 32% are due to progression of heart failure and the remaining 25% are due to other, non-circulatory causes [7].

Palliative care

Palliative care refers to management aimed at improving the quality of life of patients and their families in the face of problems associated with a life-limiting illness, such as heart failure. It should be seen as a natural step in an integrated treatment programme, covering all patients with heart failure from diagnosis to death. It is therefore not an alternative to system-specific specialised treatment, but a complement to it [7].

Selected components of palliative care management of patients with heart failure are:

1. Frequent assessment of symptoms and a focus on reducing discomfort, such as:
 - dyspnoea (use of oxygen therapy; opioids - usually oral, subcutaneous or intravenous morphine; benzodiazepines; diuretics; nitrates; positive inotropic drugs) [2,7].
 - pain (treatment according to the analgesic ladder, depending on the severity of pain: paracetamol, metamizole, NSAIDs, opioids including tramadol, oxycodone, fentanyl - oral, intravenous and transdermal) [1,7].
 - anxiety and depression (cognitive-behavioural psychotherapy, pharmacotherapy tailored to heart failure patients - drugs from the selective serotonin reuptake inhibitor group, mirtazapine, or moclobemide are safe) [2, 7].

2. Careful control of fluid retention - patients at the end of life tend to lose their thirst, so the dosage of diuretics should be reduced or discontinued [7].
3. Provide psychological and spiritual care for the patient and family [2].
4. Planning of care acknowledging the patient's preference for place of death and patient's will on resuscitation or lack of it (inactivation of implantable devices, discontinuation of mechanical circulatory support) [2, 7].

Conclusions

Knowledge of the current management of patients with heart failure is essential in primary care, in daily hospital and specialist practice [6].

At each of the stages of heart failure treatment outlined above, regular medical and nursing supervision remains crucial. This includes supervision of compliance with pharmacological and non-pharmacological recommendations, as well as qualification for implantable devices or referral of the patient to palliative care.

However, the overriding task remains the education of patients and their families, which has a significant impact on the course of heart failure and the number of hospitalisations.

References

1. The top 10 causes of death. Last modified December 09.2020. Access date 6.02.2023. <https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death>
2. McDonagh et al. Wytyczne ESC 2021 dotyczące diagnostyki i leczenia ostrej i przewlekłej niewydolności serca. Zeszyty edukacyjne. Kardiologia Polska 1/2022. Via Medica.
3. Szczeklik A. Tendera M. Kardiologia, t.II. Kraków: Medycyna Praktyczna. 2010.
4. Collet, JeanPhilippe et al. Wytyczne ESC 2020 dotyczące postępowania u pacjentów z ostrymi zespołami wieńcowymi bez uniesienia odcinka ST. Zeszyty edukacyjne. Kardiologia Polska 6/2020. Via Medica.
5. Statystyka przeszczepiania narządów od zmarłych dawców w miesiącach 2022r. Acces date 06.02.2023. https://www.poltransplant.org.pl/statystyka_2022.html
6. Nessler et al. Zasady postępowania w niewydolności serca. Lekarz rodzinny, wydanie specjalne. 2/2017. Medycyna Praktyczna.
7. Sobański P., Krajnik M., Opolski G.,. Opieka paliatywna w niewydolności serca. Gdańsk: Via Medica. 2011
8. Knuuti, Juhani et al. Wytyczne ESC dotyczące rozpoznawania i leczenia przewlekłych zespołów wieńcowych. Zeszyty edukacyjne. Kardiologia Polska 1/2020. Via Medica.
9. Glikson M., et al. Wytyczne ESC 2021 dotyczące stymulacji serca i terapii resynchronizującej serca. Zeszyty edukacyjne. Kardiologia Polska 6/2021. Via Medica.
10. Grzešek G., et al. Safety of PCSK9 inhibitors. Biomedicine & Pharmacotherapy, Volume,156,2022,<https://doi.org/10.1016/j.biopha.2022.113957>.<https://doi.org/10.1016/j.biopha.2022.113957>
11. Wołowiec Ł., et al. Inclisiran : safety and effectiveness of small interfering RNA in inhibition of PCSK-9. *Pharmaceutics* 2023, 15(2), 323; <https://doi.org/10.3390/pharmaceutics15020323>