

# THE ATTEMPT TO ASSESS NURSES' KNOWLEDGE ON SELECTED ASPECTS OF CARDIOPULMONARY RESUSCITATION

## PRÓBA OCENY WIEDZY PIELĘGNIAREK NA TEMAT WYBRANYCH ASPEKTÓW RESUSCYTACJI KRAŻENIOWO-ODDECHOWEJ

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### ABSTRACT

**Introduction.** Knowledge of cardiopulmonary resuscitation among the nursing personnel working in intensive therapy units is absolutely necessary and enables to give professional life-saving assistance while the nursing process conditions patients' recovery and high quality of life.

**Aim.** The attempt to assess nurses' knowledge on selected aspects of cardiopulmonary resuscitation.

**Material and methods.** 100 nurses from an intensive therapy unit. The respondents were mostly nurses with 5-year work experience (37%), with higher education – bachelor's degree in nursing (45%) and nurses having a frequent contact with patients after cardiac arrest (45%). A voluntary and anonymous questionnaire survey with a questionnaire of the authors' own design (30 questions). Descriptive statistics.

**Results.** In the studied group of the nursing personnel the level of knowledge on cardiopulmonary resuscitation is sufficient while knowledge on observing and monitoring a patient staying in the intensive care ward should be completed. A prevailing majority of nurses studied expressed a wish to gain knowledge of the standards and procedures related to the care of a patient in a life-threatening condition.

**Conclusions.** 1. In the studied group of nurses, knowledge of cardiopulmonary resuscitation was sufficient but it is worthwhile to complement it with the guidelines currently in force. What should be emphasized, given the development of nursing sciences, is a necessity to constantly update this knowledge in the group of nurses (as a whole) by offering them possibilities of attending complementary trainings.

2. In the studied group of nurses, knowledge in the field of the patient's observation and monitoring is insufficient. Therefore, it is necessary to give this issue more attention and expand it during postgraduate trainings and courses.

3. In the study group, despite a wide range of nursing duties performed on an unconscious patient, nurses still express readiness to gain knowledge in the form of standards and procedures related to nursing such a patient. The introduction of new types of trainings or courses in this field, for instance, online trainings, should be considered.

KEYWORDS: level of knowledge, nurses, ITU, cardiopulmonary resuscitation.

### STRESZCZENIE

**Wstęp.** Wiedza z zakresu resuscytacji krążeniowo-oddechowej personelu pielęgniarskiego pracującego w oddziałach intensywnej opieki jest niezbędna i umożliwia udzielenie profesjonalnej pomocy ratującej życie, a prowadzenie procesu pielęgnowania warunkuje powrót do zdrowia i wysokiej jakości życia pacjentów.

**Cel.** Próba oceny wiedzy pielęgniarek na temat wybranych aspektów resuscytacji krążeniowo-oddechowej.

**Materiał i metody.** 100 pielęgniarek z oddziału intensywnej terapii. Najliczniejszą grupę wśród ankietowanych stanowił personel pielęgniarski ze stażem pracy w zawodzie do 5 lat (37%), osoby z wykształceniem wyższym – tytułem licencjata pielęgniarstwa (45%) oraz respondenci mający częsty kontakt z pacjentem po zatrzymaniu krążenia (45%). Dobrowolne i anonimowe badania ankietowe za pomocą samodzielnie skonstruowanej ankiety (30 pytań). Statystyka opisowa.

**Wyniki.** W badanej grupie personelu pielęgniarskiego poziom wiedzy odnoszący się do resuscytacji krążeniowo-oddechowej jest wystarczający, wiedza z obszaru obserwacji i monitorowania pacjenta przebywającego na oddziale OIT wymaga uzupełnienia. Zdecydowana większość badanych pielęgniarek/pielęgniarzy wyraziła chęć zdobycia wiedzy z zakresu standardów i procedur względem opieki nad pacjentem w stanie zagrożenia życia.

**Wnioski.** 1. W badanej grupie pielęgniarek wiedza z obszaru resuscytacji krążeniowo-oddechowej była wystarczająca, lecz warto ją uzupełnić o aktualnie obowiązujące wytyczne. Uwzględniając rozwój nauk pielęgniarstwa oraz klasyfikację jej w obrębie specjalizacji należy podkreślać w grupie pielęgniarek możliwość ciągłego aktualizowania wiedzy poprzez możliwość odbycia szkolenia uzupełniającego, oparte o nowości i kierunki dalszego rozwoju zawodowego.

2. W badanej grupie pielęgniarek wiedza z zakresu obserwacji i monitorowania pacjenta jest niewystarczająca, dlatego należy rozszerzyć to zagadnienie podczas prowadzenia kursów i szkoleń podyplomowych.

3. W badanej grupie, personel pielęgniarski, pomimo szerokiego zakresu obowiązków pielęgnacyjnych wykonywanych wobec pacjenta nieprzytomnego, wciąż wykazuje chęć zdobycia wiedzy opracowanej w formie standardów i procedur pielęgnacji pacjenta, dlatego też należy rozważyć wprowadzenie nowego typu szkoleń czy kursów w tym zakresie, np. szkoleń on-line.

SŁOWA KLUCZOWE: poziom wiedzy, pielęgniarki, OIT, resuscytacja krążeniowo-oddechowa.

## Introduction

In 2010, the European Resuscitation Council (ERC) developed new guidelines concerning cardiopulmonary resuscitation, which were approved by the Executive Committee of the ERC. The guidelines contain simple and easy to adopt schemes of procedure, knowledge of which ensures fast and effective aid to sudden cardiac arrest (SCA) victims. The problem of adequate education in the field of cardiopulmonary resuscitation is of particular importance to medical personnel which can, when properly trained, make the society aware that the survival of victims of accidents and catastrophes depends on how fast first aid is given and how adequately organized their transport to hospital is [1–3].

## Aim

The aim of the study was the attempt to assess the knowledge of selected aspects of cardiopulmonary resuscitation among nurses in the intensive therapy unit.

## Material

The study included 100 female and male nurses from the Military Medical Institute in Warsaw. Medical personnel with up to 5-year work experience, people with higher education (bachelor's degree in nursing) and respondents having a frequent contact with cardiac arrest patients constitute the most numerous groups (37%, 45% and 45%, respectively). Detailed data can be found in **Table 1**.

**Table 1.** Characteristics of the study group of nurses

No.	Question	Answer	Number of answers given (%)
1	Work experience:	up to 5 years	37
		6–10 years	15
		11–15 years	11
		16–20 years	19
		21–29 years	10
		over 30 years	8
2	Education:	Medical secondary school	7
		Medical vocational school	15
		Bachelor's degree studies	45
		Master's degree studies	27
3	Frequency of contacts between nursing staff and post-cardiac arrest patients	Bridging undergraduate studies	6
		very rare	3
		rare	18
		frequent	45
		very frequent	34

Source: authors' study

## Methods

A voluntary and anonymous questionnaire survey study was carried out with the use of a questionnaire of the authors' own design between January and April 2014. The questionnaire contained 30 questions concerning work in the intensive therapy unit and included subjects related to cardiopulmonary resuscitation, observation and monitoring as well as nursing activities, with particular focus on patients after cardiac arrest. Moreover, the questionnaire included questions related to work experience, education and frequency with which nurses encountered cardiac arrest patients in their professional work (demographics) as well as 3 multiple choice questions. Descriptive statistics was used to describe the data gathered in the MS Excel sheet.

## Results

The study revealed that courses and trainings constituted the most common source of information about the care and nursing of a patient, followed by information obtained from nursing personnel during duty hours. Self-assessment of respondents showed that the majority of them evaluated their knowledge on the care and nursing of patients in life-threatening conditions as quite good. Detailed data can be found in **Table 2**.

**Table 2.** Female/male nurses' self-assessment of their knowledge on the care and nursing of a post-cardiopulmonary resuscitation patient in intensive therapy units

No.	Question	Answer	Number of answers given (%)
1	Where does your knowledge on the nursing care of a patient come from? (a multiple choice question)	Studies	64
		Courses/trainings from nursing staff during duty hours	91
		from a ward nurse	81
		from a coordinating nurse	40
		from nursing journals	10
		from medical journals	26
		medical books	16
		scientific conferences	37
		conferences by firms offering nursing products	17
		Internet	7
2	How would you assess your knowledge on the nursing care of a patient in a life-threatening condition?	Others	39
		very good	-
		quite good	9
3	Do you read/ Are you interested in standards/procedures of nursing a patient?	satisfactory	63
		unsatisfactory	22
		No	6
		Yes	12
4	If you had an opportunity of gaining knowledge in the field of standards/procedures of nursing a patient in a life-threatening condition, would you be interested in it?	Only when I do not know how to perform a procedure	65
		I believe that standards/procedures are of no value	19
		Definitely yes	4
4	If you had an opportunity of gaining knowledge in the field of standards/procedures of nursing a patient in a life-threatening condition, would you be interested in it?	Rather yes	22
		Rather not	66
		Definitely not	5
4	If you had an opportunity of gaining knowledge in the field of standards/procedures of nursing a patient in a life-threatening condition, would you be interested in it?		7

Source: authors' study

The majority of respondents answered the question about the notion of reanimation correctly. A prevailing majority of respondents knew that basic cardiopulmonary resuscitation procedures had to include restoration of airway access, commencement of artificial respiration, commencement of heart massage. Detailed data can be found in **Table 3**.

**Table 3.** Level of knowledge on cardiopulmonary resuscitation among nurses

No.	Question	Answer	Number of answers given (%)
1	Since when have the present standards of the procedure in cardiopulmonary resuscitation been in force?	1995	-
		2000	-
		2005	24
		2010	76
		I do not know	-
2	Reanimation is:	a set of activities which lead to restoring blood circulation or blood circulation and respiration	57
		a set of activities which lead to restoring respiration, blood circulation and consciousness	32
		a set of activities which lead to restoring at least blood circulation	10
		I do not know	1
		a set of activities which lead to restoring blood circulation or blood circulation and respiration	36
3	Resuscitation is:	a set of activities which lead to restoring respiration, blood circulation and consciousness	37
		a set of activities which lead to restoring at least blood circulation	23
		I do not know	7
		70-90/ min	7
		90-100/ min	20
4	With what frequency should the chest be compressed during resuscitation?	100-120/ min	73
		120-140/ min	-
		I do not know	-
		ventricular tachycardia, no pulse, ventricular fibrillation	83
5	Indicate the rhythms for defibrillation:	asystole, ventricular fibrillation	3
		auricular fibrillation, PEA	5
		PEA, ventricular fibrillation	4
		I do not know	5
		restore the patency of the airways, begin artificial respiration, begin cardiac massage	94
6	Indicate basic cardiopulmonary resuscitation procedures:	begin artificial respiration, begin cardiac massage, perform defibrillation	-
		begin pharmacotherapy, ECG monitoring, defibrillation	-
		begin pharmacotherapy, intubation, ECG monitoring, defibrillation	4
		I do not know	2

7	Indicate advanced cardiopulmonary resuscitation procedures:	restore the patency of the airways, begin artificial respiration, begin cardiac massage	4
		begin pharmacotherapy, ECG monitoring, defibrillation	18
		begin pharmacotherapy, ECG monitoring, defibrillation	70
		begin pharmacotherapy, intubation, ECG monitoring, cardioversion	6
		I do not know	2

Source: authors' study

The respondents were also asked about the procedure of cardioversion. 83% of the respondents marked the sentence which said that cardioversion required intubation and general anesthesia. In addition, a prevailing majority of the study group (91%) believed that reversible causes of sudden cardiac arrest included hypoxia, hypovolemia, hypothermia as well as tension pneumothorax.

Less than half of the respondents knew that the set for parenteral nutrition should be replaced after every procedure. A prevailing majority knew that to properly collect blood for culture the procedure should be carried out while temperature is rising from two different punctures prior to the administration of an antibiotic. Detailed data can be found in **Table 4**.

**Table 4.** Female/male nurses knowledge on the nursing care of post-cardiopulmonary resuscitation patients

No.	Question	Answer	Number of answers given (%)
1	List what nursing care procedures you use most frequently in an unconscious intubated patient (a multiple choice question).	anti-bedsore hygiene	93
		oral hygiene	89
		application of facilities	85
		change of body position	86
		drainage of exudate from the bronchial tree	62
		with disposable drains	-
		drainage of exudate from the bronchial tree with the help of closed circuits	86
		control of places of cannula insertion and change of dressings	77
		control of body temperature	54
		warming-up or cooling patient's body	86
2	What factors dependent on the intubated patient's nursing care contribute to the prevention of ventilator-associated pneumonia (VAP)?	position at 30-45 degrees angle	2
		hand hygiene of the staff	6
		oral hygiene 4 x a day	1
		proper drainage of exudate from air passages	13
		observance of procedures, guidelines	3
		all answers are correct	74
		all answers are false	1

		the set should be changed after 12 hours	19
		the set should be changed after 72 hours	34
3	How often should parental nutrition transfusion sets be changed?	the set should be changed only if damaged	-
		the set should be changed after every transfusion	46
		I do not know	1
		increase of body temperature in the place of the central venous catheter insertion	72
4	On the basis of what symptoms do you assess the inflammatory state of a cannula? (a multiple choice question)	fever	34
		reddening	89
		oedema	88
		pain	97
		cannula obstruction	62
		I do not know	-
		after the antibiotic administration during peak temperature	2
		samples are collected from 2 venous or arterial catheters placed earlier	-
5	What conditions should be satisfied to properly collect blood for culture?	samples are collected as temperature increases from two different sites prior to antibiotic administration	96
		I do not know	2
		Yes, always	63
6	When providing nursing care or performing doctors' orders, do you tell the patient what you are going to do in order to take care of a patient's mental condition?	I do not always use this method.	17
		Only if the actions performed can cause pain, e.g. during a change of a dressing	12
		No, I do not find it necessary.	8
		2-6 mm Hg	10
7	What are the proper values of central venous pressure (CVP)?	2-12 mm Hg	82
		6-16 mm Hg	4
		6-20 mm Hg	-
		I do not know	4
		cough, fluid overloads of the circulatory system, cardiac tamponade	89
8	What factors contribute to increasing central venous pressure (CVP)?	ventilation with positive pressures, hypothermia, drugs	2
		hypovolemia, circulatory insufficiency, cough	1
		I do not know	8

Source: authors' study

A prevailing majority of the respondents (94%) knew that the Glasgow Scale served to assess the state of consciousness of a patient. In addition, half of the respondents (50%) believed that capnography allowed for better assessment of patient's ventilation because of the measurement of carbon dioxide partial pressure at the final stage of expiration. Only 17% of nurses knew that the quantity of the crystalloid solution to be supplemented in an adult patient after a loss of blood had to be

three times larger than the quantity of blood lost. Moreover, the majority of the respondents (67%) knew that oliguria could be diagnosed when the daily diuresis was below 500 ml of urine. 27% of the study group knew that a Tegaderm-type dressing should be changed every 7 days. Merely a half of the respondents knew that 2% Xylocaine was administered during the development of ventricular arrhythmias. The same number of respondents gave a wrong answer. In addition, a prevailing majority of the respondents (97%) knew that adrenalin was the drug of the first choice during an anaphylactic shock, in resuscitation of circulatory insufficiency. Detailed study data can be found in **Table 5**.

**Table 5.** Nurses' knowledge of drugs applied in post-cardiopulmonary resuscitation patients

No.	Question	Answer	Number of questions asked (%)
		Ventricular tachycardia	42
		one of the standard drugs used	1
1	When do we apply intravenous 2% Xylocaine?	Prior to cardioversion	42
		Xylocaine cannot be administered intravenously	1
		I do not know	14
		Propofol	-
2	Which of the drugs listed may cause cellular necrosis after extravasation paravenously or when injected into an artery?	Tiopental	70
		Etomidat	7
		Midazolam	1
		I do not know	22
		sodium bicarbonate is used during every resuscitation	7
		the use of sodium bicarbonate depends on the gasometric examination	49
3	What do the current guidelines say about the application of sodium bicarbonate during resuscitation?	effective cardiac massage and satisfactory pulmonary ventilation do not require the administration of sodium bicarbonate	14
		the decision whether to apply sodium bicarbonate belongs to the doctor in charge of resuscitation	36
		I do not know	4

Source: authors' study

## Discussion

The subject of cardiopulmonary resuscitation is frequently addressed in the available Polish scientific literature in a variety of contexts [4-11]. Moreover, even more frequently tackled question concerns providing care and nursing, not only in the general scheme of practising the profession, but in its specialist aspect,

related to the disease unit or state in which a patient is [12–26].

The research area is nurses' knowledge of cardiopulmonary resuscitation, ways of its performance and knowledge of the guidelines currently in force, published by the Polish Resuscitation Council. We have not found any publications concerning nurses' knowledge of nursing a post SCA patient or an ITU patient in a life-threatening condition.

Our own research was carried out on a group of nurses working in intensive therapy units. The study group included female/male nurses with work experience of up to 5 years as well as over 30 years. The length of work, ongoing improvement of professional skills owing to a possibility of undertaking studies as well as further education trainings in the form of courses affected the study findings. After analysing the questionnaire, the respondents' knowledge of resuscitation was evaluated as sufficient while that of the observation and monitoring a patient as insufficient. Undoubtedly, it is necessary to systematize, update and complement the respondents' knowledge in the field of a holistic approach to patient care. In 2009, a questionnaire survey was carried out on the knowledge of CPR principles according to ERC 2005 among doctors and nurses working in the Public System of Emergency Medical Services. The author of the study assessed the knowledge of both doctors and nurses as insufficient. He also reported dependence between the level of knowledge and work experience.

The research conducted in 2010 on the role of a system nurse in the application of advanced resuscitation procedures within emergency medical services covered nurses aged 20 to 40 years old (50% of respondents with higher or medium-level medical education each). Half of the respondents completed supplementary courses over the past five years. Some of the survey questions overlapped with the questions posed in our own questionnaire. The study also included questions related to the scope of the nurse's rights to perform procedures without a doctor's order. The majority of the nurses taking part in the study had no problems with correct indication of rhythms requiring the performance of defibrillation (100%), reversible causes of SCA (90%) and was familiar with the algorithm of advanced resuscitation procedures (70%); these results being comparable to our own findings. What seems to be emphasized in literature is satisfactory knowledge in the field of resuscitation among nursing personnel with simultaneous gaps in their knowledge of the scope of their duties as well as failure to make full use of their professional rights and qualifications.

The conducted research into the scope of knowledge of nursing personnel with respect to performing

resuscitation procedures indicates directions of further education and training. The research findings also point to the necessity of providing introduction to the study of subjects hitherto not addressed or neglected, to mention only standards and procedures in nursing or the scope of professional rights and qualifications which do not require the doctor's order.

## Results

1. In the studied group of nurses knowledge in the field of cardiopulmonary resuscitation was sufficient but it would be worthwhile to complement it with the guidelines currently in force. What should be emphasized, given the development of nursing sciences, is a necessity to constantly update this knowledge in the group of nurses (as a whole) by offering them possibilities of attending complementary trainings.
2. In the studied group of nurses knowledge in the field of observing and monitoring a patient is insufficient. Therefore it is necessary to give this issue more attention and expand it during postgraduate trainings and courses.
3. In the study group, in spite of a wide range of nursing duties performed on an unconscious patient, nurses still express readiness to gain knowledge in the form of standards and procedures related to nursing such a patient. The introduction of new types of trainings or courses in this field, for instance, online trainings, should be considered.

## References

1. Zawadzki A. *Medycyna ratunkowa i katastrof. Podręcznik dla studentów uczelni medycznych*. Warszawa: Wydawnictwo Lekarskie PZWL; 2006. 6–17.
2. Goniewicz M. *Pierwsza pomoc. Podręcznik dla studentów*. Warszawa: Wydawnictwo Lekarskie PZWL; 2011. 63.
3. Andres J. *Pierwsza pomoc i resuscytacja krążeniowo-oddechowa. Podręcznik dla studentów medycyny*. Kraków: Wydawca Polska Rada Resuscytacji; 2006. 17–21.
4. Kübler A, Mysiak A. *Choroba poresuscytacyjna*. Wrocław: Wydawnictwo Urban & Partner; 2005. 117–179.
5. Larsen R. *Anestezjologia*. Wrocław: Wydawnictwo Elsevier Urban & Partner; 2013. 944–953.
6. Kaszuba D, Nowicka A. *Pielęgniarstwo kardiologiczne. Podręcznik dla studentów medycyny*. Warszawa: Wydawnictwo Lekarskie PZWL; 2011. 140.
7. Chrobak W, Niedziela J, Urlik M, Nadziakiewicz P. Nagłe zatrzymanie krążenia w przebiegu świeżego zawału serca. *Kardiochirurgia i Torakochirurgia Polska* 2008; 5: 211–215.
8. Kondrat E, Dobrzyń-Matusiak D. Analiza pacjentów po zatrzymaniu krążenia przyjmowanych na oddział intensywnej terapii Śląskiego Centrum Chorób Serca. *Pielęgniarstwo Specjalistyczne* 2013; 2: 12–20.
9. *Wytuczne Resuscytacji 2010*. Wydawnictwo Polska Rada Resuscytacji, Kraków: Wydawnictwo Polska Rada Resuscytacji; 2010. 11–24.
10. Jakubaszko J. *Ratownik medyczny*. Wrocław: Wydawnictwo Elsevier Urban & Partner; 2011. 512–531.

11. Jakubaszko J. ABC Resuscytacji. Wrocław: Górnicki Wydawnictwo Medyczne; 2002. 79–90.
12. Dunn PF. Procedury kliniczne w anestezjologii. Warszawa: Wydawnictwo Medi Page; 2011. 169–193, 751–765.
13. Wołowicka L, Dyk D. Anestezjologia i intensywna opieka. Klinika i pielęgniarstwo. Podręcznik dla studiów medycznych. Wrocław: Wydawnictwo Lekarskie PZWL; 2007. 225–283.
14. Jędrzejczyk M, Bazaliński D, Więch P, Włodyk A. Dostęp do szpikowy w stanach zagrożenia życia. Pielęgniarstwo Chirurgiczne i Angiologiczne 2012; 2: 52–63.
15. Kózka M, Ptaszewska-Żywko L. Procedury pielęgniarstwa. Podręcznik dla studiów medycznych. Warszawa: Wydawnictwo Lekarskie PZWL; 2009. 25–248.
16. Krajewska-Kułak E, Rolka H, Jankowiak B. Standardy i procedury pielęgnowania chorych w stanach zagrożenia życia. Warszawa: Wydawnictwo Lekarskie PZWL; 2009.
17. Ciechaniewicz W. Pielęgniarstwo ćwiczenia. Podręcznik dla studiów medycznych. Warszawa: Wydawnictwo Lekarskie PZWL; 2010. 624–660.
18. Kózka M, Rumian B, Maślanka M. Pielęgniarstwo Ratunkowe. Warszawa: Wydawnictwo Lekarskie PZWL; 2013. 93–125.
19. Fleischer M, Bober-Gheek B. Podstawy pielęgniarstwa epidemiologicznego. Wrocław: Wydawnictwo Elsevier Urban&Partner; 2006. 301–383.
20. Wojewódzka-Żeleznikowicz M, Czaban S, Szczesiul P, Nielepiec-Jałosieńska A, Ładny J. Hipotermia po resuscytacji – wskazania, sposób prowadzenia, skuteczność kliniczna, powikłania stosowania. Postępy Nauk Medycznych 2009; 11: 901–906.
21. Zawiślak B, Depukat R, Arif S, Dudek D. Zastosowanie łagodnej hipotermii terapeutycznej u pacjenta z zawałem serca powikłanym nagłym zatrzymaniem krążenia. Kardiologia Polska 2013; 4: 426–428.
22. Pągowska-Klimek I, Krajewski W. Zastosowanie hipotermii kontrolowanej w intensywnej terapii. Anestezjologia Intensywna Terapia 2010; 3: 167–173.
23. Rybakowski M, Surmacz R, Ślósarek R, Baranowski M, Baranowski K, Andrzejewski P. Opieka okołoperacyjna 2013; 1: 33–37.
24. Kusza K, Kübler A, Maciejewski D, Mikstacki A, Owczuk R, Wujtewicz M, Piechota M. Wytyczne Polskiego Towarzystwa Anestezjologii i Intensywnej Terapii Określające zasady, warunki oraz organizację udzielania świadczeń zdrowotnych w dziedzinie anestezjologii i intensywnej terapii. Anestezjologia Intensywna Terapia 2012; 4: 201–202.
25. Kübler A, Maciejewski D. Standardy postępowania oraz procedury medyczne przy udzielaniu świadczeń zdrowotnych z zakresu anestezjologii i intensywnej terapii w zakładach opieki zdrowotnej. Anestezjologia i Ratownictwo 2008; 2: 321–330.
26. Trafidło T, Gaszyński W. Monitorowanie pojemności minutowej serca metodami mniej inwazyjnymi. Anestezjologia i Ratownictwo 2010; 4: 99–110.

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