



Cardiac Nurses' Knowledge of the Physical Examination of Patients with Heart Failure

Hala Mohamed Sanad^{1*}, RajeswariKrishnasamy¹

¹ Nursing Department, College of Health Sciences, WHO Collaborating Center for Nursing Development, University of Bahrain, Kingdom of Bahrain.

ABSTRACT

The past few decades, there has been a significant increase in the clinical assessment skills to be performed by nurses, along with expansion of nurses' roles and responsibilities to enable them to have a more active contribution in patient care. The study aimed to explore nurses' knowledge regarding physical examination of patients with heart failure and to identify the possible factors influencing it.

Methods: A descriptive cross-sectional design was used, with a convenience sample of 153 nurses were included in the study. The data was collected through self-administered questionnaire.

Findings: The study findings indicate that the nurses in the study settings have low level of knowledge of the physical examination of a patient with heart failure.

Conclusion: The nurses in the study settings, particularly the Bahraini nurses, lack sufficient knowledge for proper physical assessment of the patients with heart failure. Hence, specialized training courses are recommended for these nurses, especially for the Bahraini ones. These courses should address the knowledge gaps identified to be effective.

Key Words: Heart Failure, Physical Assessment, Knowledge, Nurses

eIJPPR 2017; 7(4):1-6

HOW TO CITE THIS ARTICLE: Hala Mohamed Sanad, RajeswariKrishnasamy. (2017). "Cardiac Nurses' Knowledge of the Physical Examination of Patients with Heart Failure", *International Journal of Pharmaceutical and Phytopharmacological Research*, 7(4), pp.1-6.

INTRODUCTION

The prevalence rates of the heart failure (HF) are increasing in both developed and developing countries, with a prevalence rate of 2% in adult world population [1], and one in five lifetime risk [2]. The problem is even increasing with the aging of societies and increased life expectancies [3], and it is the leading cause of hospital admission in elderly persons [4]. Moreover, the burden of illness among patients with chronic HF is high, and could be even comparable to those having malignant diseases [5]. This makes it a challenge for researchers, caregivers, and policymakers. Hence, the prevention of this global health problem is taking high priority [6].

Nurses have important roles in the management of patients with HF and they should have good knowledge to be able to meet the needs of these patients as well as their families [7;8]. These roles have been recently diversified and executed at various levels and types of health care settings, with more collaboration with other healthcare professionals. These changes necessitate major changes in nursing schools' curricula concerning the care of patients with HF to be better educationally prepared for fulfilling such roles [9]. Moreover, they should be given the opportunity to fully apply the knowledge and skills they have acquired during their educational years [10]. During the last few decades, there has been

Corresponding author: Hala Mohamed Sanad

Address: University of Bahrain, College of Health Sciences, Nursing Department-WHO Collaborating Center for Nursing Development, P.O. Box: 32038, Salmayya, Kingdom of Bahrain.

e-mail ✉ hsanad@uob.edu.bh

Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Received: 16 November 2016, **Revised:** 08 June 2017, **Accepted:** 21 June 2017



important increases in the clinical assessment skills to be performed by

nurses, along with expansion of nurses' roles and responsibilities to enable them to have a more active contribution in patient care [11]. Thus, in New Zealand, health assessment is one part of the nurse practitioner's roles [12]. Furthermore, nurse-led clinics for HF patients were established a study in Hong Kong and their effectiveness was demonstrated through decreased hospital readmissions as well as significantly lowered mortality among these patients [13].

In order to confirm the diagnosis of HF, it is important to conduct an initial set of assessments, lab studies, and diagnostic tests. The key part of the patient assessment is the initial medical history and physical examination. A systematic and thorough physical examination of the patient with HF is crucial in gathering important information for the nurse to make clinical judgment, and this should be continued from admission to discharge [14]. Its accuracy and completeness have significant impacts on the nursing diagnosis and care plan [15]. This requires professionally trained nurses able not only to assess and record patient symptoms and signs, but also to comprehend their relevance [16]. Nonetheless, studies revealed deficiency in such expertise and knowledge among nurses [17; 18] and their need for training [19; 20].

Significance and aim of the study

The literature abounds with studies examining patient's knowledge of self-management of HF. However, there is a paucity of research investigating how well nurses are equipped with adequate knowledge and appropriate for conduction of a proper physical examination of a patient with HF. Specifically, no studies have focused exclusively on this issue in Bahrain. The present study could fill this gap in the local literature, which would help nursing administrators to plan staff development programs and activities based on identified needs. Therefore, the aim of this study was to explore nurses' knowledge regarding physical examination of patients with HF and to identify the factors possibly influencing it.

SUBJECTS AND METHODS

Research design and setting:

A descriptive cross-sectional study design was used to conduct this study at two governmental hospitals in Bahrain.

Participants:

A convenience sample of 153 nurses was recruited from those working in the cardiac units were of the two hospitals. This sample size was large enough to demonstrates an expected satisfactory knowledge rate of 60% or higher among nurses, with a 95% confidence level, and a 3% standard error, using the sample size equation for estimation of single proportion, with finite population correction.

Data collection tool:

The researchers designed a self-administered questionnaire based on pertinent literature. It consisted of two sections. The first section was for nurse's personal and job characteristics such as unit, age, gender, marital status, nationality, years of experience, and previous training in cardiac care. The second section was for nurse's knowledge of the physical examination of a patient with heart failure. It consisted of 18 True/False questions covering the most important aspects of physical examination. It was divided into three sub-sections covering knowledge of the inspection (10 items), palpation (4 items), and auscultation (4 items) parts of physical examination. The tool was vigorously revised by a panel of experts for the content validity and the necessary modifications were taken into consideration in tool finalization.

Procedures:

Upon securing official approvals, the researchers met with each participant, and provided them with the instructions concerning the filling of the data collection form. The questionnaire was filled in the study setting and in the presence of the researchers for any clarification needed, and to avoid getting help in answering the questions, which would lead to biased assessment. The nurse took approximately 10 minutes to complete the filling of the questionnaire. Data were collected over a three-month period.

Ethical considerations:

Official approvals were obtained from the administration of the two hospitals using pertinent communication channels. Oral consent was obtained from the study participants. Anonymity and confidentiality were guaranteed, with reassurance that the collected information would be used only for research purposes. The study maneuver could not induce any harm on participants. The principles of Helsinki Declaration were followed.

Statistical analysis: Data management and analysis were done using the statistical software SPSS version 20. Mann-Whitney tests and Kruskal-Wallis tests were used for comparison of quantitative data between two groups and three or more groups respectively. Multiple linear regression analysis was used to identify the factors independently influencing nurse's knowledge score. The level of statistical significance was set at $p < 0.05$.

RESULTS

The sample included slightly more nurses from the hospital A units (59.5%) as shown in Table 1. Their age ranged between 18 and 60 years, with median 34.0 years. The majority were women (86.3%), non-Bahraini (71.9%), and married (84.3%). With regard to their nursing qualification, more than half of them were carry a bachelor degree (58.8%), and their median experience was 8.0 years. Slightly less than half of them (44.4%) reported having attended training in cardiac care nursing.

Table 2 indicates that the mean percent score of nurses' knowledge of inspection was the highest (73.14), whereas the lowest was for the knowledge of palpation (66.01). Overall, the mean and median percent scores of total knowledge were 70.62 and 72.22. It is also noticed that the scores of each part as well as the total knowledge ranged between 0.00 and 100.00.

Concerning the relations between nurses' knowledge and their characteristics, Table 3 points to statistically significant associations with their working units ($p=0.008$) and subunits ($p=0.008$), as well as their nationality ($p=0.001$). As the table illustrates, the nurses working in the hospital (A) units had higher scores of knowledge. Moreover, those working in the hospital (B) sub-unit (2) had the lowest score of knowledge. Lastly, the scores of non-Bahraini nurses were higher in comparison with the Bahraini nurses. In multivariate analysis (Table 4), only the non-Bahraini nationality was identified as a statistically significant factor independently and positively influencing nurses' knowledge score. However, it explains only approximately 5% of the variation in this score. None of the other nurses' characteristics had a significant effect on their knowledge score.

Table 1: Socio-demographic and job characteristics of participants in the study sample (n=153)

| | Frequency | Percent |
|---------------------------------------|-----------|---------|
| Units: | | |
| Hospital (A) | 91 | 59.5 |
| Hospital (B) | 62 | 40.5 |
| Gender: | | |
| Male | 21 | 13.7 |
| Female | 132 | 86.3 |
| Age: | | |
| <30 | 42 | 27.5 |
| 30- | 82 | 53.6 |
| 40+ | 29 | 19.0 |
| Range | 18-60 | |
| Mean±SD | 34.5±7.3 | |
| Median | 34.0 | |
| Nationality: | | |
| Bahraini | 43 | 28.1 |
| Non-Bahraini | 110 | 71.9 |
| Marital status: | | |
| Unmarried | 24 | 15.7 |
| Married | 129 | 84.3 |
| Nursing qualification: | | |
| Diploma | 63 | 41.2 |
| Bachelor degree | 90 | 58.8 |
| Experience years: | | |
| <5 | 33 | 21.6 |
| 5- | 53 | 34.6 |
| 10+ | 67 | 43.8 |
| Range | <1-35 | |
| Mean±SD | 9.4±6.1 | |
| Median | 8.0 | |
| Had training in cardiac care nursing: | 68 | 44.4 |

Table 2: Scores of knowledge of physical examination among participants in the study sample (n=153)

| Knowledge of physical assessment (scores: max=100) | Scores | | | | | | |
|--|--------|-------|------|--------|--------|-----------------|-----------------|
| | Mean | SD | Min | Max | Median | Quartiles | |
| | | | | | | 1 st | 3 rd |
| Inspection | 73.14 | 22.17 | 0.00 | 100.00 | 80.00 | 55.00 | 90.00 |
| Palpation | 66.01 | 24.27 | 0.00 | 100.00 | 75.00 | 50.00 | 75.00 |
| Auscultation | 68.95 | 28.25 | 0.00 | 100.00 | 75.00 | 50.00 | 100.00 |
| Total knowledge | 70.62 | 19.49 | 0.00 | 100.00 | 72.22 | 55.56 | 88.89 |

Table 3: Relations between nurses' total scores of knowledge of physical examination and their characteristics

| | Mean | SD | Median | Mann-Whitney Test | p-value |
|---------------------------------------|-------|-------|--------|-------------------|-----------|
| Units: | | | | | |
| Hospital (A) | 73.44 | 20.11 | 77.80 | | |
| Hospital (B) | 66.48 | 17.90 | 63.90 | 7.15 | 0.008* |
| Sub-units: | | | | | |
| Ward 1 (A) | 68.45 | 24.39 | 77.80 | | |
| Ward 2 (A) | 71.84 | 21.87 | 72.20 | H=13.86 | 0.008* |
| Ward 3 (A) | 79.12 | 12.02 | 83.30 | | |
| Ward 1 (B) | 70.30 | 20.02 | 66.65 | | |
| Ward 2 (B) | 62.40 | 14.57 | 63.90 | | |
| Gender: | | | | | |
| Male | 75.39 | 19.92 | 83.30 | | |
| Female | 69.86 | 19.39 | 72.20 | 1.73 | 0.19 |
| Age: | | | | | |
| <30 | 66.39 | 20.49 | 66.70 | | |
| 30- | 72.35 | 19.14 | 72.20 | H=2.81 | 0.25 |
| 40+ | 71.82 | 18.71 | 72.20 | | |
| Nationality: | | | | | |
| Bahraini | 63.04 | 18.57 | 61.10 | | |
| Non-Bahraini | 73.58 | 19.11 | 77.80 | 11.44 | 0.001* |
| Marital status: | | | | | |
| Unmarried | 73.37 | 15.71 | 75.00 | | |
| Married | 70.10 | 20.12 | 72.20 | 0.24 | 0.62 |
| Nursing qualification: | | | | | |
| Diploma | 73.10 | 16.70 | 72.20 | | |
| Bachelor degree | 68.88 | 21.14 | 72.20 | 0.90 | 0.34 |
| Experience years: | | | | | |
| <5 | 69.86 | 19.73 | 66.70 | | |
| 5- | 71.68 | 20.30 | 77.80 | H=0.56 | 0.75 |
| 10+ | 70.14 | 18.97 | 72.20 | | |
| Had training in cardiac care nursing: | | | | | |
| No | 71.82 | 20.90 | 77.80 | | |
| Yes | 69.11 | 17.60 | 72.20 | | 1.91 0.17 |

(*) Statistically significant at $p<0.05$ (H) Kruskal-Wallis test

Table 4: Best fitting multiple linear regression model for the examination knowledge score

| | Unstandardized Coefficients | | Standardized Coefficients | t-test | p-value | 95% Confidence Interval for B | |
|--------------------------|-----------------------------|------------|---------------------------|--------|---------|-------------------------------|-------|
| | B | Std. Error | | | | Lower | Upper |
| Constant | 52.51 | 6.06 | | 8.666 | <0.001 | 40.54 | 64.48 |
| Non-Bahraini nationality | 10.53 | 3.41 | 0.24 | 3.089 | 0.002 | 3.79 | 17.27 |

r-square=0.053 Model ANOVA: F=9.415, p=0.002
 Variables entered and excluded: age, qualification, marital status, experience, units, subunits, and training courses.

DISCUSSION

The present study findings indicate that the nurses in the study settings have average knowledge of the physical examination of a patient with heart failure. The study sample have some characteristics that were similar to those reported in European [21] and North American [22] nurses providing care to cardiac patients. Thus, in both studies, as in the current one, a majority of the nurses are females. However, they differ in the level of education, where the highest nursing qualification was the bachelor degree, compared with a majority who was carrying master or doctoral degrees in nursing in the other two studies. Moreover, the mean experience years in our study is less than half of that reported in the North American study. These lower level qualification and shorter experience years may explain the low levels of knowledge among the nurses in the present study. Added to this is the lack of training courses, where less than a half of them had attended specialized training courses during their work.

According to the present study findings, approximately three-fourth of the nurses are non-Bahraini. This is a common finding in the Gulf countries, which depend largely on multi-national healthcare work force, especially in nursing. Nonetheless, with the increasing numbers of Bahraini students enrolling in university degree nursing programs, the situation has been gradually changing recently. Thus, Bahraini nurses are often less experienced and could have lower nursing qualification, which may explain the finding that the non-Bahraini nationality is the only independent factor positively influencing the score of nurses' knowledge in our study.

The present study results demonstrate high levels of nurses' knowledge of observing weakness and fatigue, in addition to anxiety in both side heart failure when performing inspection during physical examination of the patient with heart failure. The finding reflects the importance of these symptoms in chronic heart failure as outlined in previous studies [23; 24]. Even more, the anxiety and stress symptoms could have a

negative impact on the course and prognosis of heart failure [23]. Conversely, the nurses in the present study have lower knowledge of the importance of observing for dyspnea, breathlessness and orthopnea, as well as for sacral edema in bedridden patients with right side heart failure during physical assessment of the patient. This finding is of concern since dyspnea is an important landmark in the diagnosis of right side heart failure as mentioned by *King et al* [25]. Similarly, missing inspection for sacral edema could have negative consequences on the nursing diagnosis and management. Thus, *Delmas*[26] emphasized that the nurse should be able to identify the presence of edema, and to assess its type, extent, and location. This is of special importance in bedridden patients with heart failure [27]. However, since it needs turning the patient in bed, which could be difficult for the patients and/or the nurse.

Concerning nurses' knowledge of palpation during physical assessment of the patient with chronic HF, the present study point to better knowledge of examination of the liver for enlargement and tenderness in comparison with palpation for ascites. This could be attributed to that the process of liver palpation might be easier than that of ascites. Nevertheless, both are of importance in the diagnosis of chronic heart failure, and could help in the determination of its stage of compensation as highlighted by *Verbrugge et al* [28] in their study in Belgium.

The present study findings also demonstrate a variation in nurses' knowledge of the auscultation part of the physical assessment of the patient with heart failure. Thus, while a majority of them has correct knowledge of the presence of tachypnea in heart failure, only slightly more than half of them have correct knowledge of crackles and rales in HF. In this respect, a multicenter European study demonstrated the prognostic value of the change in heart rate among patients with chronic HF [29]. However, rales are also very important prognostic findings in patients with chronic HF as revealed by a study in Canada where the presence of rales was shown as an independent predictor of cardiovascular mortality [30]. Nonetheless, a study in Mayo clinic demonstrated major deficiency in health professionals' auscultatory skills regardless their categories or training [31]. This was also reported among nurses in Canada [32].

Overall, the nurses' scores of knowledge of physical assessment are relatively low, which is in agreement with the results of a recent study among Italian nurses [33]. Although the bivariate analyses in the current study indicate significant differences in nurses' knowledge according to the work units and sub-units, in addition to their nationality, only this latter persisted in multivariate analysis. Hence, the Bahraini nurses seem to be less knowledgeable of the physical examination of the patient with heart failure compared with their non-Bahraini counterparts. This difference has been previously discussed. However, this factor only explains about 5% of the variation in

the knowledge score, which means that other important factors have to be identified and addressed in order to improve these nurses' knowledge.

CONCLUSION AND RECOMMENDATIONS

In conclusion, the nurses in the study settings, particularly the Bahraini nurses, lack sufficient knowledge for proper physical assessment of the patients with heart failure. Hence, specialized training courses are recommended for these nurses, especially for the Bahraini ones. These courses should address the knowledge gaps identified to be effective.

ACKNOWLEDGEMENTS

We thank Dr. Mohamed Amin, Dr. MouzaSuwaileh, Dr. Shereen Al Shaikh, Dr. Adel Mashreqi, Dr. Nizar Bukamal, and Mrs. Nawah Saleh for their effort in reviewing the tool.

REFERENCES

- [1] McMurray J.J.V., Adamopoulos S., Anker S.D., Auricchio A., Böhm M., and Dickstein K. (2012): ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure 2012: The Task Force for the Diagnosis and Treatment of Acute and Chronic Heart Failure 2012 of the European Society of Cardiology. Developed in collaboration with the Heart Failure Association (HFA) of the ESC. *Eur Heart J.*;33(14):1787-847.
- [2] Bui A.L., Horwich T.B., and Fonarow G.C. (2011): Epidemiology and risk profile of heart failure. *Nat Rev Cardiol.*; 8(1):30-41.
- [3] Tomiyama M. (2016): Roles of Nurses in Home Medical Care. *Yakugaku Zasshi.*;136(8):1129-32. doi: 10.1248/yakushi.15-00271-4.
- [4] Sterne P.P., Grossman S., Migliardi J.S., and Swallow A.D. (2014): Nurses' Knowledge of Heart Failure: Implications for Decreasing 30-Day Re-Admission Rates. *Med Surg Nurs.*;23(5):321-9.
- [5] Ziehm J., Farin E., Seibel K., Becker G., and Köberich S. (2016): Health care professionals' attitudes regarding palliative care for patients with chronic heart failure: an interview study. *BMC Palliat Care.*;15:76. doi: 10.1186/s12904-016-0149-9.
- [6] Schocken D.D., Benjamin E.J., Fonarow G.C., Krumholz H.M., Levy D., Mensah G.A., Narula J., Shor E.S., Young J.B., and Hong Y. (2008): Prevention of heart failure A scientific statement from the American Heart Association councils on epidemiology and prevention, clinical cardiology, cardiovascular nursing, and high blood pressure research; Quality of care and outcomes research interdisciplinary working group; and functional genomics and translational biology interdisciplinary working group. *Circulation.*; 117(19):2544-65.
- [7] Delgado J.M., and Ruppert T.M. (2015): Health Literacy in Older Latinos With Heart Failure: A Systematic Review. *J CardiovascNurs.*
- [8] Olano-Lizarraga M., Oroviogicochea C., Errasti-Ibarrondo B., and Saracibar-Razquin M. (2016): The personal experience of living with chronic heart failure: a qualitative meta-synthesis of the literature. *J ClinNurs.* 2016 Jun 6. doi: 10.1111/jocn.13285.
- [9] Riley J.P., Astin F., Crespo-Leiro M.G., Deaton C.M., Kienhorst J., Lambrinou E6, McDonagh T.A., Rushton C.A., Stromberg A., Filippatos G., and Anker S.D. (2016): Heart Failure Association of the European Society of Cardiology heart failure nurse curriculum. *Eur J Heart Fail.*;18(7):736-43. doi: 10.1002/ejhf.568. Epub 2016 May 25.
- [10] McCleery E., Christensen V., Peterson K., Humphrey L., and Helfand M. (2014): Evidence Brief: The Quality of Care Provided by Advanced Practice Nurses. VA Evidence-based Synthesis Program Evidence Briefs [Internet]. Washington (DC): Department of Veterans Affairs (US); 2011-. VA Evidence-based Synthesis Program Reports.
- [11] Zambas S.I., Smythe E.A., and Koziol-McLain J. (2016): The consequences of using advanced physical assessment skills in medical and surgical nursing: A hermeneutic pragmatic study. *Int J Qual Stud Health Well-being.*;11:32090. doi: 10.3402/qhw.v11.32090. eCollection 2016.
- [12] Milligan K., and Neville S. (2001): Health assessment and its relationship to nursing practice in New Zealand. *Contemporary nurse.*;10(1-2):7-11.
- [13] Cheng H.Y., Chair S.Y., Wang Q., Sit J.W.H., Wong E.M.L., and Tang S.W. (2016): Effects of a nurse-led heart failure clinic on hospital readmission and mortality in Hong Kong. *J GeriatrCardiol.*; 13(5): 415-419. doi: 10.11909/j.issn.1671-5411.2016.05.013
- [14] Paul S., and Hice A. (2014): Role of the acute care nurse in managing patients with heart failure using evidence-based care. *Crit Care Nurs Q.*;37(4):357-76. doi: 10.1097/CNQ.0000000000000036.
- [15] Betty Lebona. G., Elizabeth Jasmine S., and Indira S. (2016): Assess the knowledge regarding physical examination done by and nursing students at Narayana Medical College and General Hospital, Nellore. *International*



- Journal of Applied Research; 2(6): 157-160
- [16] Yancy C.W., Jessup M., Bozkurt B., Butler J., Casey D.E., Drazner M.H., Fonarow G.C., Geraci S.A., Horwich T., Januzzi J.L., and Johnson M.R. (2013): ACCF/AHA guideline for the management of heart failure: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *Journal of the American College of Cardiology*; 62(16):e147-239
- [17] Roussel M.G. (2015): Improving Nurses' Knowledge of Heart Failure. *J Nurses Prof Dev*; 31(4):211-7. doi: 10.1097/NND.000000000000164.
- [18] Mitchell G., McGreevy J., Preshaw D.H., Agnelli J., and Diamond M. (2016): Care home managers' knowledge of palliative care: a Northern Irish study. *Int J Palliat Nurs*; 22(5):230-5. doi: 10.12968/ijpn.2016.22.5.230.
- [19] Gilmour J., Strong A., Chan H., Hanna S., and Huntington A. (2014): Primary health care nurses and heart failure education: a survey. *J Prim Health Care*.1;6(3):229-37.
- [20] Mahramus T., Penoyer D.A., Frewin S., Chamberlain L., Wilson D., and Sole M.L. (2014): Assessment of an educational intervention on nurses' knowledge and retention of heart failure self-care principles and the Teach Back method. *Heart Lung*; 43(3):204-12. doi: 10.1016/j.hrtlng.2013.11.012. Epub 2014 Feb 20.
- [21] Astin F., Carroll D.L., De Geest S., Martensson J., Jones I., Hunterbuchner L., Jennings C., Kletsiou E., Serafin A., and Timmins F. (2014): Working Group of the Education Committee of the ESC Council on Cardiovascular Nursing and Allied Professions; Working Group of the Education Committee of the ESC Council on Cardiovascular Nursing and Allied Professions Education for nurses working in cardiovascular care: a European survey. *Eur J Cardiovasc Nurs*; 13(6):532-40. doi: 10.1177/1474515113514864. Epub 2013 Dec 19.
- [22] Prasun M.A., Casida J., Howie-Esquivel J., Pozehl B., Fahlberg B., Johnson C., Mock J., Quinn J., Yehle K., and Baas L. (2012): Practice patterns of heart failure nurses. *Heart Lung*; 41(3):218-25. doi: 10.1016/j.hrtlng.2012.02.001.
- [23] Polikandrioti M., Goudevenos J., Michalis L.K., Koutelekos J., Kyristi H., Tzialis D., and Elisaf M. (2015): Factors associated with depression and anxiety of hospitalized patients with heart failure. *Hellenic J Cardiol*; 56(1):26-35.
- [24] Webb J., Jackson T., Claridge S., Sammut E., Behar J., and Carr-White G. (2015): Management of heart failure with preserved ejection fraction. *Practitioner*; 259(1786):21-4, 2-3.
- [25] King M., Kingery J., and Casey B. (2012): Diagnosis and evaluation of heart failure. *Am Fam Physician*; 85(12):1161-8.
- [26] Delmas P. (2012): Assessment of oedema. *Rev Infirm*. 2012 May; (181):35-7.
- [27] Longo D.L. et al. (2011): *Harrison's Principles of internal medicine*. 18th ed., New York: McGraw-Hill Companies.
- [28] Verbrugge F.H., Dupont M., Steels P., Grieten L., Malbrain M., Tang W.H., and Mullens W. (2013): Abdominal contributions to cardiorenal dysfunction in congestive heart failure. *J Am Coll Cardiol*; 62(6):485-95. doi: 10.1016/j.jacc.2013.04.070. Epub 2013 Jun 7.
- [29] Maeder M.T., Zurek M., Rickli H., Tobler D., Kiencke S., Suter T., Yoon S.I., Julius B., Pfisterer M.E., Brunner-La Rocca H.P.; TIME-CHF Investigators. (2016): Prognostic Value of the Change in Heart Rate From the Supine to the Upright Position in Patients With Chronic Heart Failure. *J Am Heart Assoc*; 5(8). pii: e003524. doi: 10.1161/JAHA.116.003524.
- [30] Caldentey G., Khairy P., Roy D., Leduc H., Talajic M., Racine N., White M., O'Meara E., Guertin M.C., Rouleau J.L., and Ducharme A. (2014): Prognostic value of the physical examination in patients with heart failure and atrial fibrillation: insights from the AF-CHF trial (atrial fibrillation and chronic heart failure). *JACC Heart Fail*; 2(1):15-23. doi: 10.1016/j.jchf.2013.10.004. Epub 2014 Jan 8.
- [31] March S.K., Bedynek J.L. Jr, and Chizner M.A. (2005): Teaching cardiac auscultation: effectiveness of a patient-centered teaching conference on improving cardiac auscultatory skills. *Mayo Clin Proc*; 80(11):1443-8.
- [32] Reimer-Kent J. (2013): Heart sounds: are you listening? Part 1. *Can J Cardiovasc Nurs*; 23(2):3-6.
- [33] Cicolini G., Tomietto M., Simonetti V., Comparcini D., Flacco M.E., Carvello M., and Manzoli L. (2015): Physical assessment techniques performed by Italian registered nurses: a quantitative survey. *J Clin Nurs*; 24(23-24):3700-6. doi: 10.1111/jocn.12997. Epub 2015 Sep 30.