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The Registered Nurse Surgical First Assistant (RNSFA) in Adult Cardiac Surgery.

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Background. Worldwide, the proportion of older people, and with it the number of chronic diseases is steadily increasing. The most common chronic diseases are cardiovascular diseases, where are the heart diseases still remain in the first place in the 10 main causes of death. More than 10 million people die from cardiovascular diseases each year, and by 2030 the projected mortality rate will increase to 23.6 million. There are not always possible to treat the patient therapeutically, sometimes you have to resort to open heart surgery, and it is the most effective way to treat certain heart diseases. The world practice shows that where professional nurses work, mortality decreases, and outcomes of care of diseases are much better.

Objective. Determine the feasibility of creating the Registered Nurse as surgical first assistant in adult cardiac surgery for improving medical care for persons with cardiac surgical needs in Kazakhstan.

Methods. Scoping review was used as a type of literature review. 1513 articles were selected (CINAHL - 807 articles, Pubmed - 706 articles). Of these, 554 articles were selected by names and abstracts, then 379 full-text articles were evaluated for eligibility and finally, 11 articles were included in the scoping review.

Results. Scoping review included 11 articles from databases CINAHL (3) and PubMED (8). There were Quantitative (6) and Qualitative (5) researches, described sources Primary (5), Secondary (6). There were 6 different research designs: RCT (Prospective and Retrospective), Descriptive, Analytical, Retrospective, Prospective, Case-control. Four determinants were identified: 1 competence, 2 educations, 3 benefits and 4 inhibiting factors. All 11 articles described the competencies of RNFSA, 6 articles were written about the education, 8 articles were described as benefits of speciality anf 6 articles were described as inhibit factors.

Conclusions. As a result of the study, the following recommendations were made: 1 - development of a regulatory framework defining the role, rights and responsibilities of RNFA, 2 - development of training programs for preparing RNFA, 3 - introduction of staffing units of RFFA in cardiac hospitals.

Keywords/tags (subjects)
Registered Nurse, Physician Assistant, Cardiac surgery, Surgery assistant, Perioperative Nursing, Perioperative care, Scoping review.

Miscellaneous (Confidential information)

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1 Introduction

There is an increase in the elderly population and the number of chronic diseases around the world (The Swedish National Board of Health and Welfare 2015 and 2011, according to Ljungbeck & Forss 2017). One of the major chronic diseases is Cardiovascular disease (CVD), which is the leading cause of death worldwide (Yusuf, Hawken, Ounpuu, et.al. according to Abreu, Sousa, Matias-Dias, & Pinto 2018). More than 10 million people die from cardiovascular diseases each year, and by 2030, mortality will increase to 23.6 million (Cardiovascular disease 2017). Cardiovascular diseases cover a wide range of clinical situations (Kaplan & Mathers 2011, Kaplan, Wirtz, Mantel-Teeuwisse, Stolk, Duthey, & Laing 2013, Nichols, Townsend, Scarborough, & Rayner 2012, according to Gama, Torre, Guerreiro, Azevedo, Costa, & Lunet 2017). CVD contributes to more than 30% of all deaths, mainly due to coronary heart disease and stroke, and about 10% of the total number of years of life, adjusted for disability. In high-income countries, cardiovascular mortality has been declining for decades, due to the more frequent use of evidence-based interventional and pharmacological treatment for acute therapy and secondary prophylaxis after acute coronary syndromes and stroke. (Capawell, Beaglehole, Seedon, & McMurray 2000, Ford, Ajani, Croft, Critcley, Labarthe & Kottke 2007, Unal, Critchley & Capawell 2004, Heeley, Andaerson, Patel et al.2011, Mancia, Fagart, Narkiewicz et al. 2013, according to Gama et al. 2017.) Wall and others (2018), cite several studies by Mensah and others (2017), Yang and others (2017), Vaughan and others (2017) to state that despite declines in cardiovascular mortality over the past 40 years, heart disease and stroke remain the first and fifth leading causes of death in the United States. Shown by the statistics, 4 million people die from cardiovascular diseases in Europe every year. (Townsend, Wilson, Bhatnagar et al. 2016, according to Abreu et al. 2018.) Many cardiovascular events can be prevented by reducing risk factors (Wong 2014, according to Abreu et al. 2018). But it is not always possible to treat the patient therapeutically, and in some cases open-heart surgery is necessary, as it is the most effective way to treat certain heart diseases (Gilad, Santoro, Ribera, Calevo, Cipriani, Pasquè, & Chierchia 2018).

Heart surgery gives excellent results, but it very rarely fully restores complex congenital heart disease, and sometimes there are residual disorders or late complications (Zomer, Verheugt, Vaartjes et al. 2011, according to Gilad et al. 2018). In fact, re-do operations are required in approximately 20–25% of patients with congenital heart disease due to the presence of residual defects after partial repair, degeneration and proliferation of canals, or native or prosthetic valve dysfunction. Gilad and others (2018) refer to Giamberti and others (2009), Zomer and others (2011), and Mascio (2011) presenting that the level of surgical mortality is quite low and ranges from 2 to 5%. Surgical mortality rates, which in patients with more complex disorders exceeded 50% in the 1950s, are now reduced to less than 15% (ibid.). A significant increase in survival has led to a change in the age distribution of the CHD population (Webb et al. 2015, Marelli et al. 2007, Marelli et al. 2014, according to Gilad and others 2018).

Demographic changes, an increase in chronic diseases, a shortage of doctors, and the need for improved service in the provision of medical services have led to the restructuring of work tasks and responsibility between health care workers (Wisur-Hokkanen, Glasberg, Makela, & Fagerstrom 2015). Reduction of budgets in the field of medicine also gives thought to consider the issue of economy and again switch our attention to the expansion of official duties of certain groups of nurses in practice (Fraser & Melillo 2018). By expanding the capacity and role of nurses, the quality and cost-effectiveness of health systems can be improved (Sheer & Wong 2008, Hamric 2009, according to Wisur-Hokkanen et al. 2015).

It is recognized that advanced practice facilitates the development of a competent and flexible workforce and prepares nurses, who are also the workers who will make changes to the health system as a whole, for a career path (Pearce & Breen 2018). One way to tackle this problem is to introduce an advanced nursing practitioner (ANP) into the health service. According to the International Council of Nurses (ICN), advanced practice nursing is being developed all over the world (APN) (Schober & Affara 2006, according to Wisur-Hokkanen et al. 2015.).The introduction of this specialty by Wisur-Hokkanen and others (2015) according to literary sources increases the effectiveness of medical care, improves the quality of medical care and patient safety. But, unfortunately, in many countries there are limitations in practice

and barriers to realising the role of advanced practicing nurses. Numerous studies have been conducted to study the impact and benefits of the introduction of this specialty in medical institutions. Opinions and satisfaction of doctors, managers, nurses, patients and their relatives were analyzed for various complications, and patients' risk, elapsed time, and adequacy of resource use were calculated, as well as staff costs and financial costs. (Fagerström & Glasberg 2011, Bergman et al. 2013, Bjorå 2013, according to Wisur-Hokkanen et al. 2015).

The role of the ANP has been realized and developed due to the shortage of general practioners (GPs) (Wisur-Hokkanen et al. 2015) and emergency department (ED) trainee doctors. According to the experience of Morgan (2017), ANP is practiced autonomously, regardless of the physician. At the same time numerous studies have shown that there are no defined roles for the APN, since this role is new and many are not aware of the existence of the APN (Fagerström & Glasberg 2011, Bergman et al. 2013, Bjorå 2013, according to Wisur-Hokkanen et al. 2015.)

Considering all the above, it is necessary to consider the introduction of APN in cardiac surgery, which will have a major impact on the health sector of the country.

2 Cardiovascular Diseases (CVD) as a Global Problem

2.1 Worldwide Mortality and Morbidity data of CVD

Cardiovascular diseases (CVD) are the most acute problem of modern medicine, for the sole reason that so many people die of CVD each year (Malvezzi, Cariolo, Bertuccio, & La Vecchia 2018). CVDs are the number one cause of death globally (Cardiovascular Diseases 2017). Among 56 million global deaths from all causes in 2012, cardiovascular diseases caused 17.5 million annual deaths (Allen, Cobiac, & Townsend 2017). Even after 4 years, the percentage of CVD mortality in the world remains nearly the same according to the results of 2016, in which CVD leads the cause of worldwide deaths with the result of 17.65 million, which is 32.26% of all deaths in the world (Ritchie & Roser 2018). Eighty-five percent of these deaths are due to heart attack and stroke (Cardiovascular Diseases 2017). These diseases remain the leading causes of death in the world in the last 15 years (The top 10 causes of

death 2018). In the 10 main causes of death, heart diseases remain in the first place (Benjamin, Virani, Callaway et al. 2018).

The World Health Organization predicts that deaths due to CVD will increase around the globe from 17 million in 2008 to 25 million in 2030 (World Health statistics 2012, according to Veronovici, Lasiuk, Rempel & Norris 2014). While death rates in the world are declining, the total number of deaths is increasing because the causes of death all over the world change as the world's population grows, the life expectancy of the population increases, and people's living standards improve. Scientists have proven that the main factors of changes in global mortality and the burden of disease are the aging of the population and changes in exposure to risk factors (Ritchie & Roser 2018).

In the age category of 15–49 years old, it is seen that non-communicable diseases (NCDs) are beginning to dominate. Worldwide, the leading cause of death in this age group is cardiovascular disease, with an index of 1.34 million, followed by cancer with 1.1 million deaths. And in the age group of 50–69 years, cardiovascular diseases (5.14 million) also dominate among the causes of global mortality among noncommunicable diseases leaving behind such diseases as cancer (3.81 million), respiratory diseases and diabetes (1.03 million). For the oldest age category (70 years and older), cardiovascular diseases (11.11 million) still dominate. (Ritchie & Roser 2018.) This shows that mortality from CVD is becoming younger and affects the working group of the world's population and affects the welfare of a country.

Of course, the cause of mortality depends on the country since in each of them certain diseases prevail (Ritchie & Roser 2018). More than three-quarters of CVD deaths occur in low- and middle-income countries. Of the 17 million premature deaths (under the age of 70) from non-communicable diseases in 2015, 82% are in low- and middle-income countries, and 37% are caused by CVD. (Cardiovascular diseases 2017.) In 2012, cardiovascular disease (CVD) claimed 3.5 million lives in China, which accounted for 40% of total deaths (Wang 2012, according to Wan, Ren, Ma, & Yang 2018). In Europe, CVDs cause over four million deaths (Nichols, Townsend, Luego-Fernandez, et al. 2012, according to Veronovici et al. 2014). CVD is the cause in one case out of three in Canada and the USA (Veronovici et al. 2014.) According to the American Heart Association (AHA), it is the leading cause of death

for men and women of all racial and ethnic groups in the United States. Mortality from coronary heart disease decreased by 34.4% from 2005 to 2015, a decline by 27% is expected by 2030, however, racial differences will remain. According to the American Heart Association Council on Epidemiology and Prevention Statistics Committee and Stroke Statistics Subcommittee in 2018, in 2015, 17.9 million died of CVD, and by 2030 it is expected to grow to more than 23.6 million. (Benjamin et al. 2018.)

Although death rates from cardiovascular diseases in the United States (50 states and DC) decreased by 68% between 1968 and 2015 among persons 35 years and older, heart disease remains the leading cause of death in the United States. In 2015, about 630,000 people died of cardiovascular disease, which is one of four deaths in the United States (Van Dyke, Greer, Odom, Schieb, Vaughan, Kramer, & Casper 2018.) In the Heart Disease and Stroke Statistics Update, which is compiled annually by the American Heart Association (2018), the Centers for Disease Control and Prevention, and the National Institutes of Health and other government sources, cardiovascular diseases accounts for nearly 836,546 deaths in the US. That's about one of every three deaths in the US. About 2,300 Americans die of cardiovascular disease each day, an average of 1 death every 38 seconds. (Benjamin et al. 2018.)

Cardiovascular diseases represent a big problem for the health of the population and the country's economy (Benjamin et al. 2018). Cardiovascular diseases are a rather complex problem both socially and financially. This is a problem for families and the entire health system for each country. (Veronovici et al. 2014) About 92.1 million American adults are living with some form of cardiovascular disease or the after-effects of stroke. Direct and indirect costs of total cardiovascular diseases and stroke are estimated to be more than $329.7 billion in total; that includes both health expenditures and lost productivity. CVD and stroke accounted for 14% of total health expenditures in 2013–2014. Total direct medical costs of CVD are projected to increase to $749 billion in 2035. Heart attacks (12.1 billion dollars) and coronary heart disease (9.0 billion dollars) were two of the 10 most expensive conditions that were treated in US hospitals in 2013. Between 2013 and 2030, medical costs of Coronary Heart Disease are projected to increase by about 100 percent. (Benjamin et al. 2018.)

Johansson and colleagues (2017) refer to Moran et al. (2014), Mozaffarian et al. (2015), and Nichols et al. (2014) concluding that the leading place among the cardiovascular diseases (CVD) is occupied by coronary artery disease (CAD), two forms of which, acute myocardial infarction (AMI) and unstable angina pectoris (UAP), united by one name Acute Coronary Syndrome (ACS), represent the largest danger to the lives of patients. Coronary Heart Disease is the leading cause (43.8 %) of deaths attributable to cardiovascular disease in the US, followed by stroke (16.8 %), heart failure (9.0 %), high blood pressure (9.4%), diseases of the arteries (3.1 %), and other cardiovascular diseases (17.9 %). In the US, CVD accounts for one in seven deaths, killing over 366,800 people a year. Myocardial infarction (MI) in the US contributes to 7.9 million deaths (3%) in US adults. In 2015, 114,023 people died from heart attacks in the United States. The annual incidence of heart attack in the US is estimated at 720,000 new and 335,000 recurrent attacks. Approximately every 40 seconds, an American will have a heart attack. (Benjamin et al. 2018.)

Treatment of heart disease is one of the most important branches of medicine. In economically developed countries in the last three decades, there has been a clear downward trend in the cardiovascular diseases in the structure of total mortality (Malvezzi et al. 2018).

2.2 Kazakhstan's Mortality and Morbidity data of CVD

At the same time, Kazakhstan also ranks first in terms of mortality from cardiovascular diseases among the countries of the European Union, Central and Eastern Europe, and the Central Asian regions (Nogayeva 2014; Turlybekova, Rakhypbekov, Kotlyar, Khismetova, Khudayberdina, & Glushkova 2016). According to the data for 2011, the Republic of Kazakhstan ranks fifth in the world in terms of the standardized mortality rate from coronary heart disease, amounting to 417.1 per 100,000 population. Mortality from CVDs accounted for 52.8% of the total mortality of the population. (Turlybekova et al. 2016). According to the Ministry of Health of the Republic of Kazakhstan (2019), the mortality rate from CVD from 2010 to 2017 is decreasing throughout the country (in 2010 it corresponds to 403.99 per 100,000 people, in 2015 it is 193.8 and in 2017 it corresponds to 174.83). At the same time, the number of CVD diseases in the country, registered for the first time in their lives

per 100,000 people of the relevant population from 2010 to 2017, has increased (from the number of 2086.7 in 2010, increasing in 2015 to 2429.7, and rising in 2017 to 2595.7). (Ministry of Health of the Republic of Kazakhstan 2019. CVD Statistics of Kazakhstan from 2008-2017.)

The decline of CVD mortality in Kazakhstan occurs with the implementation of government programs in development of cardiac and cardiac surgery care; the introduction of effective methods of prevention, early diagnosis, rehabilitation of patients and disabled with CVD; training qualified specialists and etc. All the necessary help to cardiac patients is provided by the state budget. (State program of health care development of the Republic of Kazakhstan "Health" for 2016-2019 years.)

Today, an effective cardiological and cardiac surgery service has been created in the country. The creation of cardiac surgery centers in the regions and the availability of trained specialists has significantly increased the number of cardiac surgeries. Since 2010, a national screening program has been introduced in the country aimed at early detection and prevention of major socially significant diseases such as circulatory system diseases and oncological diseases. It provides access to specialized and highly specialized medical care. Screening studies have improved the detection of circulatory system diseases. (State program of health care development of the Republic of Kazakhstan "Health" for 2016-2019 years.)

In Kazakhstan, the number of patients waiting for open heart surgery is increasing (State program of health care development of the Republic of Kazakhstan "Health" for 2016-2019 years). In 2011, there were 6,547 open-heart operations (Development strategy 2012). In 2014, more than 70.0 thousand cardiac surgeries and interventions were performed in the country. During the implementation of the program "Salamatty Kazakhstan 2011–2015", the number of cardiac operations increased from 7,000 to 70,000 operations per year, which in turn suggests the need to increase the number of high-tech medical services provided. (State program of health care development of the Republic of Kazakhstan "Health" for 2016-2019 years.) About 14,000 open-heart operations in adults are performed in Kazakhstan annually. In 2016, it was 12.306, and in 2015, there were 10,456 operations in Kazakhstan. (Ministry of Health of the Republic of Kazakhstan 2019. CVD Statistics of

Kazakhstan from 2015-2018.) The result of this work is the reduction of circulatory system diseases (CSD) mortality in Kazakhstan. For the period 2010–2013, there was an increase in high-tech care for CSD, the number of coronary angiographies has doubled, stenting by 4.5% etc. The inplementation of advanced technologies in cardiology significantly reduced the level of complications and mortality from cardiovascular diseases, which led to an increase in the number of patients who returned to full-fledged work and active life. (State program of health care development of the Republic of Kazakhstan "Health" for 2016–2019 years.)

Increasing the number of patients leads to an increased demand of the volume of medical personnel, too (State program of health care development of the Republic of Kazakhstan "Health" for 2016-2019 years). Although the provision of medical personnel in Kazakhstan is tending to increase, the lack of human resources in the country still exists (Republican Health Development Center 2019). Therefore, it is very important to focus on developing competencies for nurses in cardiac surgery. It is worth considering their superiority in numbers in relation to doctors, and how effective this is from an economic point of view. Nursing reforms have been undertaken in many countries to improve the quality of care and reduce costs. (Republican Health Development Center 2019.)

Cardiovascular diseases are very common among people of working age in Kazakhstan. Consequently, the state of health of the population of the Republic affects the socio-economic development of Kazakhstan as a whole. (Nogayeva 2014.)

2.3 Current CVD Health Care Reimbursement Issues

Elderly people are a quickly growing part of the population in the world. Over 10 years, the proportion of operated patients over 80 years increased from 2.6–7% to 9.3–12% (Buth, Gainer,Legare, & Hirsch 2014, Pierri, Capestro, Zingaro, & Torracca 2010, according to Tamuleviciute-Prasciene, Drulyte, Jurenaite, Kabilius, & Bjarnson-Wehrens 2018). According to the Euro Heart Surveyon Valvular Heart Disease (VHD), patients with valvular heart disease (VHD) are often older, with a higher prevalence of other cardiovascular risk factors and comorbidities (Iung, Baron, Butchart et al. 2003, according to Tamuleviciute-Prasciene et al.2018). This age category of heart

surgery patients are considered complex group of patients (Buth et al.2014, Pierri et al. 2010, Afilalo, Eisenberg, Morin et al. 2010, according to Tamuleviciute-Prasciene et al.2018). Considering that the average life expectancy of a person averages 80–88 years, the functional reserve in these patients is lower, and there are numerous diseases that can lead to serious complications (Rosborough 2006). Most of these operations are performed for elderly patients, which suffer from left ventricular dysfunction, diabetes mellitus, arterial hypertension, obesity, and hyperlipoproteinemia (McCarthy & Cosgrove 2019). Innovations in the methods of heart surgery (Gilmanov, Farneti, Ferrerini et al. 2015) and advanced anesthesiology have reduced the risk in elderly patients (Pierri, Capestro, Zingaro & Torracca 2010). However, elderly patients still have a high mortality rate, more frequent complications, and a longer hospital stay after surgical interventions (Buth et al.2014,Pierri et al.2010, Afilalo et al.2010, according to Tamuleviciute-Prasciene et al. 2018.) The success of such operations directly depends on the conduct, technical equipment during the operation, as well as on the quality of the postoperative period (McCarthy & Cosgrove 2019).

The modern level of development of cardiovascular surgery and extensive experience of operations allows to predict risk of operations depending on an initial condition of the patient, the nosological form of a disease accompanying pathology of other factors (Nashef, Roques, Michel et al. 1999, according to Roques, Michel, Goldstone, & Nasher 2003). As a result, the European Heart Risk Assessment System (EuroSCORE) was created. The main purpose of this assessment is to identify risk factors necessary to predict the frequency of mortality in the results of surgical interventions on the heart (Nashef, Roques, Michel et al. 1999, according to Roques, Michel, Goldstone, & Nasher 2003). EuroSCORE has been widely used in Europe and many other countries since 1999 (Roques et al. 2003). Nowadays, both the European System for Cardiac Operative Risk Evaluation (EuroSCORE) logistic (ESL) and EuroSCORE II (ESII) models are used worldwide in predicting in-hospital mortality after cardiac operation but are based on different populations (Czub, Cacko, Gawałko, Tataj, Poliński, Pawlik, Cichoń, Hendzel, & Rosa 2018). For example, only one state, frailty, is a predictive factor of mortality, incidence, serious complications,

functional decrease, quality of life, and risk a delirium after the procedure (Tamuleviciute-Prasciene et al. 2018).

Costs of the patient with long stay with infection of post-surgical wounds of the lower extremities in the postoperative period twice exceeded average postoperative lengths of stay (LOS) compared to those who had a successful heart operation (13.1 days against 7). The same patients had five times higher probability of repeated readmission (relative risk = 5.4) and had repeated hospitalization lasting nearly three additional weeks (18.8 days). (Pear & Williamson 2009.) By reducing preventable complications, such as an infection, medical institutions reduce the expenditure spent on the patient, thereby improving the length of stay (LOS). In order to avoid side effects, surgical experience is important since more experienced surgeons have better results (Pear & Williamson 2009). Due to the high level of requirements for professional, scientific, technical, and organizational support, modern cardiac surgery is the basis of the progress of healthcare (Jaarsma, Deaton, Fitzsimmons, Fridlund, Hardig, Mahrer-Imhof, Moons, Noureddine, O'Donnell, Pedersen, Stewart, Stromberg, Thompson, Tokem, Y. & Kjellstrom, B. 2014).

The economic crisis has affected the labor force, led to a pay cut, and a reduction in the number of medical personnel. Common to many OECD countries is the shortage of health workers in certain regions, for example, in villages and remote areas. So, the role of nurses has needed to expand. For this reason, it is important to focus on developing new competencies for nurses. This is an urgent task of public health. (Maier, Aiken & Busse 2017.) Nursing is one of the largest groups of personnel in the health service, so it must be taken into account how much resources are allocated. The public health service is under pressure to improve medical care while keeping costs low. (Balsdon & Wilkinson 2014.)

In many OECD (Organization for Economic Cooperation and Development) countries, reforms have been carried out for nurses to improve access to care, quality of care, and reduce costs. These reforms increase interest both in the personnel area of health care and in improving medical care itself and reducing its costs. Most of the OECD and EU countries have implemented and expanded the scope of practice of certain groups of nurses, and they have carried out educational programs that are part of higher education institutions. But so many countries are still at the initial

stage of implementation, and the roles of nurses differ from skills and their responsibilities. There are two concepts: task-shifting and task supplementation. First, task-shifting refers to nurses or other non-medical professions engaging in clinical activities traditionally performed by doctors. After additional training, nurses perform actions previously performed by doctors to reduce the burden on doctors and improve access. Secondly, nurses can also work in new or additional roles in clinical areas. (Maier et al. 2017.)

Given the economic downturn and the shortage of surgeons with the growth of patients, this may further increase the demand for this specialty of nurses (Pear & Williamson 2009). There are new models of assistance to improve coordination, integration, and teamwork. In many countries, the level of qualifications and professions of health workers is changing. New advanced nursing practices are being developed, including among nursing staff. (Maier et al. 2017.) Also, if we talk about another reason for the introduction of new roles, this includes more efficient use of resources of nursing staff and assistance in streamlining the provision of services (Lowe, Plummer, & Boyd 2013). This universal nursing role would help ensure public safety (Desrosiers 2008).

By 2015, the shortage of doctors in America was projected to be about 63 000, yet at the same time, 32 million Americans would receive medical insurance, and quickly aging and patients with chronic diseases would increase. In this regard, the practice is gaining momentum in hiring nurse practioners and phycisian's assistants (NPs and PAs), clinicians who do most of the same work as a doctor and for half the cost. Especially in rural areas, NP and PA are the main suppliers of patients; this is the opportunity to spend less on the services of a doctor. Savings are achieved by reducing wages and liability insurance, the ability to add more patients to the schedule, and the ability to free up doctors to perform higher-risk procedures. Cost recovery also works in favor of a hospital that uses advanced practice nurses and NPs. By delegating responsibilities to nurses, such as daily rounds and receiving moderate-risk patients, the doctor can take care of patients with higher risk, with more severe situations requiring sometimes medical interventions and procedures. Advanced practice nurses can take a patient and help the patient in an emergency when a doctor is called to several hospitals. Those medical-surgical institutions,

where hiring a doctor can take a year or two, are especially in need of NP and PA. (Lowe et al.2013)

In the past, the advanced roles of nurses evolved gradually and due to various barriers, such as the limiting legal framework concerning the volume of practice of nurses and strong opposition from medical associations. Delegating some responsibilities of doctors to nurses reduces the load of doctors, enables the possibility of career development for nurses, and the continuation of a scientific career that in turn will improve the provided medical care in the country. The world practice shows that where professional nurses (category of registered nurses) work, mortality decreases, and outcomes of care of diseases are much better. (Maier et al. 2017.) RNFA program can later retrieve all expenses spent (Pear & Williamson 2009, Fraser & Melillo 2018).

3 Nurses working in Advanced roles

Nurses working in advanced roles take many forms. Roles are often not clear because practice areas are varying and there are many specializations (Maier et al. 2017). Hamric (2009) created one of the first conceptual APN models, which consists of seven competencies: clinical practice, expert guidance and coaching of patients, families and other care providers; consultation; collaboration; research; leadership. The seven general characteristics of APN have been defined by Mantzoukas and Watkinson (2007). Those characteristics are the use of knowledge in practice, critical thinking and analytical skills, clinical judgment and decision making, professional leadership and clinical research, coaching and mentoring, research skills and practice change. (Mantzoukas & Watkinson 2007, Hamric 2009, according to Wisur-Hokkanen et al. 2015.)

Nurses in advanced roles can be defined as “nurses working in advanced roles beyond the traditional registered nurses’ (RN) scope-of-practice, after additional training” (Maier et al. 2017). Some countries use the general term by the International Council of Nurses (ICN). According to the ICN, “A Nurse Practitioner/Advanced Practice Nurse is a registered nurse who has acquired the expert knowledge base, complex decision-making skills and clinical competencies for

expanded practice, the characteristics of which are shaped by the context and/or country in which she/he is credentialed to practice (ICN International Nurse Practitioner 2005; Maier et al. 2017). This definition is internationally recognized (International Council of Nurses 2002). Also Advanced Practice Nurses (APNs) are defined as nurse practitioners, clinical nurse specialists, certified nurse midwives, and certified registered nurse anesthetists (Sharp 1995).

According to US health care resources, by 2020 a shortage of primary care physicians (PCPs) will amount to 20,400 (The U.S. Health Resources and Services Administration (HRSA)2013, according to Fraser & Melillo 2018). Advanced practice registered nurses (APRNs) can be used for acute shortages of PCPs performing doctors' work by 90% (Bauer 2010, according to Fraser & Melillo 2018). In order to get a general idea of the patient's overall health, the APN carefully monitors the patient's health and functional problems. The goal is to gain a significantly deeper understanding of the patient's health problems, than was previously the case with a registered nurse (RN) (Wisur-Hokkanen et al. 2015). Advanced practice nurses can also perform telephone counseling. Telephone consultations with these nurses significantly increased the number of patients undergoing screenings (Nathan, Greenberg, Ness, Hudson, Mertens, Mahoney & Oeffinger 2008, according to Cox, Andersen, Santucci, Robison & Hudson 2016). It is noted that there was a significant reduction in mortality and cardiac arrest occurring in hospital outside the intensive care unit (ICU) when APNs were in rapid response teams (Morse, Warshawsky, Moore & Pecora 2006, according to Kleinpell 2007). Patients were very pleased with the APN services (Green & Davis 2005, Wilson, Shifaxa 2008, according to Wisur-Hokkanen et al. 2015). Young parents with children preferred to see the APN, because the APN spent more time explaining self-service information, the children were less afraid of the APN than the general practioners (GPs), the elderly often preferred to contact the APN, because the APN spent more time listening and gave a clearer explanation of the reasons for poor condition. In this work, teamwork is needed. Collaboration with general practitioners is important in the development of APN roles. (Wisur-Hokkanen et al. 2015.)

The APN group is made up of very different occupations that face different conditions in the labor market, its largest and most care-oriented subgroup being NP. Nurse practitioners are well positioned to manage care environments and assist in

restructuring care in line with patient needs and organizational goals. (Perry 2009.) In some cases, NP and PA are usually called mid-level providers, although The American Academy of Physician Assistants, the American Academy of Nurse Practitioners and several other organizations' practitioners argue that this terminology means a lower level of service and prefer the name 'advanced practice providers'. Basically, the practical activities of NP and PA overlap, as they both undergo training in diagnosing and treating diseases, prescribing tests or therapy, counseling patients and their families, and prescribing drugs. As mentioned above, the law obliges the physicians to control their activities; but in some states, NPs are licensed to practice independently. Both NP and PA have educational and professional experience, and they easily adapt to clinical needs, regardless of whether they had previously held positions in previous roles as RNs. PA or NP can provide timely medical care to the patient, make a diagnosis, decide the need and duration of the patient's stay and expectations in the clinic. (Frellick 2011.) Both as NP and PA are usually considered substitutes for each other. The quality of NP and medical care is similar, and the existing potential cost savings creates competition between these specialties (Perry 2009). By 2006, many states had authorized NPs and PAs. NP and PA for a long time observed and advised patients, kept all medical documentation and made recommendations for diagnosis and treatment. However, without clarity of the powers prescribed by law, this category of persons is limited in the provision of medical care which they can provide in its full scope, if necessary. Having received the full prescription, NPs and PAs, they could provide medical assistance to patients without the participation of a physician. (Perry 2009.)

In some countries, such as Ireland, New Zealand or Australia, NPs are generally working in more advanced clinical and leadership roles than other APNs, such as Clinical Nurse Specialists (Maier et al. 2017). CNL also provides direct care in difficult patient care situations (Rusch & Bakewell-Sachs 2007). One of the successes of modern health care in England is the role of the CNS. Regardless of their specialization, CNS have a high degree of clinical expertise, innovation, leadership and continuity of medical care in their individual work with patients, as well as commitment to technical management, audit and thorough documentation. In addition, although roles differ from different people and different specialties, it is

becoming increasingly clear that the CNS assumes responsibilities such as clinics before and after treatment, diagnosis, treatment decisions and prescription, which were previously the prerogative of medical colleagues. They also provide mentoring, formal and non-formal education, as well as training for other medical personnel, including associate physicians (Young 2012). The CNS has both psychiatric and medical/surgical experience. The responsibilities of the CNS include: rounding patients, prescribing a care plan, holding conferences for caring for patients, consulting at the patient's bed, training staff, supporting staff morale and protecting the interests of patients (Linck & Phillips 2005). As previously it was said that nurses in advanced positions have many forms, and the CNS has its own sub-specialties as Gerontological Clinical Nurse Specialist (GCNS). This specialty is aimed at planning the discharge of elderly patients. Previously, this program was developed and implemented by one of the GCNS specialists. In Neidlinger and colleagues' (1987) study, patient's health status, orientation level, knowledge/perception of health status, resource use pattern, functional status, skill level, level of motivation, and demographic data were considered. Summarizing all the information gathered, potential care needs were considered. The variables analyzed in this study included payments related to Diagnostic-Related Group, treatment costs, and the amount of time GCNS spent on the discharge plan. Two groups of 39 experimental patients and a control group of 41 patients were created, and they came to the conclusion that the experimental group saved $911 per patient for the hospital. Positive economic efficiency of the CNS services was proved (Neidlinger et al. 1987, according to Maxon & Guthmiller 1998). For the success of the implementation of the role of CNL, the totality of practice and education is of paramount importance (Rusch & Bakewell-Sachs 2007).

ANPs work in more severe conditions than traditionally emergency nurse practitioners (ENPs), sometimes first aid in the admission department of the hospital was the same because of the nature of work of Emergency Department. ANP practices autonomously, regardless of the physician. According to Morgan (2017), this role of the ANP was introduced and developed due to the lack of trainee doctors in the ED. APNs have the right to document patient records using the correct medical terms, as well as order laboratory tests and, based on the medical history and

physical examination, independently analyze the results and make a differential diagnosis. In their role, RNs simply collected information from patients, and then referred patients to a general practitioner doctor (Wisur-Hokkanen et al. 2015).

In Australia, nurses who perform the role of surgical assistant is one of non-medical surgical assistants (Hall, Quick, Hall & Jones 2014, Quick, Hall & Jones 2014, Morgan 2010, Mumford & Haas 2014, Kneebone, Nestel, Chrzanowska, Barnet & Darzi 2006, Independent Healthcare Advisory Services 2006, Quick 2013, according to Smith, Hains & Mannion 2016) have been practiced for in excess 15 years (Brennan 2001, according to Smith, Hains & Mannion 2016). The physician nurse surgical assistant (PNSA) was role established in 2001 (Smith & Mannion 2015, according to Smith, Hains & Mannion 2016). PNSA may attain graduate master's degree certificate or graduate diploma level if desired (School of Health and Human Sciences 2014, according to Smith, Hains & Mannion 2016). For convenience in this paper, both the roles of the PNSA and the PNP will be referred to as PNSA (Smith, Hains & Mannion 2016).

Particular attention is paid to RN although NPs are also RNs (Perry 2009). RNFA is one of physician-extenders, which was created to fill the lack of human resources and financial nature in many medical institutions (Zarnitz & Malone 2006). New APN roles should be developed in accordance with the needs and culture of each country (Schober & Affara 2006, according to Wisur-Hokkanen et al. 2015).

3.1 Development of RNFA role

The role of the Registered Nurse First Assistant is not new. This role has been played by nurses since the days of Florence Nightingale and the Crimean War (Bukowiec & Kelly 1999). In the past, victims of conflict and war have influenced the development of the role of nurses who help in surgery. With field stations under constant threat of attack and growing casualties, the army nurse assumed many of the roles of the surgeon and assisted in surgery. The mortality rate of World War II was decreased by 50% in comparison to World War I, thanks to the expansion of nursing and medical skills, as well as new medical technologies. During the Korean War, nurses were constantly expanding the role and importance of RNFA in mobile hospitals. Thus,

assistance was provided before, during and after the operative interventions. (Zarnitz & Malone 2006.)

In the 1960s, nursing practitioners (NP) were introduced in the United States and further developed in many countries (Carryer et al. 2007, according to Lowe et al. 2013). In the United States and Canada, nursing practitioners (NP) and other nursing care posts (APNs) were appointed in the mid-1960s. Due to lack of medical personnel, NPs worked as doctor general practitioners (Maier et al.2017).

In 1965, at Duke University, a training program for a physician assistant was developed and then the role of cardiothoracic surgeon assistants became important. After the changes in resident housestaff duty hours in 2003, there has been resurgence in the need of Physician Assistants (PAs). Cardiothoracic surgery has historically resorted to the help of PAs ın preoperative, intraoperative, and postoperative care. (Thourani & Miller 2006.)

In 1973, in a Duke University PA program, began the training of two-personnel on cardiothoracic surgery, at that time the number the cardiothoracic operations were 250 per year. During 30 years, the number of university clinics increased up to five, and the number of adult and children's cardiac operations became 3000 in a year. In 30 years, 23 PAs graduated. Eleven PAs (47.8%) remained and worked in office of cardiothoracic surgery more than 15 years. The satisfaction with RNFA work remains high. (Thourani & Miller 2006.)

The role of RN First Assistant (RNFA) has evolved due to changes in the medical care system and increased attention of insurers in its cost-effectiveness. Since 1979, a registered nurse has been assisting the patient by performing surgical and invasive procedures when the physician is absent. Many large professional organizations, such as the American College of Surgeons (ACS); the Association of Operating Room Nurses, Inc. (AORN); the American Nurses' Association (ANA); the National League of Nurses (NLN); and the National Association of Orthopedic Nurses (NAON) recognize the role of the RNFA. Currently, the role of the RNFA is recognized in nursing practice by all 50 state medical commissions. In 1985, this role was first recognized in Louisiana after the adoption of the “Guidelines of the RNFA”. In 1998, these guidelines were revised to become the “Declaratory Statement for RN First

Assistants" (Allen 1998). In 1998, the American College of Nursing Midwives supported the introduction of the role of midwives as first assistants in caesarean sections proposed by Moes and Thacher (2001) (Zarnitz & Malone 2006).

By implementing nonphysician healthcare provider in cardiothoracic surgery in 1973, were improvement in job stability, the need for these specialists, cooperative work with cardiothoracic residents and nurses, job satisfaction and the learning and effectiveness of cardiovascular surgical services, and even after 30 years of practice, any doubt of PAs work. (THE MEANING OF THIS SENTENCE IS UNCLEAR, PLEASE REPHRASE.) Now the question is whether surgeons and medical institutions can afford to replace residents by PA, because residents have limited working hours. One solution is to develop surgical PA further. Creation of "Doctor's Assistant" residency programs was previously described and, as has been shown, to allow the approved programs of resident surgeon doctors to analyze the needs of the workforce. In general, cardiothoracic PAs are very important team members. Adding the PA to surgical service solved many problems of work distribution and coverage and also to create efficient and effective cardiovascular and chest surgery groups in various university hospitals system. (Thourani & Miller 2006.) In 1977, when the American College of Surgeons issued documents supporting RNs as an assistant in surgery, the role of the first RN assistant was recognized, but there is still a lack of literature describing the results of the work of the first RN assistants (Smith 2011).

In the mid-1990s, there was a shortage of doctors and resident surgeons in Canada, and a group of NP nurses was created. Initially, they were placed in the provinces of Canada, where there was an acute shortage of doctors, but the goal was not to replace doctors with them, but so that their activities were based on care. Sometimes NPs took on new tasks that were previously performed by doctors. (Reay, Golden-Biddle, & Germann 2003.)

In 50 states, the RNFA is practiced. According to the literature, RNFA as a provider of surgical care can be reimbursed by insurance companies for services rendered at a much lower price to consumers and the insurance industry without compromising the quality of patient care (Jansky 2001). RNFA role has been supported by the American College of Surgeons since the 1980s. The Nurses Operating Association (AORN, Inc.) adopted the first official application for the First Assistant to RN in 1984

(Bukowiec & Kelly 1999). In 2000, Québec led the way among Canadian provinces, deciding to recognize the delegation of medical certificates from the nurse first surgical assistants (NFSA), in line with trends in North America (Desrosiers 2008). Between 2005 and 2015 in six countries (Australia, Canada, Ireland, the Netherlands, New Zealand, and the USA), there was a steady and significant increase in the NP workforce, as well as a growth rate among medical professions in all countries (Maier et al. 2016). According to the OECD 2016, from 2005 to 2012 in the USA, the number of NP graduates increased from 6,900 to 14,000 graduates per year, and according to the Canadian Institute of Medical Information 2016, in Canada from 2005 to 2014, from 178 to 449. In other countries, the introduction of NP occurred a little later, for example in the Netherlands in 1997, in Australia in 2000, Ireland and New Zealand in 2001, and Finland in 2003. Countries like Austria, Belgium, Croatia, Cyprus, France, Germany, Iceland, Lithuania, Sweden, Norway, Switzerland, Israel and others are in the early stages of developing the role of NP/APN. In 2015, Australia, Canada, Finland, Ireland, the Netherlands, New Zealand, and four parts of the United Kingdom (England, Northern Ireland, Wales, Scotland) and the United States already had existing NPs and/or other APN roles. What it says is that there has been a huge shift in tasks that led to a significant expansion of the practical level of NP. (Maier et al.2017.)

Federal regulations have established restrictions on the working hours of resident doctors and surgical residents. Therefor, the need for NPs and physician assistants (hereinafter referred to as PA) with surgical skills has increased. (Zarnitz & Malone 2005, Herrick 2005, according to Zarnitz & Malone 2006.) Eighty-seven percent of thoracic residents believe that the number of trainees should be reduced since 20% did not find work after graduation (Salazar, Lee, Wheatley and Doty 2004, according to Thourani & Miller 2006.). Mutual understanding of residents with the PA did not cause problems since the PA freed the residents from many routine tasks, freeing up more time to spend in the operating room, but also to participate in the care. (Thourani & Miller 2006.)

Given the shortage of nurses, the Quebec Federation of Medical Specialists (FMSQ) proposed to introduce in Quebec a new category of operating personnel as instrumentalists. However, heart surgeons and orthopedists continue to call for

nurse first surgical assistant (NFSA). The whole situation is confusing, as the operating rooms are under pressure to reduce waiting time, the shortage of nurses (and doctors) seems to be permanent, and hundreds of young nurses will have to be trained to work in the operating rooms. And in private clinics the current rules regarding NFSA will not apply. (Desrosiers 2008.)

Nowadays, there are clinics headed by nurses, and the profitability of these clinics is not disputable. The main factor in this specialty is to work as a team since it is not a competition among staff in the first place but professional coherence of teamwork to provide high-quality assistance (Pearce & Breen, 2018).

3.2 Duties of RNFA

Nurses, like no one else, monitor patients in hospitals around the clock for early detection of a patient's deterioration when surgery is necessary. It can be said with certainly that the effectiveness of nursing observation is crucial in-patient care (Linck & Phillips 2005). Well trained nurses can provide an appropriate level of care at least (Thourani & Miller 2006). Possessing the knowledge and skills advanced clinical practitioners (ACPs) have the authority to make decisions in the assessment, diagnosis and treatment of patients (Pearce & Breen 2018). According to the literature, patients receiving APN treatment have less readmission for heart failure and spent less days in the hospital (Bergman, Perhed, Eriksson, Lindblad & Fagerstrom 2013, Fagerstrom 2013, Kleinpell 2009, according to Wisur-Hokkanen et al. 2015). The duties of the RNFA is to assist the surgeon with intra-operative procedures and provide direct care to patients using the nursing process pre-operatively, intra-operatively, and post-operatively (Zarnitz & Malone 2006).

In the preoperative period, RNFA is responsible for conducting interviews and taking history, conducting physical assessments of nurses, training and providing emotional support, as well as assessing the needs of the patient and the surgical team throughout the surgery (Jansky 2001). Nurses have main role in preoperative education, helping patients and their relatives prepare to the operation and self-management after discharge (Fredericks, Ibrahim & Puri 2009, Moore & Dolansky 2001, according to Veronovici et al. 2014).

After completion of the preoperative evaluation, a patient-oriented nursing care plan is prepared (Wentzell & Neff 2015). The RNFA performs an expanded role as the first surgical assistant and works in collaboration with the surgeon and other health care team members to achieve optimal patient outcomes; has acquired the necessary knowledge, judgment, and skills specific to the expanded role of RNFA clinical practice; and intraoperatively practices at the direction of the surgeon (Ogg, Burlingame, & Chambers 2015). Such status of the assistant assumes unconditional knowledge of both the patient, and features of the planned operation. The production operations team involves sufficient coherence, harmony and automatism in the joint execution of the entire sequence of operational techniques. Ideally, the assistant should not only know the course of the operation and perform his intended techniques, but also be able to do this operation as a surgeon. It is then that he will be able to mentally put himself in the place of the operator and best help him, especially in critical cases. In a well-coordinated team, the surgeon does not give instructions to the assistant, who foresees the sequence of actions of the operator in any situation and does everything necessary in a timely manner. Based on these considerations, it is advisable to complete the permanent surgical teams, which provides the highest operational technique (Hi 1990,2).

Surgeons are forced by various circumstances to operate, even without having a qualified assistant. Such assistants may be doctors without surgical training, medical students, nurses and Junior medical staff, and even random people. In some cases, it turns out the doctor's only and best assistants are from the middle medical staff. Experienced operating nurses, long time working with the same surgeon in small hospitals, perfectly cope with such a double role. At the same time, the surgeon develops a peculiar style of work and unconventional techniques (Hi 1990, 13). This role allows such nurses to perform clinical and technical activities: use surgical instruments during surgery, exposing the operating area, safe handling of fabrics, performing hemostasis, dissecting tissue, and help close incisions (Desrosiers 2008).

In the operating room, all efforts are made with a team of anesthesiologists, nurse circulators, surgeons, RNFAs and scrubs to improve the effectiveness by minimizing surgery time and complications. Even to place the patient in the correct position before the start of the operation is important for the achievement of good results.

(Wentzell & Neff 2015.) RNFA is practiced under the supervision of a surgeon during the intraoperative period and the phase of perioperative experience. RNFA does not function simultaneously as a nurse. The scope of the RNFA practice is a further improvement in the practice of perioperative care and is carried out in the context of the care process. These behaviors may include: handling tissues, providing exposure, using tools, stitching, and providing hemostasis. This behavior varies depending on the patient population, financial resources, conditions of practice, and state practitioners of nursing practitioners (Jansky 2001). RNA during surgery is responsible for providing exposure, hemostasis, suturing, tissue processing, and other technical functions that assist the surgeon in safely completing the operation (Bukowiec & Kelly 1999). The RNFA should use both direct and peripheral vision to anticipate appropriate actions. In addition, the surgeon's body language and the movement of the instruments telegraph cues to the RNFA (Allen 1998).

A surgical NP as RNFA has the opportunity to gain knowledge about the surgical environment and surgical procedures and anatomy. It includes all perioperative phase as the preoperative, intraoperative and postoperative periods. They include anamnesis, physical examination, preparation of a care and treatment plan, preoperative and postoperative patient education and diagnostic activities before operation. Medical history and current tasks, problems, medications, allergies, social datas, examinations, scans, research and laboratories, consultations of experts, learn to determine the risks for a patient going for an operation. (UNCLEAR SENTENCE) The RNFA is a member of the preoperative team. The NP, who received the qualification of RNFA, has critical knowledge, experience, and skills to assess the factors of surgical risk and to ensure the quality of preoperative education and patient preparation. In the intraoperative period, those who receive RNFA skills receive training in sterile techniques, patient safety, surgical risks, wound classification, pathogens and the operating environment, skills in the use of instruments and medical equipment, and many intraoperative surgical procedures, such as tissue processing and preparation, tissue incision hemostasis, grip, retraction, exposure, clamping, ligation and suturing during surgery. (Zarnitz & Malone 2006.)

The operating room is where the risk factors for patients are high: 51.4% of adverse events are associated with surgical treatment (in perioperative rooms), and in 37% of these complications can be avoided. Nurses should master a wide range of knowledge and skills needed for various types of surgery, aseptic control, infection prevention, compliance with environmental standards, safe use of a huge variety of devices, an operating and rehabilitation room, pharmacology, and clinical monitoring in the immediate postoperative period (Desrosiers 2008). To minimize postoperative back pain, the team may place a pillow under the back of the patient's knees. Time saved during the procedure translates to shorter surgical time, reduced anesthesia and recovery times, reduced costs to the hospital, and a better outcome for the patient. To interact with the environment and surgeon in a way that promotes a smooth-flowing rhythm, the RNFA must understand anatomy, optimal patient positioning, and the steps of the surgical procedure, in addition to the surgeon's specific preferences (Allen 1998). As summary, it can be stated that if nurses are adequately trained, they can provide at least corresponding level of care as physicians. Patient satisfaction is associated with the fact that nurses, as a rule, provide more information to patients, give repeat consultations, and spend more time than doctors, which in turn leads to significant savings. (Maier et al 2017.) RNFA answers patient's and family's questions and reinforces patient teaching as needed (Wentzell & Neff 2015). Nurses teach patients how to effectively manage postoperative symptoms after they are discharged home (Veronovici et al. 2014). Different literature data show that the provision of patient education (preoperative inpatient, postoperative outpatient) does not differ. But Shuldham (2001) and Goodman et al. (2003) reported that conducting training for discharge before surgery more effectively helps patients and caregivers deal with acute and chronic health problems (Shuldham 2001, Goodman, Peters, Matthews et al. 2003, according to Veronovici et al.2014). Careful monitoring, adequate treatment and an ideal time for surgery and intervention are key to successful treatment of valvular heart disease (VHD) (Tamuleviciute-Prasciene et al. 2018).

Surgical Nurse Practioner is involved in assisting both in surgery and also in post-operative patient care. NP received training in the specialty of RNFA, who assisted in the operation, knowing about the past surgical procedure, has enough knowledge to

assess the patient's condition after the operation (Revised AORN Official Statement on the RNFA 2004, Vaiden, Rothrock & Fox 2000, according to Zarnitz & Malone 2006). The RNFA assists the surgeon in performing the surgical procedure from preoperative assessment to surgical intervention, recovery and discharge of the patient. This expanded role of perioperative nursing care requires special education and training to perform the skills and obtain the judgment necessary for safe care with optimal results for the patient. The RNFA practice is part of a specialized perioperative care practice. The use of RNFA depends on the practice environment, the required services, the availability of institutional staff policies and professional actions. RNFA works closely with the surgeon and patient. Under the supervision of a surgeon during the intraoperative phase of the operation, the RNFA does not function simultaneously as a scrub. RNFA processes fabrics, uses tools, provides hemostasis and suturing. Being an educated, certified and licensed professional, RNFA can provide a multi-purpose solution for our health crisis that is in line with the modern philosophy of health care reform. Many interested consumers of healthcare sometimes demand that they use the services of RNFA (Allen 1998).

After surgery, RNFA helps to safely deliver the patient to the PACU, communicates with the appropriate medical staff and family, performs follow-up, discharge planning and post-operative training. RNFA demonstrates the ability to work as a scrub nurse; applies the principles of asepsis and infection control; possesses knowledge in the field of surgical anatomy, physiology and operational techniques associated with operating procedures; is able to perform CPR; is able to work effectively in stressful and emergency situations; is able to recognize security threats and take appropriate preventive and corrective actions; effectively and consistently speaks with other members of the operational team; and meets the requirements of statutes, rules and institutional policies relating to the RNFA. (Jansky 2001.)

Of course, as in many countries there are some limitations in abilities in the management of heavy patients (Linck & Phillips 2005). There is not a unanimous opinion on whether cost savings come at the expense of lower wages or the level of reimbursement for nurses (Maier et al. 2017). But, for example, in 2014 the Australian College of Perioperative Nurses (ACORN) updated standards about the nurses' vocation with responsibilities in surgical assisting. According to the Physician

Nurse Surgical Assistant (PNSA) standards, they provide surgical care for the preoperative, intraoperative, and postoperative patient care (Smith et al. 2016).

In the conclusion, there is a wish to note that the future provides exciting opportunities for highly qualified nurses (APNs), one of which is the participation of a nurse as a first assistant during an operation. In 1990, when the United States Congress included first aid and reimbursement for the APNs performing this task, teachers of the programs that train the RNFA studied redesigning curricula, and strategies to prepare the APN for this role. Traditionally, the RNFA has been defined as a perioperative nurse who is certified as a nurse in the operating room (CNOR). Enrolling APN students in RNFA programs, often without such empirical readiness, required that the curricula of educational programs be adapted to prepare the APN as a safe and qualified assistant for operations. Using assessment and correction of competencies, along with a curriculum model that includes the development of knowledge and skills in basic methods of perioperative care, the RNFA programs prepare an APN with a broad knowledge of surgical care for patients, an expanded base of skills in perioperative procedures, and critical thinking skills to perform the role of a first assistant during the operation. Competency assessment and competence acquisition: the advanced practice nurse as RN surgical first assistant (Rothrock 2005).

Expert RNFA care expedites the perioperative process and may considerably improve patient safety in the OR and beyond (Zarnitz & Malone 2006). RNFA collaborates with all members of the patient care plan team. This allows the surgeon to concentrate on the operation and its duration as much as possible. This increases the efficiency of caring for a cardiac patient. (Rozakis 2014).

4 Purpose, Objective and Research Questions

The purpose of this study was to determine the feasibility of creating the Registered Nurse as surgical first assistant in adult cardiac surgery for improving care for persons with cardiac surgical needs in Kazakhstan.

The objective of the research was to identify the determinants (competencies, education, benefits, and inhibiting factors) of implementing Registered Nurse as surgical first assistant in adult cardiac surgery worldwide.

The research question was:

"What are the determinants of implementing the Registered Nurse Surgical First Assistant (RNFA) for improving adult cardiac surgery care worldwide?"

5 Methodology

5.1 Selection of Research Methodology

Fourteen types of literature reviews were identified by Grant and Booth in 2009 and the "scoping review" is one type of them (Grant & Booth 2009, according to Khalil et al. 2016). Although it was first published in 2005 by Arksey and O'Malley, it is a new methodology, which still does not have a definitive method (Anderson, Allen, Peckham, & Goodwin 2008, Davis, Drey & Gold 2009, Levac, Colquhoun & O'Brein 2010, according to Khalil et al. 2016). In 2010 Levac, Colquhoun and O'Brein widened the framework proposed by Arksey and O'Malley by giving details of each scoping review stage, thereby improving its clarity and ~~severity~~ affectiveness (Levac, Colquhoun, & O'Brien 2010). Furthermore, both of the above frameworks are used in the Joanna Briggs Institute (JBI) approach in providing scoping reviews (The scoping review framework 2019).

A scoping review is an increasingly popular approach to summarizing scientific data (Davis, Drey & Gould 2009, Levac, Colquhoun, O'Brien 2010, Daud, van Mossel & Scott 2013, according to Pham, Rajic, Greig, Sargeant, Papadopoulos & McEwen 2014). It aims to study the existing literature in the field of interest, within the interests of the volume, nature, and characteristics of the primary research (Arksey & O'Malley 2005, according to Pham et al. 2014). This method is useful in cases where the interested topic was not thoroughly or widely reviewed or has a complex or heterogeneous character that is not amenable to a more accurate systematic review (Khalil et al. 2016). In the thematic area, it is commonly used to research the range, extent, and nature of research activities; to determine the value and scope of a full

systematic review, to summarize and disseminate research results, to identify gaps in research and in all existing literature (Arksey & O'Malley 2005, Levac et al.2010, according to Pham et al. 2014). Evaluation of the voluminous literature on a specific topic can provide further research in this area and be a useful addition to world knowledge (Khalil et al. 2016). Therefore, sometimes scoping reviews are also called "mapping" reviews (Anderson et al. 2008, Arksey & O'Malley 2005, Ehrich, Freeman, Richards, Robinson & Shepperd 2002, according to Khalil et al. 2016). It can be said that by mapping research areas, the scoping review can be used as a first step to conduct a systematic review (Arksey & O'Malley 2005, according to Pham et al. 2014). A scoping review seeks to provide a large amount of diverse literature for a broad topic, including a wider range of research plans and methodologies or the research. The purpose of the scoping review is to compare the literature by the subject area. A scoping review provides a descriptive review of material without critically evaluating individual studies or summarizing data from various studies (Arksey & O'Malley 2005; Brein et al. 2010, according to Pham et al. 2014).

A scoping review provides a preliminary assessment of the available literature by identifying the nature and amount of scientific data (Grant & Booth 2009). Scoping reviews are "[e]xploratory projects that systematically map the literature available on a topic, identifying key concepts, theories, sources of evidence and gaps" (Canadian Institutes of Health Research 2019).

There are numerous reasons of conducting scoping reviews (Why a scoping review? 2019), but main four common reasons were identified by Arksey and O'Malley in 2005. Firstly, to study the scale, spectrum, and character of research process while mapping research areas, to facilitate visualization of the material's range. Secondly, to determine the possibility of conducting a full systematic review. Thirdly, to summarize and disseminate the results of research, for consumers with not enough time for independent work. Fourth, to identify gaps in the literature and quality of the study. These 4 types suggest 2 approaches to the role and purpose of a scoping study. It is when a scoping study is perceived as part of a continuous review process, and when it can be itself as a method leading to the publication and dissemination of research results (Arksey & O'Malley 2005).

Scoping reviews help to quickly determine the amount of literature base in specifying definitions and prevalence of the studied material when the amount of studied literary data was not previously comprehensively reviewed or has broad nature topic (Cochrane training 2019). Therefore, for this study, the method of scoping review was chosen.

5.2 Process of Scoping Review

The scoping review framework by Arksey and O'Malley (2005) and proposed by Levac, Colquhoun & O'Brein (2010) and Peters et al.(2015) included the following stages: 1) Defining and aligning the objective/s and question/s, (2) Developing and aligning the inclusion criteria with the objective/s and question/s, (3) Describing the planned approach to evidence searching, selection, extraction, and charting, (4) Searching for the evidence, (5) Selecting the evidence , (6) Extracting the evidence, (7) Charting the evidence , (8) Summarizing the evidence in relation to the objective/s and question/s, (9) Consultation of information scientists, librarians, and/or experts (throughout) (The scoping review framework 2019).

Firstly, the research question and objective were determined. The research question was: What are the determinants of implementing the Registered Nurse First Assistant (RNFA) for improving cardiac surgery care worldwide? The objective of this work was to identify the determinants (competencies, education, benefits, and inhibiting factors) of implementing Registered Nurse as an assistant in cardiac surgery worldwide.

Then, eligibility criteria were defined, databases were defined for searching, the search strategy was formulated, and key terms were defined. The filtering methods included the date range (2000–2019). All criteria for inclusion and exclusion are presented in Table 1. The initial search was on November 2018 in two databases and screened last on 31/05/2019. The following electronic databases were searched: PubMed and the Cumulative Index to Nursing and Allied Health Literature (CINAHL).

Table 1. Inclusion and exclusion criteria

INCLUSION CRITERIA:	EXCLUSION CRITERIA:
Publication language: English	Other languages.
Study population: Advanced practice nurses (APNs), Registered nurse first assistants RNFSA, Registered nurse first assistants (RNFAs), Certificated registered nurse first assistants CRNFA, Physician assistants (PAs), nurse practioners (NPs), CNOR, surgery assistants, perioperative nurse, first assistants, circulating nurses, core nurses, patients, doctors, residents, managers.	All previously listed but in another area.
Area: cardiac surgery or heart surgery or surgery, cardiovascular or coronary artery bypass or cardiopulmonary bypass	Infant (pediatric, neonatal) cardiac surgery, endovascular surgery, neurology, neurosurgery, Primary care, gynecology, oncology and onco-surgery, geriatric, orthopedic, traumatology, nephrology, breastfeeding, palliative care, outpatient care, outpatient department, Robotic surgery, laboratory, infectious diseases, home care, ambulatory health care, medicine in rural areas and remote countries. *After reading already searched articles was decided to exclude general surgery among them also.
Topics were also searched for by the following determinants: competences, education, benefits and Inhibiting factors.	
Data type: All results	peer reviewed conference abstracts, Letters to editor, conversations, different examine processes and examinations.
Time: 2000-2019	Before 2000 and after 2019
Published only Academical journals	

Databases (PubMed and CINAHL) were chosen to cover a wider range of disciplines. Next, filters were activated: Full text, English, Academic Journals. Also the Boolean term ‘OR’ and ‘AND’ was used between the search strategy and each of the other

keywords. Search terms were: RNFA, Registered Nurse surgical Assistant, Perioperative Nurse Surgery, RN first assistant or physician assistant, surgical assistant, Perioperative Nurse Surgeon's Assistants, Perioperative Nurse Practitioners and cardiac surgery or heart surgery or surgery, cardiovascular or coronary artery bypass or cardiopulmonary bypass. Tables 2 and 3 show the process of selecting the relevant studies.

Table 2. Process of selecting relevant studies in CINAHL

Database (last searched data)	**Search terms:**	**Search strategy (Filters activated)**	**Results**
CINAHL 31.05.2019	RNSFA Or RNFA Or Registered Nurse surgical Assistant Or Perioperative Nurse Surgery Or RN first assistant Or physician assistant Or surgical assistant Or Perioperative Nurse Surgeon's Assistants Or Perioperative Nurse Practitioners And cardiac surgery or heart surgery or surgery, cardiovascular or coronary artery bypass or cardiopulmonary bypass	Full text + Academic Journals + Lang- Eng Period- 01.01.2000- 31.05.2019	807

Table 3. Process of selecting relevant studies in PubMed

Database	**Search terms:**	**Search strategy**	**Results**

		(Filters activated)	
Pubmed (31.05.2019)	RNSFA Or RNFA Or Registered Nurse surgical Assistant Or Perioperative Nurse Surgery Or RN first assistant Or physician assistant Or surgical assistant Or Perioperative Nurse Surgeon's Assistants Or Perioperative Nurse Practitioners And cardiac surgery or heart surgery or surgery, cardiovascular or coronary artery bypass or cardiopulmonary bypass	Full text + Lang- Eng Period- 01.01.2000- 31.05.2019	706

The result from CINAHL was 807 and PubMed 706 articles. In total, there were 1513 articles identified. All 1513 titles were reviewed by a single reviewer to determine eligibility based on the defined inclusion and exclusion criteria. After the second part of the selection process, the abstracts of all articles selected by name (561) were looked through determined by the same criteria. A table was created of listed literature, with columns which identify database, title, source of publication, suitable name and abstract and a result column. The selected material was marked with +/- signs in the corresponding section of the table. (See Appendix 1). The number of excluded articles by name were 952 and by abstract 175 articles, and 7 duplicates of articles were removed (see Appendix 2), resulting in 379 articles. Figure 1 shows a flow diagram (PRISMA) of the process that was used to select the relevant studies.

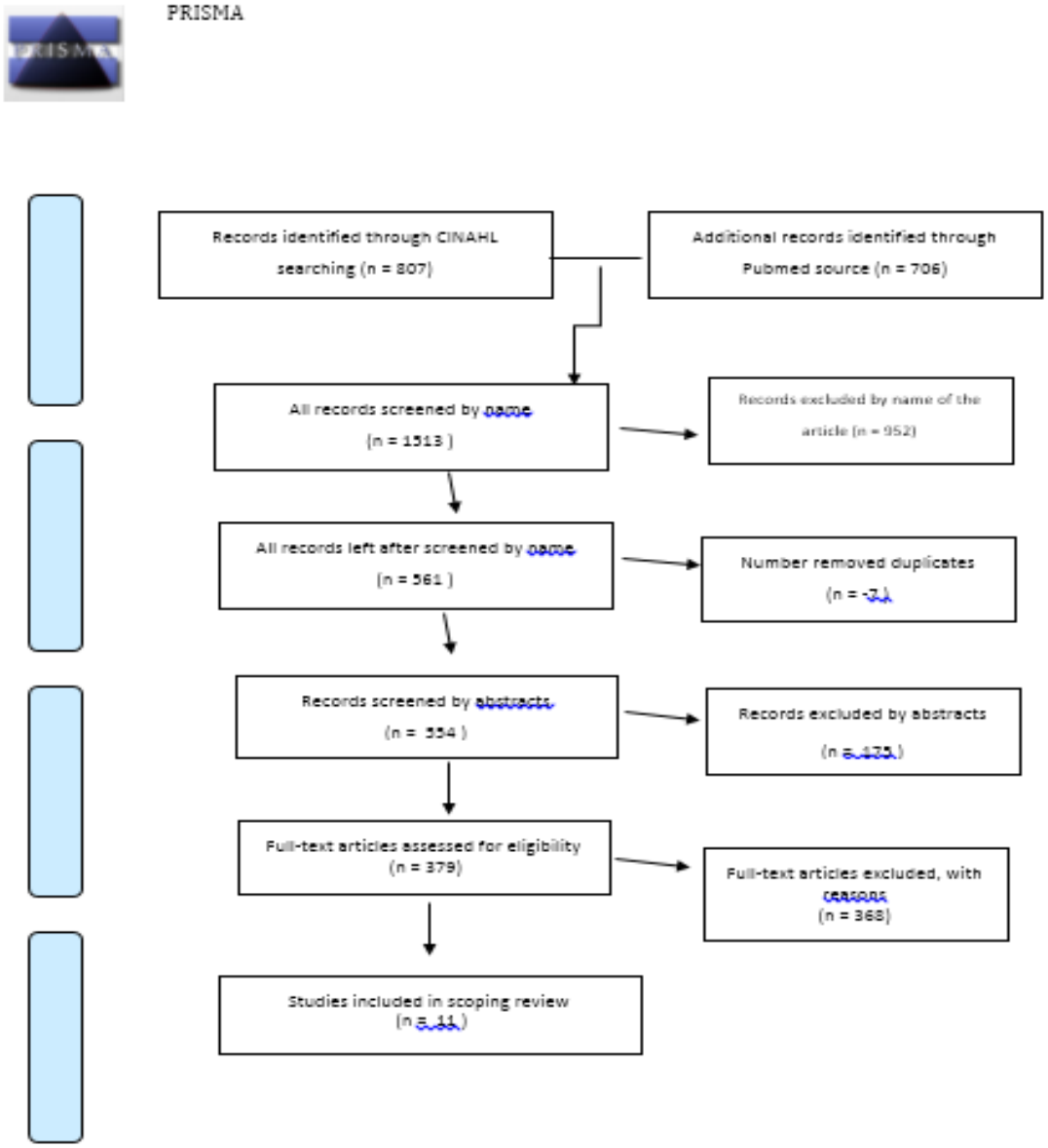

Figure 1. PRISMA. The RNFSA in cardiac surgery

Information for data extraction was compared and summarized, and the results were presented using the same structure that was created for the purposes and questions of the study, as well as for the data extraction form.

A form for extracting data from articles was designed to display data; it included a table divided into predefined categories that are related to the purpose and research questions of the review. This table contains data from each article on the content (determinants) and on the study (see Table 4). Any information documented by the author of relevant studies was recorded during the data extraction phase.

Table 4. Determinants for analysis of selected articles

#	Title /Country	Authors Source Year of publication	Design	Determinants			
				competency	education	benefits	inhibit

5.3 Strengths and Limitations of the Study

The strengths of this research were: the importance of the introduction of RNFA in cardiac surgery, versatile and structured search for accessible literature, methodology fitted to the Arksey and O'Malley (2005) method, consisting of five stages.

At the same time, there were some limitations, such as: results based on studies conducted in different countries and health systems, the organization of the work of the RNFSA in different countries is slightly different, as well as the system of training for this specialty, it was reviewed only English language literature was reviewed and the study was conducted by one searcher abstracts and relevant articles.

6 Results

A total of 11 articles were included in the scoping review. All of these articles (11) came from the databases CINAHL (3) and PubMED (8). All found articles had been cited at least once. Most of them were written in USA (7) and also in Canada, UK, Norway, and New Zealand. There were quantitative (6) and qualitative (5) researches, sources described primary (5) and secondary (6). There were six different research designs: RCT (Prospective and Retrospective), Descriptive, Analytical, Retrospective, Prospective, and Case-control. All 11 articles described the competencies of RNSFA, 6 articles were written about the education, 8 articles reported about benefits, and 6 articles described inhibit factors. Analysis of the determinants of these articles is shown in Appendix 3.

RSFA Competencies on a Cardiothoracic Service. This determinant was presented in all 11 articles. In some of them, this topic was partially described, and some were described in a more detailed form. The role of a registered nurse first surgical assistant (RNFSA) in cardiac surgeon implied direct assistance to the surgeon in the operating room in the article “Waikato Hospital introduces new nursing role” (New Zealand). The routine functions performed by a resident or physician like harvesting great saphenous veins and radial artery during CABG, the opening and closing of the chest, suturing and assistance as the first assistant during cardiac operation can be performed by physician extenders (McLean 2005). RNFs are key members of the cardiac surgery team who work closely with the surgeon, provide pre-operative and post-operative care to patients. They are designed to perform many technical procedures that require considerable dexterity in an environment where every millimeter is critical, and time is important. At the same time, RNFA have basic knowledge on the management of such patients in the working conditions of a multidisciplinary team. It is important that PHFAs can be trained to solve many of the tasks traditionally performed by surgeons. It was RNFA that became safe and effective first assistants in cardiac surgery. Their responsibilities include caring for patients, educating both patients and staff, managing services, and maintaining a database, which are used to better understand and improve the field. They work for many hours and can provide around the clock medical care or may be in touch when they are outside the hospital (Bunnel 2016). The article “A retrospective review of leg wound complications after coronary artery bypass surgery” (USA) describes a large amount of practice for RNFAs in a facility. This includes: thinking critically and assisting surgeon intraoperatively that ensures patient safety, retracting, tying, clamping and harvesting arteries and veins, closing incisions; obtaining a medical history and providing physical examination, patient education and evaluation of laboratory and diagnostic tests results by working in collaboration with surgeons and other members of the healthcare team to achieve an optimal patient outcome. (East, Lorenz & Armbrecht 2013). The article “Core competencies required for the cardiac surgical nurse practitioner” (USA) reveals the availability of RNFA 24 hours a day, 5 days a week. Their functional duties include the collection of anamneses, the conduct of a physical examination, the appointment and interpretation of diagnostic studies, the diagnosis of acute and chronic conditions, and the referral of patients to other

specialists as necessary. The treatment is performed at the preoperative stage and continues after the surgical intervention at the postoperative stage (Foster 2012). According to “The RNF first assistant: an expert resource for surgical site infection prevention” (USA), RNFA can perform the role of a surgeon's assistant daily or cross-functionally, also performing the role of a circulation nurse, in accordance with the requirements or requirements of staff depending on the conditions that are provided by the administration (Pear & Williamson 2009). In addition, the article “The Texas Heart Institute experience” (USA) specifies that RNFA should conduct open (OVH) and endoscopic saphenous vein harvestings (EVH) (Lai, Babb, Ning, Reyes, Dao, Lee, Mitchell, Gentry, Reul & Ott 2006). And in the article “The effect of subcutaneous corpus artery bypass grafting: a prospective randomized study” (Norway), the core competence for RNFA is vein harvesting (Stenvik, Tjomsland, Lien, Gunnes, Kirkeby-Garstad, & Astudillo 2006). The article “Physicians assistants in cardiothoracic surgery: a 30-year experience in a university center” (USA) defines the duties of the RNFA as taking anamnesis, conducting a physical examination, collecting tubes before introducing invasive catheters and chest tubes, providing first aid, closing the chest cells and additional primary intensive care unit at night at home. The RNFA also conducts training for patients, families, nurses, PA students, specialists in general surgery and cardiothoracic surgery, training, administrative functions for admission planning, operations planning and special procedures, organizing and presenting information for patient care conferences and keeping records necessary to ensure quality, long-term assessment of the patient’s condition and clinical studies, communication between the doctor and other consultants and the surgeon’s assistant during the performance of surgical procedures. During the operation, RNFAs help and ensure the engagement, closure of the incision in the lower limb, help in cannulation and decanulation, and closure of the chest (Thourani &Miller 2006). According to “Surgical nurse assistants in cardiac surgery: a UK trainee's perspective” (UK), the surgical nurse assistants in cardio surgical department involved in cardiac catheterization, in extubation, median sternotomy, thoracotomy and it’s closing, cannulation, going onto bypass at the beginin till the end of anastomosis and weaning off bypas (Alex, Rao, Cale, Griffin, Cowen,& Guvendik 2004). In the article “Nurse first surgical assistant (NFSA): a rewarding career” (CANADA), the functions of RNFA at the stage of the operation are defined as

follows: Positioning the patient before surgery; trains; drapery; the implementation of hemostasis by electrical or mechanical devices; squeezing, burning as well as ligation of vessels; aspirating fluids, wiping, placing and fixing retractors, irrigating the surgical site, cutting the tissue by the surgeon's command and placing hemostatic sponges around the operating sites; the imposition of the tissues; selection of needble materials as stitches and needles, stitching, cutting and knot manufacturing; and using any tools requested by the surgeon, manipulating with laparoscopes, striking an osteotome, etc. (Arpin 2005).

The role of cardiac surgeon's assistant is multifactorial. They train patients and their relatives, nurses, physician assistants, as well as general surgery and cardiothoracic surgery residents; also perform administrative functions such as setting the date of admission, planning day operations and special procedures, providing conferences in patient care information, and also providing notes in patient monitoring and clinical research; as a kind of bridge between a cardiac surgeon, a cardiologist and other specialists, if necessary; and assist intraoperative to surgeon (Thourani & Miller 2006). For example, the intraoperative role of RNFA at Emory University is quite broad. They have significant autonomy in the performance of critical tasks as the large saphenous veins or radial arteries harvesting, with both open and endoscopic methods at CABG surgery. Later, the RNFA assists as the surgeon's first/second assistant during cardiac retraction and other manipulations. Lately RNFAs began to close open wounds in the harvested conduits' places, then help in aorta cannulation and decanulation and chest closure. In a shortage of cardiothoracic residents, the main responsibility of RNFA is to function as surgical first assistant. It can be noted that the more specific role of RNFA is still determined by the clinical experience of the specialist and at the discretion of the cardiothoracic surgeon. Thanks to RNFAs, provided services are expanded without decreasing patient care. Also, one of the important aspects is that, by increasing the number of operations, there is no need to increase the resident doctors. By creating more stable and long-lasting teams over time, RNFA has more sophisticated technical skills, which is invaluable for the surgical team. Being a kind of connection between the nurses, cardiothoracic residents, and the surgeon, RNFA provides better medical care (Thourani & Miller 2006).

Education. This determinant is described in six articles. All articles have a direct relation to the preparation of RNFAs in surgery. As well as RNFAs, surgeons who perform certain surgical procedures in large numbers and repeatedly, have better patient outcomes. Since RNFAs have the education, experience, and qualifications to assist in a number of different types of surgical procedures, they become experts in their field by performing certain procedures repeatedly (Pear & Williamson 2009). According to “Surgical nurse assistants in cardiac surgery: a UK trainee's perspective” (UK), the duration of cardiothoracic education in the United Kingdom ranges from 13 to 16 years after medical school graduation. In the first year, the training is carried out as a house officer (HO), the next three years as a senior house officer (SHO) are rotated in basic surgical training (BTS). In the BST period, they acquire certain skills, after 2–3 years in research, before beginning higher training as specialists. Since 1997, surgical training has been introduced in the UK; single specialist registrars have combined classes of registrars and senior registrars. But new reforms have reduced the duration of higher training from 10 years to 6 years (Alex, Rao, Cale, Griffin, Cowen,& Guvendik 2004). According to “The 80-hour work week: why safer patient care will mean more health care is provided by physician extenders ”, physician extenders have guidelines with definite activities performed for each kind of extender (McLean 2005). In “Physician assistants in cardiothoracic surgery” , the Association of Physician Assistants in Cardiovascular Surgery (APACVS) tries to provide education and protection for the new PA specialty since 1981, but this educational opportunity needs to be constantly updated for higher demand for this specialty (Bunnell 2016). According to “ A retrospective review of leg wound complications after coronary artery bypass surgery”, the cardiothorathic surgical RNFAs have associate degrees and there are also some with doctorate degrees in nursing practice (East, Lorenz & Armbrecht 2013). Before starting education, each PA completes a training program with cadaveric surgical experience (Lai et al.2006).

Benefits. This determinant is presented in eight selected articles. The introduction of RNFA in cardiac surgery provides various benefits. The RNFA is significantly associated with improved outcomes in CABG surgery (Pear & Williamson 2009). The role of the RN First Assistant is important in solving the problem of shortage of surgeons in order to provide safe and quality care for surgical patients (Smith 2011).

The advantages of RNFAs, in contrast to the resident staff, are a reduction in the time of cardiac surgery, a reduction in infection of the surgical wounds of the legs and sternum, and the introduction of cardiac surgery patients after the operating period were discharged much earlier than patients who were observed by resident doctors (11.5 vs. 14.7 days) (Pear & Williamson 2009). With the participation of RNFA during cardiac surgery, when collecting the saphenous vein during CABG operations, infection of surgical wounds (the sternum and the site of collection of the great saphenous vein) was reduced. The duration of CABG surgery increased from 232 minutes to 300 minutes from 1995 to 1998. The National Nosocomial Infection Surveillance (NNIS) considers patients to be at higher risk of infection with coronary artery bypass grafting (CABG) duration of more than 300 minutes. According to the Centers for Disease Control (CDC's), duration of operation is the main factor for CABG surgical site infection (SSIs). Pear & Wıllıamson (2009) hypothesized that lengthening the time of surgery and infection of surgical wounds was due to the involvement of cardiosurgery residents who do not have much practical experience in the team, which carried out a harvesting of the veins, and then closed the wound and sternum at the end of operatıon. It was suggested to add two RNFAs to the cardiac surgery team to speed up the extraction of the graft from the leg. RNFAs, as part of a project to improve the collection of veins on the legs, were also responsible for closing the incision on the leg as soon as the vein was removed to minimize the time during which the incision remained open. During the nine months following RNFA intervention, the average monthly CABG surgery time decreased to 268 minutes, and the average monthly surgical site infection (SSI) frequency improved by 43%. The higher the percentage of CABG procedures per month in which RNFA was used as a first assıstant in cardiac surgery, let lower the surgical site infection (SSI). The reverse was also found, as the incidence of foot infections was higher in the months when RNFA was used less frequently. Correlation analysis of cardiac trainee surgeons as a first assistant showed a positive correlation with surgical site infection (SSI) in the legs, which means that in the months when surgical residents, rather than RNFA, were used more often, SSI in the legs were higher. (Pear & Williamson 2009.) RNFSA is a new career pathway for nurses which increases the quality department service by decreasing wound complications in the article "Waikato Hospital introduces new nursing role". According to the article "The 80-hour work week: why

safer patient care will mean more health care is provided by physician extenders", physicians can delegate their responsibilities to PAs because of restriction of work time (McLean 2005, Bunnel 2016). In article "Core competencies required for the cardiac surgical nurse practitioner", cardiac surgery nurse practitioners (CSNPs) collaborate with staff, decrease the length of stay, and manage the patient in the pre-postsurgical period (Foster 2012). In the article "The RN first assistant: an expert resource for surgical site infection prevention", RNFAs fill the lack of clinical resources of a financial or human nature, improve patient outcomes, assist surgeons and increase patient safety (Pear & Williamson 2009). According to "Effect of subcutaneous suture line and surgical technique on wound infection after saphenectomy in coronary artery bypass grafting: a prospective randomised study", RNFAs, by reducing wound infection, decrease the LOS and improve the quality of medical care (Stenvik et al. 2006). The RNFA has evolved to fill the lack of clinical resources of a financial or human nature the last three decades. Depending on the conditions and administrative support, they can perform the role of surgical first assistant daily or perform the role of a nurse working on the principle of circulation or scrub nurse, depending on how these permits or requires staffing. According to the same article, in 2004, a cohort study conducted to study the relationship of perioperative hyperglycemia with postoperative infection of surgical wounds also showed that the use of RNAs in the perioperative period also reduced the infection of surgical wounds of the legs by at least 40%. This study was over 8.5 years and held from 1995 till 2003. They controlled the indicators and risk factors of patients, such as age, diabetes, sugar level, peripheral vascular diseases, and time of operation. Therefore, nurses in the expanded RNFA role do not put patients at increased risk, instead they improve patient safety. (Pear & Williamson 2009.)

The annual increase in number of cardiac patients corresponds to increase in needs and clinical services. Addition of assistants to the doctor (Superiority) to cardiothoracic surgery (in further CTS) university service allowed to solve many problems of purpose of work and allowed to establish effective and efficient operational teams, without increasing the number of categorical CTS residents. Of the 23 PAs in cardiovascular surgery of Duke University Hospital, it was revealed that 10 of them (43.4%) noted that

their work satisfaction was excellent, and 13 (56.5%) noted that their satisfaction with work was good. (Thourani & Miller 2006.)

Inhibiting factors. This determinant is presented in six articles. In article "Waikato Hospital introduces new nursing role", registrars and junior doctors performing FSA role are not always availabe in New Zealand (Waikato Hospital introduces new nursing role 2013). According to "The 80-hour work week: why safer patient care will mean more health care is provided by physician extenders", The Accreditation Council for Graduate Medical Education (ACGME) limited the working time of residents to avoid harming patients while in the United States, there are not enough trained physician extenders to replace a doctor at night, on weekends, and on public holidays. Therefore, PA was never perceived. In addition, the issue of providing insurance and liability to persons remains problematic. When using extenders, you must choose either to pay more for professional liability insurance or change the system of protection against offenses. Firstly, this specialty is not prepared at the appropriate level to replace doctors, secondly, extenders will complicate the provision of medical care, and thirdly, clinical recommendations will not eliminate the mistakes of the health care provider. (McLean 2005.) In the article "Physician assistants in cardiothoracic surgery", PAs are still confronted with laws that create barriers to practice. Being an innovator, California still prohibits the use of PAs as first assistants to surgeons when a patient is in a state of artificial circulation, making it difficult for patients to receive proven experience and cost-effectiveness of a PA (Bunnell 2016). According to "Core competencies required for the cardiac surgical nurse practitioner", hospitals recognizing CSNPs are required to rely on their resources to implement processes to clearly articulate the role of cardiac surgery patients (Foster 2012). In the article "The RN first assistant: an expert resource for surgical site infection prevention", the conditions of this specialty depend on the administrative level and support (Pear & Williamson 2009). In the article "The transition from open to endoscopic saphenous vein harvesting and its clinical impact: The Texas Heart Institute experience", the endoscopic method of collecting veins will be successful if operators receive training on the technique of the fence, receive support from surgeons and personnel since this method is more expensive in cost, sometimes not applicable due to the quality of the veins, which increases the time of

vein collection which in turn is problematic in its use (Lai, Babb, Ning, Reyes, Dao, Lee, Mitchell, Gentry, Reul & Ott 2006).

7 Discussion

By creating more stable and long-lasting teams over time, RNFAs has more sophisticated technical skills, which is invaluable for the surgical team. Being a kind of connection between the nurses, cardiothoracic residents, and the surgeon, RNFAs provide better medical care (Thourani & Miller 2006).

The purpose of this study was to determine the possibility of creating a registered nurse as an assistant in cardiac surgery to improve the care for people with cardiac surgery in Kazakhstan. The goal was achieved by a scoping review of scientific articles with the definition of determinants and the development of recommendations for the implementation of RNFA in cardiac surgery in the Republic of Kazakhstan. The main result of this study was the definition of core competencies and the definition of the role of RNFA.

Another important case is that the process of reforming nursing education is under way, and they have fully or partially transferred the initial nursing education to bachelor level because of majority this speciality (Lahtinen, Leino-Kilpi, & Salminen 2014). For instance, in the United States during the period 2000–2014, the ratio of nurses with a four-year undergraduate program has increased more than 50% (Maier et al. 2017). In 2015, 53% of Canadian RNs had higher education (48% with bachelor’s degree and 5% a master’s/doctoral degree), and in 2006, it was 33% (Maier et al. 2017). In 1999, changes in nursing education were brought about in Europe (Lahtinen et al. 2014). Forty-five countries (82%) offer nursing education, which gives a bachelor's degree or equivalent but in some countries a diploma-level education coexists. Sixty percent offer a full academic cycle of bachelor’s, master’s and doctoral degrees (Lahtinen et al. 2014). In Australia, Canada, Finland, Ireland, Netherlands, New Zealand, United Kingdom (England, N. Ireland, Scotland, Wales) and the United States, NP/APNs work at a high level of professionalism and have a master’s degree or post-graduate education. Master’s programmes are mandatory and include courses on physical assessment skills and competencies, physiology and

pathophysiology, and advanced pharmacology, among countries such as Australia, Canada, Ireland, Netherlands, New Zealand, and the United States. In other countries, it is only being introduced but the master's degree has become the most widespread among NPs.

In those countries where NPs/APNs are emerging (Austria, Belgium, Croatia, Cyprus, France, Germany, Iceland, Israel, Lithuania, Norway, Spain, Sweden, and Switzerland), the number of graduates is low, and their practical activities have not been improved. In 2003, an educational program for APNs was developed in Sweden, and in 2015, 25–30 highly qualified nurses completed their studies, but in practice, they did not differ from ordinary nurses. In countries such as Austria, Belgium (Flemish part), Germany, France, Iceland, Lithuania and Norway, master's programs for APN were introduced. In Germany, pilot projects were implemented in villages to delegate the powers of a doctor to a nurse after completing additional training. The direction and independence of these nurses was different depending on the country. In addition to eight countries with the settled practice and education at the level of NP/APN, in such countries as (Austria, Belgium, Croatia, Cyprus, France, Germany, Iceland, Israel, Lithuania, Norway, Spain, Sweden, and Switzerland) where new roles appeared, developments and reforms of policy have happened, and formation of NP/APN is often at early stages. In the countries Austria, Belgium, Croatia, Cyprus, France, Germany, Iceland, Israel, Lithuania, Norway, Spain, Sweden, and Switzerland, the duration and contents of educational programs, training programs, concrete clinical skills and competences considerably differ. For example, skills and abilities in which to train to diagnose and carry out expanded estimates of the state of health are various (if they in general are covered) as are degrees of knowledge of pharmacology, appointment, or pathophysiology. Besides, the level of officially approved practice (according to scopes) considerably varies and is not at the same level as in the countries Australia, Canada, Finland, Ireland, Netherlands, New Zealand, United Kingdom (England, N. Ireland, Scotland, Wales), and the United States, and is usually carried out in the delegated model under control of the doctor. (Maier et al. 2017.) The Swedish health care system also faced these challenges in its healthcare sector and to this day, they do not have a clear role for the ANP. But Linköping and Skövde universities have released a small number of ANPs specializing

in surgical treatment and primary care. Some doctor's powers were delegated, such as discharge from the hospital, with recommendations for the next admission and testing, and sent for various examinations if necessary, but they can only prescribe medications during an additional course of pharmacology, depending on whether they are a registered or a specialized nurse. A registered nurse in Sweden has a bachelor's degree after she receives 60–75 educational credits and a one-year master's degree. A specialized nurse has a one-year magistracy and ANP has a two-year master's degree and is authorized to prescribe medications. (Ljungbeck & Forss, 2017.) There are many factors that influence the preparation of a surgical nurse (NP) as a first assistant in surgery. Since the 1990s, curriculum development has begun to develop and receive APNs for this role (Zarnitz & Malone 2006).

According to AORN, before working as a first assistant RNFA, a candidate must obtain privileges through the medical staff office. The requirements for obtaining practical privileges are based on the specific policies of the institution in which you will practice and the requirements of the organization accrediting the institution. Facility requirement policies are always stricter than the accrediting organization’s requirement. Accrediting organizations describe the requirements, but do not require a particular branch of the institution to process the accrediting. However, human resources (HR) department or the medical staff office (MSO) are often assigned. If the RNFA applicant is an employee of the institution, the process is reviewed by the human resources department. If the claimed RNFA is not an employee, the process is reviewed via MSO. Contender for RNFA, would contact the appropriate office to verify the facility's specific requirements. When RNFA begins to be practiced at a facility, privileges should be periodically updated and revised. "The Position of first assistant, RN" AORN contains a partial list of requirements to assist RNFA privilege. The applicant will provide to the institution copies of licenses, proof of certification, a certificate of completion of the program in which the education was obtained, and the RNFA program that he/she completed. A candidate may be asked to provide proof of competency by providing reference letters from a previous employer or the supervising surgeon. The institution granting the privileges may require all additional certificates of completion of continuing education related to the practice of RNFA, with confirmation of completion of certain topics, such as

support for cardiac activity. It may also be necessary for the candidate to undergo a physical examination or an examination for the professional suitability of the candidate for the position. (Burlingame 2013.)

There are many advantages of implementing RNFA. In a two-month study, PNSA, surgeons, and perioperative personnel assessed the compliance of PNSA with the needs of patients, surgeons, and hospitals. Of PNSA employees, 67% had a strong or moderately high impact on their leadership skills, 67% fully agreed that they gained more experience. Surgeons all agreed that PNSAs with prior perioperative experience are important and they provided support services to the perioperative team and acted as a resource and should be able to require (procedural) assistance to pay for patient care through Medicare and private health funds. Ninety-eight percent of the perioperative staff “liked” PNSA in their theater. Of the perioperative nurses, 54% thought about getting a qualification as PNSA. Eighty-seven percent believed that PNSA had an impact on leadership, and 97% thought that the contribution of PNSA to the patient and “setting "was high to moderately high. The perioperative staff satisfaction with Physician Nurse Surgical Assistant (PNSA) guarantees that Advanced Practice Nurses are and will be an important provider of cost-effective and affordable medical care in the 21st century. (Smith et al. 2016.)

The European Working Time Directive reduced the working time of training physicians. In Australia, the role of Physician Nurse Surgical Assistant (PNSA) is confirmed due to the fact that the tendency towards the feminization of the medical profession and medical workers has begun to increasingly keep a balance between work and personal life. Australia also supported the national implementation of the new labor roles for 2013–2014. The two-month training project PNSA was positive, this was confirmed by positive comments from surveys, and the hospital’s desire to extend the duration of this project. And the PNSA specialists themselves received experience and a specialty that went beyond their usual practice. Further on this experience, PNSA expanded its experience in Queensland and across Australia by demonstrating that PNSAs are fully implementable. (Smith et al. 2016.)

In her article about APNs impacts on patient outcomes and evidence-based practice, Kleinpell (2007) sums up several studies to note that the patients who received

treatment from an ACNP and cardiac surgeons team reduced the intubation time, decreased time on supplemental oxygen, decreased the length of stay (LOS) in the hospital, mortality rates, and decreased the cost of treatment. Even when comparing the results of APN treatment with other medical specialists, team care for patients of the intensive care unit led to similar results in patients compared with the treatment provided by the attending physician only. According to the same article, it has also been shown that care by an APN led to a decrease in urinary catheter establishment days and urinary tract infections, skin breakdown, pneumonia, tracheostomy tube installation, fewer days to out-of-bed activity, the number of days in the intensive care unit, and also, the waiting time for discharge was reduced, hospital mortality rates and cardiac arrest rates occurring outside the ICU decreased. (Kleinpell 2007.)

At the same time, there are also inhibiting factors in creating positions for RNFA as staff. When country want to implement new roles for nurses, the question arises of policy development and reform, so that it would take as short a time as possible and ensure patient safety and quality of care (Maier et al. 2017). There are differences between countries in the implementation of roles. For example, in some countries, roles have been introduced to meet the needs of disadvantaged communities, and in some, as providers who can provide good quality and cost-effective medical care. (Lowe et al. 2013.) But these obstacles are quite similar in some countries, the barriers to implementing good nursing practices. For example, in Australia in 2000, the number of nursing practitioners (NPs) increased, but growth was slow. In 2012, in practice there were only about 500 NPs. Despite the extensive literature on the role, effectiveness and improvement of medical care, government support for NPs still hinders its implementation in the health care system in Australia and other countries. The main reasons are lack of funding, medical support, clarity of roles and organizational commitment. But some Australian health services did succeed. (Lowe et al. 2013.) In Australia, two problems are noted in supporting the development of NP roles: first, there are commitments on NP financing, as they are paid more than other nurses. Secondly, access to IB financing is limited to the services provided by the NP and is considered an obstacle to expanding the role. The development of the NP requires support from government funding and legislative bodies. Political change must be carried out on a large scale. (ibid..) The American Medical Association is

struggling with 28 states to review a proposal for empowering practicing nurses. The ratio of advanced practice providers to doctors is determined by state law, and also depends on the needs of the hospital department. (Frellick 2011.) The process of implementing advanced nursing roles in daily care requires changes in policies for managing and regulating occupations, as well as changes in financing and payment systems. Practical application also depends on factors of support of the organizational level. Nevertheless, political reforms are often delayed and contradict, and opposed to stakeholders, in the face of medical associations. Many countries have also introduced health workforce and regulatory reforms that include changing tasks, new tasks and the redeployment of responsibilities between professions. Therefore, political decisions are important, as they either speed up or slow down the adoption of new roles in the health care system. (Maier et al. 2017.) The United Kingdom has regulated best practice NPs through legislation, while other countries have relied on employer protocols or cooperation agreements at the level of the medical institution itself. While this approach may offer more flexibility, non-regulatory approaches to management can lead to significant differences between medical organizations in general. Consequently, modern regulation (in accordance with advanced nursing skills and competencies) offers advantages over non-normative management mechanisms by protecting names and applications. (ibid..)

One of the problematic points of this specialty is in differentiating the roles between PNSA and the nurse (Smith et al. 2016). First, there is a need to standardise titles, to arrive at commonly agreed definitions. Secondly, it is necessary to periodically collect international data about advanced nursing practice, to monitor this workforce around the world. Third, more cross-country research needs to be conducted to identify barriers and factors contributing to the implementation in practice. (Maier et al. 2017.)

One strategy is to increase the role of nurses or other non-medical providers by expanding their skills and clinical activities (Maier et al. 2017). However, the problem remains that the participants are not offered any relevant training or education in their organizations or at the national level. In the long run, this may adversely affect the outcomes of the roles of the APN. The Scandinavian APN model is based on eight areas of expertise where direct clinical practice is particularly important. A study in Holland showed that when introducing the new role of the APN,

political/organizational, financial, legal or institutional barriers were encountered. (Wisur-Hokkanen et al. 2015.) The American Academy of Physician Assistants (AAPA) sporadically released a publication, Physician Assistants: State Laws and Regulations, which contains systematic information by state and year on PA regulation. It was taken as a basis, and later supplemented with separate state regulatory and regulatory research. Initially, PA must be practiced under physician supervising. The meaning of " supervising " varies in each state, but all exclusively require that PA be supervised by a physician. (Perry 2009.)

For successful implementation in the practice of this direction, simply obtaining the degree of APN is not enough. The numerous external factors influence the development of APN role, and proper planning and elimination of these factors are necessary to help avoid many barriers to the implementation and development of APN role. (Wisur-Hokkanen et al. 2015.) So due to numerous obstacles, the potential of NP roles in patient care is not fully realized (Lowe et al. 2013). In Australia, obstacles have arisen to changing the role of nurses and the adoption of NPs in mainstream health sector. The reasons were: changes of roles (NP) could give a feeling of isolation, non-understanding of fellow nurses of their new roles due to lack of clarity of roles, and there can also be professional jealousy. (ibid..) For example, in western Finland, lack of knowledge about advanced nursing practice and the role of the APN was one of the main problems in the implementation of the APN. The lack of understanding of advanced nursing practice by the leaders of organizations and colleagues and mistrust for APN role is one of the factors hindering the development of APN. (Wisur-Hokkanen et al. 2015.) Not everyone believes that the use of highly qualified nurses is a good idea, so this has led to limited opportunities for practicing NP and PA. As mentioned, state laws are different, in some they can practice independently without the participation of a doctor, in others certain procedures are performed only under the supervision of a doctor. (Frellick 2011.) Doctors question about whether nurses will take responsibility for their role, which is also an important part of the problem as a whole (Ljungbeck & Forss 2017). That is why the development of the NP role as medical support in the early stages of implementation is important (Lowe et al. 2013).

Uncertain roles of APN specialists have led to the fact that the name of this specialty is often incorrect and sometimes they have been called RN instead of APN (Wisur-Hokkanen et al. 2015). In 2006, the Order in its study noted that administrative, budgetary and other restrictions, such as the need for this undergraduate degree and insufficient access to training, delayed the development of NFSAs (Desrosiers 2008). In 2006, the Order proposed a succession plan for the operating nurses and an approach to enhance their role. The proposals were based on three principles. The first is the need to focus on attracting and retaining operating nurses. This will lead to the mandatory training of nurses in the operating room for the work/study program, issuing credit hours and a certificate confirming the competence of the specialist. Second, reorganize the operating room. This in turn speaks of increasing the versatility of nurses by increasing their skills. Having a special permit for perioperative, first aid and surgical care in public and private institutions. It is imperative that these care assistants receive training for internal service in large operations. Thirdly, to ensure the safety of the operating room, determining which operations require surgical assistance, obliging all new nurses working in this field to obtain special permission, and providing appropriate training for domestic nursing assistants and first nursing assistants. (ibid..) Policy tools that foster the integration of new, advanced nursing roles include reviews of independent laws and/or regulations regarding practice and harmonization in a decentralized country. In the financing and reimbursement scheme, the recognition of new roles by payers and the reimbursement of these services are very important. Leadership support influences the development of new nursing roles. Therefore, both political and organizational measures are crucial for making changes in the structure of skills, removing barriers in practice and meeting local needs. (Maier et al. 2017.)

An important role in the development of advanced nurses is also that it is affected by funding and reimbursement policies. First, the reimbursement of costs for patient care is very important for the transition from pilot projects to full implementation. Secondly, reimbursement of expenses (payment for a service) or the salary indicator of nurses in advanced positions. The experience of the United States and Australia showed that if the insurers did not pay for the services of an NP, this in turn made it difficult for patients to access the services of an NP. Australia in 2010 removed a

serious barrier to NP practice. Low pay NP/APN compared with doctors reduce costs for payers, which showed in the United States. Third, the payment systems of some countries are moving from individual payments to team payments and payments based on results, which can contribute to greater deployment of highly skilled nurses and teamwork. (Maier et al. 2017.) Many OECD countries are implementing educational and payment specific reforms to expand nursing practice (ibid.). Some APNs received a wage increase but considered it disproportionate to the increased responsibility that the APN took on (Wisur-Hokkanen et al. 2015). So, for the roles of the NP, financing is an important issue, too (Lowe et al. 2013).

The next factor is the lack of courage in accepting the new role of the APN (Wisur-Hokkanen et al. 2015) in creating a supportive work environment and management structure in an organization is the role of health managers (Maier et al. 2017). (UNCLEAR) Inadequate support from managers can lead to reduced motivation and reduced changes in work tasks or roles for reasons such as sometimes an APN cannot leave their post as an RN due to a lack of sufficient staff. The process of working as an APN also affects personal value, the degree of its involvement and the time and energy used, since accepting responsibility for patient health requires both personal maturity and courage. (Wisur-Hokkanen et al. 2015.) Filling a gap in the provision of medical services with new nursing models as NPs means that the public, other health care workers, and the nurses themselves must understood the difference in roles. In the emergency department, this category of nurses is not perceived as a problem, since emergency NPs are more numerous in this particular department than others, so they understand their roles better in the ED (Lowe et al. 2013).

The largest experience in the NP/APN integration process includes the countries the US, Canada, Great Britain, the Netherlands, Finland, Australia, New Zealand, and Ireland. Political lessons show that educational programs (with advanced skills and competencies) combined with modern regulations are a prerequisite for expanded clinical practice: without formal permission from new clinical activities defined in practice areas, nurses cannot practice in advanced roles officially and legally. Politicians directly influence the issue of regulation and financing, and at the organization level, such as leadership, change management, and team culture,

determine successful integration within the medical organization itself (Maier et al. 2017).

8 Conclusion

The results of the scoping review show that RNFAs significantly improve the quality of cardiac surgery care and reduce the economic costs of managing cardiac surgery patients. The implementing of RNFAs as staff in a cardiac surgery department has several advantages for both patients and the entire health care system. So, RNFAs can be delegated to preoperative workup, perioperative care, discharge care and intraoperative assistance as first or second surgical assistance. Also, they can perform such specific intraoperative manipulations which are usually performed by a physician or resident staff and participate in clinical research under the supervision of a cardiac surgeon.

The presence of prepared RNFAs helps in declining postoperative complications, especially the risk of infection, improves circulation in the operating room not only by reducing the duration of cardiac operations but also without causing congestion in delivery patients, creates more comfortable conditions for the physician, work team and the clinic, and decreases staffing needs by creating a reliable and constant team. This in turn decreases the length of the patient's hospital days, thereby reducing the cost of the patient's treatment. Quite important is the fact that RNFAs significantly reduce the repeated hospitalization of patients with complications, which contributes to the development of quality cardiac surgery.

There are other benefits of implementing RNFA in cardiac surgery field. Firstly, RNFA provides an opportunity to significantly relieve the physician's work, by giving him the opportunity to deal with more complex patient cases and issues. RNFA were implemented in developed countries in order to streamline doctor's working hours because it influenced doctors and the quality of their work negatively. Secondly, the nurse as a RNFA has a high image and incentive for professional growth and development, and hence the interest in their work will be at a high level. Thirdly, the implementation of RNFA in cardiac surgery provides a stable team, which is very

difficult to achieve nowadays, in terms of staff turnover and increasing in the learning hours of residents' education programs.

Thus, all the above advantages of introducing RNFA in a cardiac surgery hospital are difficult to overestimate. Therefore, it is necessary to implement RNFA in cardiac surgery departments. However, it is worth noting that currently in the Republic of Kazakhstan there are certain difficulties with the implementation of RNFA in cardiac surgery. Primarily, this is because there is no regulatory framework governing the level of responsibility of nurses. Therefore, all nursing activities are carried out only under the physician's supervision and strictly in his presence, even the main tasks that have been the responsibility of nurses in other countries. Secondly, the imperfection of the regulatory framework that defines the RNFA as a staff unit and regulates their rights and obligations. Thirdly, the lack of special training and educational programs for the RNFA preparation in the Republic of Kazakhstan. Therefore, the main recommendations for practical implementation of the results of the study are: the development of a regulatory framework that defines the role, rights, and responsibilities of RNFA; the development of training programs for the preparation of RNFA; and the implementing of RNFA as a staff unit in hospitals with cardiac surgery departments.

It should be noted that for the implementation of RNFA in cardiac surgery fields, it is necessary to conduct numerous studies. This should include studies such as: studying the legal basis for implementing RNFA in hospitals, the opinion of society and health workers about RNFA, and developing and evaluating a training-educational program for preparing RNFAs. In the future, there should also be the possibility of implementing RNFA in cardiac surgery, at least as a pilot project in one hospital, and to conduct a number of research studies in defining the expences spent by government on prepairing cardiac surgeons and RNFAs, considering the superiority ın numbers of nurses compared to physicians, the number of complications, postoperative outcomes and the overall quality of cardiac surgical care of patients with RNFA.

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Appendices

Appendix 1. List of the articles chosen from database by name and screened by abstracts and full texts

Data base	Title	Authors Source Year of publication	Suitable name of the article	Suitubl e abstrac t of the article	Result
Pub med	1-Intervention Development Process for a Pragmatic Randomized Controlled Trial: The Thoracic Peri-Operative Integrative Surgical Care Evaluation Trial.	Seely D[1,2,3], Ennis JE[1,2], McDonell E[1,2], Fazekas A[3], Zhao L[2], Asmis T[4], Auer RC[3,4], Fergusson D[3], Kanji S[3,4], Maziak DE[4], Ramsay T[3], Chamberland P[4], Spooner C[5], Threader J[6], Seely A[3,4].J Altern Complement Med. 2019 Mar;25(S1): S112-S123. doi: 10.1089/acm.2018.0419.	+	-	-
CINA HL	2- Integrating Cultural Competency Throughout a First-Year Physician Assistant Curriculum Steadily Improves Cultural Awareness.	(includes abstract) Beck, Barbra; Scheel, Matthew H.; De Oliveira, Kathleen; Hopp, Jane; Journal of Physician Assistant Education (Physician Assistant Education Association), 2013; 24(2): 28-31. 4p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	+	-
CINA HL	3- Thematic Analysis of Personal Statements in Physician Assistant Program Admissions.	Forister, J. Glenn; Jones, Eugene; Mei Liang; Journal of Physician Assistant Education (Physician Assistant Education Association), 2011; 22(2): 6-12. 7p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	-	-
CINA HL	4- Fostering Lifelong Learning in the Physician Assistant Student Through Internet-Based Continuing Medical Education.	- Fostering Lifelong Learning in the Physician Assistant Student Through Internet-Based Continuing Medical Education.	+	+	-
CINA HL	5- Racial and Gender Disparities in the Physician Assistant Profession.	Felix, Heidi; Garrubba, Carl; Devlin, Denise; Journal of Physician Assistant Education (Physician Assistant Education Association), 2011; 22(2): 25-29. 5p. (Journal Article - forms, questionnaire/scale, research, tables/charts) ISSN: 1941-9430	+	+	-
CINA HL	6- Physician Assistant Students' Perceptions of an Entry-Level Doctorate Degree.	Swanchak, Lori E.; Levine, Alan M.; Arscott, Karen E.; Golden, Mary Alice; Journal of Physician Assistant Education (Physician Assistant Education Association), 2011; 22(1): 19-24. 6p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	+	-
CINA HL	7- Evidence-Based Medicine Databases: Changing Needs Along the	Keahey, David; Goldgar, Constance; Journal of Physician Assistant Education (Physician Assistant	+	+	-

	Path From Physician Assistant Student to Clinician.	Education Association), 2011; 22(1): 48-52. 5p. (Journal Article - tables/charts) ISSN: 1941-9430			
CINAHL	8- A novel approach to ranking physician assistant programs.	Van Rhee J; Davanzo MJ; Journal of Physician Assistant Education (Physician Assistant Education Association), 2010; 21(4): 30-36. 7p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	-	-
CINAHL	9- The role of the assistant practitioner in the clinical setting: a focus group study.	Henshall, Catherine; Doherty, Andrea; Green, Helen; Westcott, Liz; Aveyard, Helen; BMC Health Services Research, 9/10/2018; 18(1): N.PAG-N.PAG. 1p. (journal article) ISSN: 1472-6963 PMID: 30200943	+	+	-
CINAHL	10- Clinical coordination and the experiential year in physician assistant education.	Snyder JA; Lucich JA; Zorn JS; Enking PJ; Barnett JS; Fahringer D; Journal of Physician Assistant Education (Physician Assistant Education Association), 2010; 21(4): 23-29. 7p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	+	-
CINAHL	11- Predictive ability of the graduate record examination and its usage across physician assistant programs.	Hocking JA; Piepenbrock K; Journal of Physician Assistant Education (Physician Assistant Education Association), 2010; 21(4): 18-22. 5p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	-	-
CINAHL	12- Patient Willingness to Be Seen by Physician Assistants, Nurse Practitioners, and Residents in the Emergency Department: Does the Presumption of Assent Have an Empirical Basis?	Larkin GL; Hooker RS; American Journal of Bioethics, Aug2010; 10(8): 1-10. 10p. (Journal Article - research, tables/charts) ISSN: 1526-5161 PMID: 20694894	+	-	-
CINAHL	13-Simulation-based examinations in physician assistant education: a comparison of two standard-setting methods.	Carlson J; Tomkowiak J; Knott P; Journal of Physician Assistant Education (Physician Assistant Education Association), 2010; 21(2): 7-14. 8p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	-	-
CINAHL	14- Deciding Activity Level for an Acute Post-surgical Patient with an Elevated Risk of Bleeding.	Einhorn, Carol S.; Journal of Acute Care Physical Therapy (Acute Care Section - APTA, Inc.), Spring2012; 3(1): 164-170. 7p. (Journal Article - case study, tables/charts) ISSN: 2158-8686	+	-	-
CINAHL	15- Introducing incident reporting in primary care: a translation from safety science into medical practice.	Zwart, Dorien Lyd Marieke; de Bont, Antoinette Adriana; Health, Risk & Society, May2013; 15(3): 265-278. 14p. (Journal Article - research, tables/charts) ISSN: 1369-8575	+	-	-
CINAHL	16-Interprofessional education accreditation standards in the USA: A comparative analysis.	Zorek, Joseph; Raehl, Cynthia; Journal of Interprofessional Care, Mar2013; 27(2): 123-130. 8p. (Journal Article - research, tables/charts) ISSN: 1356-1820 PMID: 22950791	+	-	-

CINAHL	17- Evaluation of Multiple Variables Predicting the Likelihood of Passage and Failure of PANCE.	Ennulat, Carol W.; Garrubba, Carl; DeLong, Deborah; Journal of Physician Assistant Education (Physician Assistant Education Association), 2011; 22(1): 7-18. 12p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	-	-
CINAHL	18- The Relationship Between Formative and Summative Examinations and PANCE Scores; Can the Past Predict the Future?	Massey, Scott; Stallman, John; Lee, Louise; Klingaman, Kathy; Holmerud, David; Journal of Physician Assistant Education (Physician Assistant Education Association), 2011; 22(1): 41-45. 5p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	-	-
CINAHL	19- Admission variables as predictors of PANCE scores in physician assistant programs: a comparison study across universities.	Higgins R; Moser S; Dereczyk A; Canales R; Stewart G; Schierholtz C; Ruback TJ; McDaniel J; Van Rhee J; Arbuckle S; Journal of Physician Assistant Education (Physician Assistant Education Association), 2010; 21(1): 10-17. 8p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	-	-
CINAHL	20- Physician assistant students' attitudes and behaviors toward cheating and academic integrity.	Dereczyk A; Bozimowski G; Thiel L; Higgins R; Asprey D; Journal of Physician Assistant Education (Physician Assistant Education Association), 2010; 21(1): 27-31. 5p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	-	-
CINAHL	21- Expectations of students enrolled in doctor of pharmacy, master's physician assistant, and anesthesia assistant programs.	Schwartz MD; Zdanowicz MM; Journal of Physician Assistant Education (Physician Assistant Education Association), 2010; 21(1): 4-9. 6p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	-	-
CINAHL	22- The self-reported, perceived effect of interactions with pharmaceutical industry on physician assistant students and recent program graduates.	Caputo C; Swanson M; Quigley T; Ablah E; Asprey D; Journal of Physician Assistant Education (Physician Assistant Education Association), 2009; 20(3): 31-35. 5p. (Journal Article) ISSN: 1941-9430	+	+	-
CINAHL	23- Physician assistant clinical doctorate summit: final report and summary.	Journal of Physician Assistant Education (Physician Assistant Education Association), 2009; 20(2): 22-28. 7p. (Journal Article - pictorial, tables/charts) ISSN: 1941-9430	+	+	-
CINAHL	24- Enhancing transformative learning in physician assistant education.	O'Connell CB; Journal of Physician Assistant Education (Physician Assistant Education Association), 2010; 21(1): 18-22. 5p. (Journal Article) ISSN: 1941-9430	+	+	-
CINAHL	25- Physician assistant program medical directors' opinions of an entry-level physician assistant clinical doctorate degree.	Complan B; Richardson L; Stoehr JD; Journal of Physician Assistant Education (Physician Assistant Education Association), 2009; 20(2): 8-13. 6p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	+	-
CINAHL	26- Evaluating physician assistant students' attitudes toward	Christiansen MP; Robinson WD; Geske JA; McIlvain HE; Asprey D; Journal of Physician Assistant Education	+	-	-

	underserved patients: a mixed methods study.	(Physician Assistant Education Association), 2009; 20(4): 14-20. 7p. (Journal Article - research, tables/charts) ISSN: 1941-9430			
CINAHL	27- The effects of synchronized distance education on academic achievement in a physician assistant program.	Goldsmith CW; Miller KE; Lee L; Moreau T; White S; Massey SL; Journal of Physician Assistant Education (Physician Assistant Education Association), 2009; 20(2): 17-21. 5p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	+	-
CINAHL	28- The professional development needs of faculty of physician assistant programs.	Essary AC; Coplan B; Liang M; Calhoun BC; Journal of Physician Assistant Education (Physician Assistant Education Association), 2009; 20(4): 40-44. 5p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	+	-
CINAHL	29- Test item analysis for the physician assistant educator.	Garino A; Van Rhee J; Journal of Physician Assistant Education (Physician Assistant Education Association), 2009; 20(3): 22-27. 6p. (Journal Article - tables/charts) ISSN: 1941-9430	+	-	-
CINAHL	30- Physician Assistant Research Culture: Another View.	Miller, Anthony A.; Dehn, Richard; Journal of Physician Assistant Education (Physician Assistant Education Association), 2014; 25(3): 7-8. 2p. (Journal Article - commentary, editorial) ISSN: 1941-9430	+	+	-
CINAHL	31- A Physician Assistant Institute.	Hooker, Roderick S.; Journal of Physician Assistant Education (Physician Assistant Education Association), 2014; 25(3): 5-6. 2p. (Journal Article - editorial) ISSN: 1941-9430	+	+	_
CINAHL	32 Life savers now; care givers when?	Gianola FJ; Harbert K; Journal of Physician Assistant Education (Physician Assistant Education Association), 2009; 20(2): 33-37. 5p. (Journal Article) ISSN: 1941-9430	+	-	-
CINAHL	33- Perceptions of US physician assistants regarding the entry-level doctoral degree in PA education.	Ohlemeier LS; Muma RD; Journal of Physician Assistant Education (Physician Assistant Education Association), 2008; 19(2): 10-17. 8p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	+	-
CINAHL	34- Examination of new graduate income and degree obtained from physician assistant programs, 1998-2006.	Snyder J; Zorn J; Nord A; Journal of Physician Assistant Education (Physician Assistant Education Association), 2008; 19(3): 8-12. 5p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	+	-
CINAHL	35- An update on the utilization of standardized patients in physician assistant education.	Coplan B; Essary AC; Lohenry K; Stoehr JD; Journal of Physician Assistant Education (Physician Assistant Education Association), 2008; 19(4): 14-19. 6p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	+	-

CINAHL	36- Physician assistant education in the United Kingdom: the first five years.	Begg PAP; Ross NM; Parle JV; Journal of Physician Assistant Education (Physician Assistant Education Association), 2008; 19(3): 47-50. 4p. (Journal Article) ISSN: 1941-9430	+	+	-
CINAHL	37- 'Educating for service': the medical assistant profession in Ghana.	Miniclier N; Antwi J; Adjase ET; Fahringer D; Journal of Physician Assistant Education (Physician Assistant Education Association), 2009; 20(3): 44-47. 4p. (Journal Article - pictorial) ISSN: 1941-9430	+	+	-
CINAHL	38- An assessment of the suitability of physician assistants to meet health needs in rural Panama.	Ryvnine S; Fahringer D; Journal of Physician Assistant Education (Physician Assistant Education Association), 2008; 19(3): 42-46. 5p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	-	-
CINAHL	39-Evidence-based medicine resources for physician assistant faculty: the turning research into practice (TRIP) database.	Goldgar C; Journal of Physician Assistant Education (Physician Assistant Education Association), 2008; 19(3): 37-41. 5p. (Journal Article - tables/charts) ISSN: 1941-9430	+	-	-
CINAHL	40- A medical education model for collaborative chronic disease management.	Ives-Kennedy B; Kennedy WC; Southard DR; Journal of Physician Assistant Education (Physician Assistant Education Association), 2008; 19(2): 18-29. 12p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	-	-
CINAHL	41- Improving observation skill in physician assistant students.	Garino A; Geisler S; Journal of Physician Assistant Education (Physician Assistant Education Association), 2008; 19(1): 47-52. 6p. (Journal Article - pictorial, research, tables/charts) ISSN: 1941-9430	+	-	-
CINAHL	42- Snapshots in time: Duke University physician assistant classes, 1967-2007.	Dieter PM; Strand J; Journal of Physician Assistant Education (Physician Assistant Education Association), 2007; 18(3): 16-23. 8p. (Journal Article - pictorial, statistics, tables/charts) ISSN: 1941-9430	+	+	-
CINAHL	43- Physician assistant education: an abbreviated history.	Cawley JF; Journal of Physician Assistant Education (Physician Assistant Education Association), 2007; 18(3): 6-15. 10p. (Journal Article - pictorial, statistics, tables/charts) ISSN: 1941-9430	+	+	-
CINAHL	44- Defining leadership training for physician assistant education.	Calhoun BC; Vrbin CM; Grzybicki DM; Journal of Physician Assistant Education (Physician Assistant Education Association), 2008; 19(1): 18-23. 6p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	+	-
CINAHL	45- The use of standardized patients in the training and evaluation of physician assistant students.	Calhoun BC; Vrbin CM; Grzybicki DM; Journal of Physician Assistant Education (Physician Assistant Education Association), 2008; 19(1): 18-23. 6p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	+	-

CINAHL	46- Anticipated salaries of physician assistant students.	Snyder J; Zorn J; Satterblom K; Journal of Physician Assistant Education (Physician Assistant Education Association), 2008; 19(1): 13-17. 5p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	+	-
CINAHL	47- The imposter phenomenon: self-assessment and competency to perform as a physician assistant in the United States.	Mattie C; Gietzen J; Davis S; Prata J; Journal of Physician Assistant Education (Physician Assistant Education Association), 2008; 19(1): 5-12. 8p. (Journal Article - questionnaire/scale, research, tables/charts) ISSN: 1941-9430	+	+	-
CINAHL	48- A pilot study assessing PA students' self-assessment of professionalism.	Knight D; Higgins R; Moser S; Groh C; Journal of Physician Assistant Education (Physician Assistant Education Association), 2009; 20(1): 24-29. 6p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	-	-
CINAHL	49- Central application service for physician assistants: five-year report.	Ruback T; Coombs J; Keck M; McDaniel J; Barwick TA; Liang M; Journal of Physician Assistant Education (Physician Assistant Education Association), 2007; 18(3): 52-59. 8p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	-	-
CINAHL	50- Physician assistant students take the plunge.	Marion GS; Van Rhee J; Hildebrandt CA; Lischke MP; Journal of Physician Assistant Education (Physician Assistant Education Association), 2007; 18(4): 48-51. 4p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	-	-
CINAHL	51- Comparison of medical student and physician assistant student performance on standardized-patient assessments.	Asprey DP; Hegmann TE; Bergus GR; Journal of Physician Assistant Education (Physician Assistant Education Association), 2007; 18(4): 16-19. 4p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	+	-
CINAHL	52- The role of reflective journaling in physician assistant education.	Wright KA; Powers SL; Ali M; Journal of Physician Assistant Education (Physician Assistant Education Association), 2007; 18(4): 20-26. 7p. (Journal Article) ISSN: 1941-9430	+	+	-
CINAHL	53- The future of physician assistant education.	Miller AA; Glicken AD; Journal of Physician Assistant Education (Physician Assistant Education Association), 2007; 18(3): 109-116. 8p. (Journal Article - tables/charts, website) ISSN: 1941-9430	+	+	-
CINAHL	54- Physician assistant educational research.	Dehn R; Journal of Physician Assistant Education (Physician Assistant Education Association), 2007; 18(3): 94-99. 6p. (Journal Article) ISSN: 1941-9430	+	+	-
CINAHL	55- The globalization of the physician assistant profession.	Hooker RS; Hogan K; Leeker E; Journal of Physician Assistant Education (Physician Assistant Education	+	+	-

		Association), 2007; 18(3): 76-85. 10p. (Journal Article - pictorial, research, tables/charts) ISSN: 1941-9430			
CINAHL	56- The evolution of physician assistant faculty.	Orcutt VL; Journal of Physician Assistant Education (Physician Assistant Education Association), 2007; 18(3): 60-66. 7p. (Journal Article - statistics, tables/charts) ISSN: 1941-9430	+	+	-
CINAHL	57- Diversity in physician assistant education.	Mulitalo KE; Straker H; Journal of Physician Assistant Education (Physician Assistant Education Association), 2007; 18(3): 46-51. 6p. (Journal Article - statistics, tables/charts) ISSN: 1941-9430	+	+	-
CINAHL	58- Service learning as a component of physician assistant education: the development of a compassionate practitioner.	Knight D; Moser S; Groh C; Journal of Physician Assistant Education (Physician Assistant Education Association), 2007; 18(2): 49-52. 4p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	-	-
CINAHL	59- Improving physician assistants students' competencies in developmental disabilities using virtual patient modules.	Kleinert HL; Fisher SB; Sanders CL; Boyd S; Journal of Physician Assistant Education (Physician Assistant Education Association), 2007; 18(2): 33-40. 8p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	+	-
CINAHL	60- Clinical issues. Credentialing guidelines for RN first assistants.	Burlingame B.L; AORN Journal, Dec2007; 86(6): 1044-1049. 4p. (Journal Article - questions and answers, tables/charts) ISSN: 0001-2092	+	-	-
CINAHL	61- The effects of an interactive learning system on PANCE performance.	Massey S; Sedrak M; Lee L; Asprey D; Journal of Physician Assistant Education (Physician Assistant Education Association), 2008; 19(3): 30-34. 5p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	+	-
CINAHL	62- Breaching patient confidentiality: a study of physician assistants' awareness and attitudes.	Slabic K; McGuire AL; Journal of Physician Assistant Education (Physician Assistant Education Association), 2007; 18(2): 20-32. 13p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	+	-
CINAHL	63 A descriptive study of physician assistant faculty benefits.	Danielsen RD; Simon AF; Wendel OT; Bay C; Journal of Physician Assistant Education (Physician Assistant Education Association), 2007; 18(1): 16-21. 6p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	+	-
CINAHL	64- A comparison of research teaching models in physician assistant education: theory vs. application via cooperative learning.	Alexander B; Ludwig D; Journal of Physician Assistant Education (Physician Assistant Education Association), 2006; 17(3): 28-32. 5p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	+	-

CINAHL	65- The effectiveness of online courses in physician assistant education.	Day D; Smith B; Muma RD; Journal of Physician Assistant Education (Physician Assistant Education Association), 2006; 17(3): 33-36. 4p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	+	-
CINAHL	66- Physician assistant students' knowledge and attitudes towards aging and geriatric medicine.	Dacey ML; Vail M; Tataronis G; Journal of Physician Assistant Education (Physician Assistant Education Association), 2007; 18(1): 7-15. 9p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	-	-
CINAHL	67-Evidence-based medicine resources for physician assistant faculty: a review of two textbooks.	Keahey D; Journal of Physician Assistant Education (Physician Assistant Education Association), 2007; 18(1): 60-63. 4p. (Journal Article - tables/charts) ISSN: 1941-9430	+	+	-
CINAHL	68-Are Physician Assistant Educators Prepared to Facilitate Master's level Research Among Their Students?	Swanchak, Lori E.; Walters, Heather; Journal of Physician Assistant Education (Physician Assistant Education Association), 2013; 24(2): 42-43. 2p. (Journal Article) ISSN: 1941-9430	+	+	-
CINAHL	69- Influence of route of entry to a physician assistant education program on selected characteristics of practices of physician assistants.	Cavenagh JM; Journal of Physician Assistant Education (Physician Assistant Education Association), 2006; 17(3): 18-22. 5p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	+	-
CINAHL	70- The influence of personality characteristics and test anxiety on physician assistant clinical knowledge rating and assessment tool (PACKRAT) performance.	Bourne KC; Arend W; Johnson D; Daher NS; Martin B; Hooker RS; Journal of Physician Assistant Education (Physician Assistant Education Association), 2006; 17(4): 42-46. 5p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	+	-
CINAHL	71- Teaching physician assistant history: program directors' impressions.	Fasser C; Blessing D; Journal of Physician Assistant Education (Physician Assistant Education Association), 2006; 17(3): 37-40. 4p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	-	-
CINAHL	72- A description of cultural competency education in physician assistant programs.	Symington S; Cooper K; Wallace L; Journal of Physician Assistant Education (Physician Assistant Education Association), 2006; 17(1): 18-22. 5p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	+	-
CINAHL	73- Influence of curriculum pedagogy on student knowledge acquisition in physician assistant training: preliminary findings.	Wardley CS; Applegate EB; Van Rhee JA; Journal of Physician Assistant Education (Physician Assistant Education Association), 2006; 17(1): 10-17. 8p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	-	-
CINAHL	74- The doctoral pipeline in physician assistant education.	Orcutt VL; Hildebrand A; Jones PE; Journal of Physician Assistant Education (Physician Assistant Education Association), 2006; 17(1): 6-9. 4p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	+	-

CINAHL	75- Wellness in a physician assistant curriculum: an experience model.	Laird J; Hawkins S; Hertweck M; Swanson-Biearman B; Journal of Physician Assistant Education (Physician Assistant Education Association), 2006; 17(4): 5-11. 7p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	-	-
CINAHL	76- Physician assistant faculty retirement intentions.	Jones PE; Repka M; Draper D; Orcutt V; Journal of Physician Assistant Education (Physician Assistant Education Association), 2006; 17(4): 17-21. 5p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	-	-
CINAHL	77- The description of adventitious lung sounds by physician assistants.	Wilkins RL; Samson M; Dudley G; McElvain R; Valera R; Daher NS; Journal of Physician Assistant Education (Physician Assistant Education Association), 2006; 17(3): 23-27. 5p. (Journal Article - questionnaire/scale, research, tables/charts) ISSN: 1941-9430	+	+	-
CINAHL	78- Physician assistant student attitudes toward complementary and alternative medicine before and after completion of a core curriculum.	Colletti T; Robinson P; Ostbye T; Morgan P; Caniglio D; Journal of Physician Assistant Education (Physician Assistant Education Association), 2006; 17(3): 11-17. 7p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	-	-
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Pub med	47-Preoperative Tests (Update): Routine Preoperative Tests for Elective Surgery.	National Guideline Centre (UK). London: National Institute for Health and Care Excellence (UK); 2016 Apr. PMID:27077168	+	+	-
Pub med	48-Effect of Anesthesia Staffing Ratio on First-Case Surgical Start Time.	Chen Y, Gabriel RA, Kodali BS, Urman RD. J Med Syst. 2016 May;40(5):115. doi: 10.1007/s10916-016-0471-z. Epub 2016 Mar 19.	+	+	-

		PMID:26995356			
Pub med	49-Clinicopathological comparisons of open vein harvesting and endoscopic vein harvesting in coronary artery bypass grafting patients in Mashhad.	Amouzeshi A, Teshnisi MA, Zirak N, Shamloo AS, Hoseinikhah H, Alizadeh B, Moeinipour A. Electron Physician. 2016 Jan 15;8(1):1693-700. doi: 10.19082/1693. eCollection 2016 Jan. PMID:26955438	+	+	-
Pub med	50-In a demanding task, three-handed manipulation is preferred to two-handed manipulation.	Abdi E, Burdet E, Bouri M, Himidan S, Bleuler H. Sci Rep. 2016 Feb 25;6:21758. doi: 10.1038/srep21758. PMID: 26912293	+	+	-
Pub med	51-Risk Factors and Outcomes Associated With Readmission to the Intensive Care Unit After Cardiac Surgery.	Kang YA. AACN Adv Crit Care. 2016 Feb;27(1):29-39. doi: 10.4037/aacnacc2016451. PMID: 26909451	+	+	–
Pub med	52-The effectiveness of systematic perioperative oral hygiene in reduction of postoperative respiratory tract infections after elective thoracic surgery in adults: a systematic review.	Pedersen PU, Larsen P, Håkonsen SJ. JBI Database System Rev Implement Rep. 2016 Jan;14(1):140-73. doi: 10.11124/jbisrir-2016-2180. Review.PMID:26878926	+	+	-
Pub med	53-Resident training in a new robotic thoracic surgery program.	White YN, Dedhia P, Bergeron EJ, Lin J, Chang AA, Reddy RM. J Surg Res. 2016 Mar;201(1):219-25. doi: 10.1016/j.jss.2015.10.030. Epub 2015 Oct 28. PMID:26850206	+	+	-
Pub med	54-Physician assistants in cardiothoracic surgery.	Bunnell DJ. JAAPA. 2016 Jan;29(1):9-10. doi: 10.1097/01.JAA.0000475470.94509.ff. No abstract available. PMID:26656381	+	+	+

Pub med	55-Reducing the pathogen burden and promoting healing with polyhexanide in non-healing wounds: a prospective study.	Ceviker K, Canikoglu M, Tatlıoglu S, Bagdatli Y. J Wound Care. 2015 Dec;24(12):582-6. doi: 10.12968/jowc.2015.24.12.582. PMID:26654738	+ CH	+ O	+ SE
Pub med	56-Value of preoperative 6-minute walk test for predicting postoperative pulmonary complications.	Keeratichananont W, Thanadetsuntorn C, Keeratichananont S. Ther Adv Respir Dis. 2016 Feb;10(1):18-25. doi: 10.1177/1753465815615509. Epub 2015 Nov 6. PMID:26546478	+	+	-
Pub med	57-Validation of the confusion assessment method in detecting postoperative delirium in cardiac surgery patients.	Smulter N, Lingehall HC, Gustafson Y, Olofsson B, Engström KG. Am J Crit Care. 2015 Nov;24(6):480-7. doi: 10.4037/ajcc2015551. PMID:26523005	+	+	-
Pub med	58-The Toronto General Hospital Transitional Pain Service: development and implementation of a multidisciplinary program to prevent chronic postsurgical pain.	Katz J, Weinrib A, Fashler SR, Katznelzon R, Shah BR, Ladak SS, Jiang J, Li Q, McMillan K, Santa Mina D, Wentlandt K, McRae K, Tamir D, Lyn S, de Perrot M, Rao V, Grant D, Roche-Nagle G, Cleary SP, Hofer SO, Gilbert R, Wijeysundera D, Ritvo P, Janmohamed T, O'Leary G, Clarke H. J Pain Res. 2015 Oct 12;8:695-702. doi: 10.2147/JPR.S91924. eCollection 2015. PMID:26508886	+	+	-
Pub med	59-Provider Type and Quality of Outpatient Cardiovascular Disease Care: Insights From the NCDR PINNACLE Registry.	Virani SS, Maddox TM, Chan PS, Tang F, Akeroyd JM, Risch SA, Oetgen WJ, Deswal A, Bozkurt B, Ballantyne CM, Petersen LA. J Am Coll Cardiol. 2015 Oct 20;66(16):1803-1812. doi: 10.1016/j.jacc.2015.08.017. PMID:26483105	+	+	-
Pub med	60-STOP: Can We Minimize OR Traffic?	Elliott S, Parker S, Mills J, Meeusen L, Frana T, Anderson M, Storsveen A, White A. AORN J. 2015 Oct;102(4):409.e1-7. doi: 10.1016/j.aorn.2015.08.011.	+	+	-

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Pub med	61-Charts versus Discharge ICD-10 Coding for Sternal Wound Infection Following Coronary Artery Bypass Grafting.	Southern DA, Doherty C, De Souza MA, Quan H, Harrop AR, Nickerson D, Rabi D. Perspect Health Inf Manag. 2015 Jul 1;12:1e. eCollection 2015. PMID:26396556	+	+	-
Pub med	62-Robot-Assisted Thoracic Surgery (RATS): Perioperative Nursing Professional Development Program.	Sarmanian JD. AORN J. 2015 Sep;102(3):241-53. doi: 10.1016/j.aorn.2015.06.013. PMID:26323222	+	+	-
Pub med	63-ffect of Anxiety on Individuals and Caregivers After Coronary Artery Bypass Grafting Surgery: A Review of the Literature.	Joseph HK, Whitcomb J, Taylor W. Dimens Crit Care Nurs. 2015 Sep-Oct;34(5):285-8. doi: 10.1097/DCC.0000000000000137. Review. PMID:26244244	+	+	-
Pub med	64-Achieving and Sustaining Zero: Preventing Surgical Site Infections After Isolated Coronary Artery Bypass With Saphenous Vein Harvest Site Through Implementation of a Staff-Driven Quality Improvement Process.	Kles CL, Murrah CP, Smith K, Baugus-Wellmeier E, Hurry T, Morris CD. Dimens Crit Care Nurs. 2015 Sep-Oct;34(5):265-72. doi: 10.1097/DCC.0000000000000131. PMID:26244240	+	+	.
Pub med	65-Training Assistants Improves the Process of Adoption of Video-Assisted Thoracic Surgery Lobectomy.	Meyerson SL, Balderson SS, D'Amico TA. Ann Thorac Surg. 2015 Aug;100(2):401-6. doi: 10.1016/j.athoracsur.2015.03.087. Epub 2015 Jun 23. PMID:26116475	+	-	-
Pub med	66-A framework for physician assistant intervention for overweight and obesity.	Herman L, McGinnity JG, Doll M, Peterson ED, Russell A, Largay J; American Academy of Physician Assistants Overweight and Obesity Task Force. JAAPA. 2015 Jul;28(7):29-33. doi: 10.1097/01.JAA.0000466594.30788.a6. PMID:26107792	+	-	-

Pub med	67-Hospitals In 'Magnet' Program Show Better Patient Outcomes On Mortality Measures Compared To Non-'Magnet' Hospitals.	Friese CR, Xia R, Ghaferi A, Birkmeyer JD, Banerjee M. Health Aff (Millwood). 2015 Jun;34(6):986-92. doi: 10.1377/hlthaff.2014.0793. PMID:26056204	+	+	-
Pub med	68-A Comparison of Teaching Modalities and Fidelity of Simulation Levels in Teaching Resuscitation Scenarios.	Adams AJ, Wasson EA, Admire JR, Pablo Gomez P, Babayeuski RA, Sako EY, Willis RE. J Surg Educ. 2015 Sep-Oct;72(5):778-85. doi: 10.1016/j.jsurg.2015.04.011. Epub 2015 May 20. PMID:26002536	+	+	-
Pub med	69-Establishing an Early Discharge Protocol After Cardiac Surgery in Korea.	Kwak C, Ko Y. Worldviews Evid Based Nurs. 2015 Jun;12(3):176-8. doi: 10.1111/wvn.12092. Epub 2015 May 11. PMID:25964014	+	+	-
Pub med	70-Sharma's clamp for sequential coronary artery grafting.	Sharma AK, Siddiqi MS, Al Sabti H. Asian Cardiovasc Thorac Ann. 2015 Oct;23(8):1007-9. doi: 10.1177/0218492315585045. Epub 2015 Apr 29. PMID:25931571	+	+	-
Pub med	71-Getting satisfaction: drivers of surgical Hospital Consumer Assessment of Health care Providers and Systems survey scores.	Iannuzzi JC, Kahn SA, Zhang L, Gestring ML, Noyes K, Monson JR. J Surg Res. 2015 Jul;197(1):155-61. doi: 10.1016/j.jss.2015.03.045. Epub 2015 Mar 24. PMID:25908102	+	+	-
Pub med	72-Transition to surgical residency: a multi-institutional study of perceived intern preparedness and the effect of a formal residency preparatory course in the fourth year of medical school.	Minter RM, Amos KD, Bentz ML, Blair PG, Brandt C, D'Cunha J, Davis E, Delman KA, Deutsch ES, Divino C, Kingsley D, Klingensmith M, Meterissian S, Sachdeva AK, Terhune K, Termuhlen PM, Mullan PB. Acad Med. 2015 Aug;90(8):1116-24. doi: 10.1097/ACM.0000000000000680.	+	+	-

		PMID:25785673			
Pub med	73-See one, do one, and teach none: resident experience as a teaching assistant.	Sachs TE, Pawlik TM. J Surg Res. 2015 May 1;195(1):44-51. doi: 10.1016/j.jss.2014.08.001. Epub 2015 Feb 3. PMID:25703163	+	+	-
Pub med	74-Cardiac risk assessment: decreasing postoperative complications.	Thanavaro JL. AORN J. 2015 Feb;101(2):201-12. doi: 10.1016/j.aorn.2014.03.014. PMID:25645037	+	+	-
Pub med	75-The perioperative handoff protocol: evaluating impacts on handoff defects and provider satisfaction in adult perianesthesia care units.	Petrovic MA, Aboumatar H, Scholl AT, Gill RS, Krenzischek DA, Camp MS, Senger CM, Deng Y, Chang TY, Xie Y, Jurdi ZR, Martinez EA. J Clin Anesth. 2015 Mar;27(2):111-9. doi: 10.1016/j.jclinane.2014.09.007. Epub 2014 Dec 22. PMID:25541368	+	+	-
Pub med	76-Creating a high-reliability health care system: improving performance on core processes of care at Johns Hopkins Medicine.	Pronovost PJ, Armstrong CM, Demski R, Callender T, Winner L, Miller MR, Austin JM, Berenholtz SM, Yang T, Peterson RR, Reitz JA, Bennett RG, Broccolino VA, Davis RO, Gragnolati BA, Green GE, Rothman PB. Acad Med. 2015 Feb;90(2):165-72. doi: 10.1097/ACM.0000000000000610. PMID:25517699	+	+	-
Pub med	77-Predicting Heart Failure Readmissions.	Sherer AP, Crane PB, Abel WM, Efird J. J Cardiovasc Nurs. 2016 Mar-Apr;31(2):114-20. doi: 10.1097/JCN.0000000000000225. PMID:25513988	+	+	-
Pub med	78-Perioperative nursing in public university hospitals: an ethnography.	Sørensen EE, Olsen IØ, Tewes M, Uhrenfeldt L. BMC Nurs. 2014 Dec 9;13(1):45. doi: 10.1186/s12912-014-0045-7. eCollection 2014.	+	+	-

		PMID:25506263			
Pub med	79-Improving patients' readiness for coronary artery bypass graft surgery.	Chaisson K, Sanford M, Boss RA Jr, Leavitt BJ, Hearne MJ, Ross CS, Olmstead EM, Kramer RS, Hofmaster P, Mingo C, Duquette D, Maislen E, Clark JA, Likosky DS, Horton SR, O'Connor GT, Malenka DJ; Northern New England Cardiovascular Disease Study Group. Crit Care Nurse. 2014 Dec;34(6):29-36. doi: 10.4037/ccn2014951. Erratum in: Crit Care Nurse. 2015 Feb;35(1):9. PMID:25452407	+	+	-
Pub med	80-Surgical outcomes of heart valves replacement: A study of tertiary specialied cardiac center.	Samiei N, Hakimi MR, Mirmesdagh Y, Peighambari MM, Alizadeh-Ghavidel A, Hosseini S. ARYA Atheroscler. 2014 Sep;10(5):233-7. PMID: 25477979	+	+	-
Pub med	81-Factors associated with post-surgical delirium in patients undergoing open heart surgery.	Jannati Y, Bagheri-Nesami M, Sohrabi M, Yazdani-Cherati J, Mazdarani S. Oman Med J. 2014 Sep;29(5):340-5. doi: 10.5001/omj.2014.91. PMID:25337310	+	+	-
Pub med	82-Psychophysical workload in the operating room: primary surgeon versus assistant.	Rieger A, Fenger S, Neubert S, Weippert M, Kreuzfeld S, Stoll R. Surg Endosc. 2015 Jul;29(7):1990-8. doi: 10.1007/s00464-014-3899-6. Epub 2014 Oct 11. PMID:25303917	+	+	-
Pub med	83-What's behind the scenes? Exploring the unspoken dimensions of complex and challenging surgical situations.	Cristancho SM, Bidinosti SJ, Lingard LA, Novick RJ, Ott MC, Forbes TL. Acad Med. 2014 Nov;89(11):1540-7. doi: 10.1097/ACM.0000000000000478. PMID:25250744	+	+	-
Pub med	84-A pharmacologic review of cardiac arrest.	Wagner BJ, Yunker NS. Plast Surg Nurs. 2014 Jul-Sep;34(3):133-8; quiz 139-40. doi: 10.1097/PSN.0000000000000051.	+	-	-

		PMID:25188852			
Pub med	85-Barriers and enablers affecting patient engagement in managing medications within specialty hospital settings.	Manias E, Rixon S, Williams A, Liew D, Braaf S. Health Expect. 2015 Dec;18(6):2787-98. doi: 10.1111/hex.12255. Epub 2014 Sep 4. PMID:25186633	+	+	-
Pub med	86-Patient perspectives on information needs for amputation secondary to vascular surgery: what, when, why, and how much?	Pedlow H, Cormier A, Provost M, Bailey S, Balboul G, Coucill A, Coleman J, Fox P, Moloney T, Nixon SA. J Vasc Nurs. 2014 Sep;32(3):88-98. doi: 10.1016/j.jvn.2014.01.002. PMID: 25131755	+	-	-
Pub med	87-Breaking the silence: Determinants of voice for quality improvement in hospitals.	Nembhard IM, Labao I, Savage S. Health Care Manage Rev. 2015 Jul-Sep;40(3):225-36. doi: 10.1097/HMR.0000000000000028. PMID:24901299	+	–	–
Pub med	88-Use of a machine learning algorithm to classify expertise: analysis of hand motion patterns during a simulated surgical task.	Watson RA. Acad Med. 2014 Aug;89(8):1163-7. doi: 10.1097/ACM.0000000000000316. PMID: 24853195	+	+	-
Pub med	89-Promotion of progressive mobility activities with ventricular assist and extracorporeal membrane oxygenation devices in a cardiothoracic intensive care unit.	Chavez J, Bortolotto SJ, Paulson M, Huntley N, Sullivan B, Babu A. Dimens Crit Care Nurs. 2015 Nov-Dec;34(6):348-55. doi: +10.1097/DCC.0000000000000141. PMID: 26436301	+	-	-

Pub med	90- Cognitive behavioral therapy in depressed cardiac surgery patients: role of ejection fraction.	Hwang B, Eastwood JA, McGuire A, Chen B, Cross-Bodán R, Doering LV. J Cardiovasc Nurs. 2015 Jul-Aug;30(4):319-24. doi: 10.1097/JCN.0000000000000155. PMID:24763358	+	-	-
Pub med	91- Clinical usefulness and cost effectiveness of fractional flow reserve among Indian patients (FIND study).	Sengottuvelu G, Chakravarthy B, Rajendran R, Ravi S. Catheter Cardiovasc Interv. 2016 Nov;88(5):E139-E144. doi: 10.1002/ccd.25517. Epub 2014 Jun 17. PMID:24740902	+	-	-
Pub med	92-Outcomes reported by the Vascular Quality Initiative and the National Surgical Quality Improvement Program are not comparable.	Aiello FA, Shue B, Kini N, Rosen A, Messina L, Robinson W, Gona P, Schanzer A. J Vasc Surg. 2014 Jul;60(1):152-9, 159.e1-3. doi: 10.1016/j.jvs.2014.01.046. Epub 2014 Mar 14. PMID:24630871	+	-	-
Pub med	93-Operative management of intracardiac myxomas: A single center experience.	Mishra A, Shah M, Sharma P, Kothari J, Malhotra A. Med J Armed Forces India. 2014 Jan;70(1):5-9. doi: 10.1016/j.mjafi.2013.05.009. Epub 2013 Aug 30. PMID:24623939	+	-	-
Pub med	94-Pharmacy management of postoperative blood glucose in open heart surgery patients: evaluation of an intravenous to subcutaneous insulin protocol.	Stahnke A, Struemph K, Behnen E, Schimmelpfennig J. Hosp Pharm. 2014 Feb;49(2):164-9. doi: 10.1310/hpj4902-164. PMID: 24623869	+	-	-
Pub med	95-Nurse screening for neuropathic pain in postoperative patients.	Taverner T, Prince J. Br J Nurs. 2014 Jan 23-Feb 12;23(2):76-80. PMID:24464110	+	+	-
Pub med	96-The year in cardiothoracic and vascular anesthesia: selected highlights from 2013.	Ramakrishna H, Kohl BA, Gutsche JT, Fassl J, Patel PA, Riha H, Ghadimi K, Vernick WJ, Andritsos M, Silvay G, Augoustides JGT.	+	-	-

		J Cardiothorac Vasc Anesth. 2014 Feb;28(1):1-7. doi: 10.1053/j.jvca.2013.10.018. Review. PMID:24440007			
Pub med	97-Predicting coronary heart disease events in women: a longitudinal cohort study.	McSweeney J, Cleves MA, Fischer EP, Moser DK, Wei J, Pettey C, Rojo MO, Armbya N. J Cardiovasc Nurs. 2014 Nov-Dec;29(6):482-92. doi: 10.1097/JCN.0b013e3182a409cc. PMID:24231895	+	-	-
Pub med	98-Reevaluation of the critical-care pain observation tool in intubated adults after cardiac surgery.	Linde SM, Badger JM, Machan JT, Beaudry J, Brucker A, Martin K, Opaluch-Bushy NB, Navedo Roy RD. Am J Crit Care. 2013 Nov;22(6):491-7. doi: 10.4037/ajcc2013700. PMID:24186820	+	-	-
Pub med	99-Audit of co-management and critical care outreach for high risk postoperative patients (The POST audit).	Story DA, Shelton A, Jones D, Heland M, Belomo R; Austin Health Post-Operative Surveillance Team Investigators (POST). Anaesth Intensive Care. 2013 Nov;41(6):793-8. PMID:24180722	+	-	-
Pub med	100-Decline in health-related quality of life 6 months after coronary artery bypass graft surgery: the influence of anxiety, depression, and personality traits.	Middel B, El Baz N, Pedersen SS, van Dijk JP, Wynia K, Reijneveld SA. J Cardiovasc Nurs. 2014 Nov-Dec;29(6):544-54. doi: 10.1097/JCN.0b013e3182a102ae. PMID:24165701	+	+	-
Pub med	101-Patient selection for day case-eligible surgery: identifying those at high risk for major complications.	Mathis MR, Naughton NN, Shanks AM, Freundlich RE, Pannucci CJ, Chu Y, Haus J, Morris M, Kheterpal S. Anesthesiology. 2013 Dec;119(6):1310-21. doi: 10.1097/ALN.0000000000000005. PMID:24108100	+	-	-
Pub medv	102-Physician assistant model for lung procurements: a paradigm worth considering.	Costa J, D'Ovidio F, Bacchetta M, Lavelle M, Singh G, Sonett JR. Ann Thorac Surg. 2013 Dec;96(6):2033-7. doi: 10.1016/j.athoracsur.2013.07.094. Epub 2013 Oct 1. PMID:24090582	+	-	-

Pub med	103-Introduction of cardiac surgery residency program at an earlier stage in surgical training.	Komiya T. Gen Thorac Cardiovasc Surg. 2013 Dec;61(12):694-8. doi: 10.1007/s11748-013-0325-2. PMID:24078281	+	+	-
Pub med	104-A retrospective review of leg wound complications after coronary artery bypass surgery.	East SA, Lorenz RA, Armbrecht ES. AORN J. 2013 Oct;98(4):401-12. doi: 10.1016/j.aorn.2013.07.016. Review. PMID:24075335	+ CH	+ O	+ SE
Pub med	105-Discharge education to promote self-management following cardiovascular surgery: an integrative review.	Veronovici NR, Lasiuk GC, Rempel GR, Norris CM. Eur J Cardiovasc Nurs. 2014 Feb;13(1):22-31. doi: 10.1177/1474515113504863. Epub 2013 Sep 15. Review. PMID:24042728	+	+	-
Pub med	106-Validation of the Swedish version of the Nursing Delirium Screening Scale used in patients 70 years and older undergoing cardiac surgery.	Lingehall HC, Smulter N, Engström KG, Gustafson Y, Olofsson B. J Clin Nurs. 2013 Oct;22(19-20):2858-66. doi: 10.1111/j.1365-2702.2012.04102.x. PMID:24033713	+	+	-
Pub med	107-Principles of monitoring postoperative patients.	Liddle C. Nurs Times. 2013 Jun 5-11;109(22):24-6. PMID:23862357	+	+	-
Pub med	108-Realizing improved patient care through human-centered operating room design: a human factors methodology for observing flow disruptions in the cardiothoracic operating room.	Palmer G 2nd, Abernathy JH 3rd, Swinton G, Allison D, Greenstein J, Shappell S, Juang K, Reeves ST. Anesthesiology. 2013 Nov;119(5):1066-77. doi: 10.1097/ALN.0b013e31829f68cf. PMID:23811697	+	+	-
Pub med	109-Does goal-directed fluid therapy affect postoperative orthostatic intolerance?: A randomized trial.	Bundgaard-Nielsen M, Jans Ø, Müller RG, Korshin A, Ruhnau B, Bie P, Secher NH, Kehlet H. Anesthesiology. 2013 Oct;119(4):813-23. doi: 10.1097/ALN.0b013e31829ce4ea.	+	+	-

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Pub med	110-Rapid clinical evaluation: an early warning cardiac surgical scoring system for hand-held digital devices.	Badreldin AM, Doerr F, Bender EM, Bayer O, Brehm BR, Wahlers T, Hekmat K. Eur J Cardiothorac Surg. 2013 Dec;44(6):992-7; discussion 997-8. doi: 10.1093/ejcts/ezt232. Epub 2013 Jun 11. PMID:23756348	+	+	-
Pub med	111-Improving cardiovascular care through outpatient cardiac rehabilitation: an analysis of payment models that would improve quality and promote use.	Mead H, Grantham S, Siegel B. J Cardiovasc Nurs. 2014 Mar-Apr;29(2):158-64. doi: 10.1097/JCN.0b013e31828568f7. PMID:23416941	+	+	-
Pub med	112-Physician assistant home visit program to reduce hospital readmissions.	Nabagiez JP, Shariff MA, Khan MA, Molloy WJ, McGinn JT Jr. J Thorac Cardiovasc Surg. 2013 Jan;145(1):225-31, 233; discussion 232-3. doi: 10.1016/j.jtcvs.2012.09.047. PMID:23244257	+	+	-
Pub med	113-Web-based nursing intervention for self-management of pain after cardiac surgery: pilot randomized controlled trial.	Martorella G, Côté J, Racine M, Choinière M. J Med Internet Res. 2012 Dec 14;14(6):e177. doi: 10.2196/jmir.2070. PMID:+ 23241361	+	+	-
Pub med	114-Managing a surgical exsanguination emergency in the operating room through simulation: an interdisciplinary approach.	Acero NM, Motuk G, Luba J, Murphy M, McKelvey S, Kolb G, Dumon KR, Resnick AS. J Surg Educ. 2012 Nov-Dec;69(6):759-65. doi: 10.1016/j.jsurg.2012.06.022. Epub 2012 Aug 16. PMID:23111043	+	+	-
Pub med	115-Physician assistant education in India.	Kuilman L, Sundar G, Cherian KM. J Physician Assist Educ. 2012;23(3):56-9. PMID:23072073	+	+	-
Pub med	116-Peri-operative care in adults with congenital heart disease: room for improvement in after care.	Schoormans D, Smets EM, Zwart R, Sprangers MA, Veelenturg TH, de Mol BA, Hazekamp MG, Koolbergen DR, Sojak V, Bouma BJ, Groenink M, Boekholdt MS, Backx AP, Mulder BJ.	+	+	-

		Cardiol Young. 2013 Aug;23(4):540-5. doi: 10.1017/S1047951112001254. Epub 2012 Oct 2. PMID:23025898			
Pub med	117-Impact of an assistant on the technical skills of the primary operator in superficial femoral artery angioplasty.	Hseino H, Nugent E, Cantwell C, Lee MJ, Given M, Hill AD, Moneley D. Vasc Endovascular Surg. 2012 Nov;46(8):635-9. doi: 10.1177/1538574412460771. Epub 2012 Sep 20. PMID:23002121	+	-	-
Pub med	118-Smoking cessation in women at the time of an invasive cardiovascular procedure and 3 months later.	Moore LC, Clark PC, Lee SY, Eriksen M, Evans K, Smith CH. J Cardiovasc Nurs. 2013 Nov-Dec;28(6):524-33. doi: 10.1097/JCN.0b013e31826620d4. PMID:23001066	+	-	-
Pub med	119-A systematic review on the effectiveness of prewarming to prevent perioperative hypothermia.	de Brito Poveda V, Clark AM, Galvão CM. J Clin Nurs. 2013 Apr;22(7-8):906-18. doi: 10.1111/j.1365-2702.2012.04287.x. Epub 2012 Sep 17. Review. PMID:22978458	+	+	-
Pub med	120-The safety and efficacy of physician assistants as first assistant surgeons in cardiac surgery.	Ranzenbach EA, Poa L, Puig-Palomar M, Holtzman M, Miller S, Mohr M. JAAPA. 2012 Aug;25(8):52. PMID: 22928278	+	+	-
Pub med	121-Measuring what we value: quantifying the impact of the physician extender in surgical care.	Berger J, D'Cunha J. Semin Thorac Cardiovasc Surg. 2012 Summer;24(2):85-6. doi: 10.1053/j.semtcvs.2012.06.008. No abstract available. PMID:22920521	+	+	-
Pub med	122-Core competencies required for the cardiac surgical nurse practitioner.	Foster SS. J Am Acad Nurse Pract. 2012 Aug;24(8):472-5. doi: 10.1111/j.1745-7599.2012.00727.x. Epub 2012 May 3. Review. PMID:22845030	+ CH	+ O	+ SE

Pub med	123-The circulating nurse's role in error recovery in the cardiovascular OR.	Yang YT, Henry L, Dellinger M, Yonish K, Emerson B, Seifert PC. AORN J. 2012 Jun;95(6):755-62. doi: 10.1016/j.aorn.2011.09.022. PMID:22633382	+	+	-
Pub med	124-Diabetes and stress hyperglycemia in the intensive care unit: outcomes after cardiac surgery.	Gianchandani RY, Esfandiari NH, Haft JW, Prager RL, Pop-Busui R. Hosp Pract (1995). 2012 Apr;40(2):22-30. doi: 10.3810/hp.2012.04.966. PMID: 22615075	+	+	-
Pub med	125-Clinical information transfer and data capture in the acute myocardial infarction pathway: an observational study.	Kesavan S, Kelay T, Collins RE, Cox B, Bello F, Kneebone RL, Sevdalis N. J Eval Clin Pract. 2013 Oct;19(5):805-11. doi: 10.1111/j.1365-2753.2012.01853.x. Epub 2012 May 15. PMID:22587539	+	-	-
Pub med	126-Surgical resident participation in laparoscopic Roux-en-Y bypass: Is it safe?	Fanous M, Carlin A. Surgery. 2012 Jul;152(1):21-5. doi: 10.1016/j.surg.2012.02.014. Epub 2012 Apr 11. PMID: 22503322	+	-	-
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Pub med	129-Pilot implementation of a perioperative protocol to guide operating room-to-intensive care unit patient handoffs.	Petrovic MA, Aboumatar H, Baumgartner WA, Ulatowski JA, Moyer J, Chang TY, Camp MS, Kowalski J, Senger CM, Martinez EA.	+	+	-

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CINA HL	2-The Weight Is Over: RN First Assisting Techniques for Laparoscopic Sleeve Gastrectomy.	Authors:Wentzell, Joanne; Neff, Marc Source:AORN Journal (AORN J), Aug2015; 102(2): 161-180. (20p) http://dx.doi.org.ezproxy.jamk.fi:2048/10.1016/j.aorn.2015.05.019 *PMID:* 26227520 *NLM UID:* 0372403	+	-	-
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CINAHL	114- Distance learning for the RN first assistant.	Degon R; AORN Journal, Jan2010; 91(1): 146-153. 8p. (Journal Article - forms, tables/charts) ISSN: 0001-2092 PMID: 20102811	+	+	-
CINAHL	115- Health policy issues. Providers of first assisting services.	Franko FP; AORN Journal, Jun2004; 79(6): 1311-1318. 5p. (Journal Article) ISSN: 0001-2092 PMID: 15239331	+	+	-
CINAHL	116- Organizational infrastructure of American physician assistant education programs.	Wright KA; Cawley JF; Hooker RS; Ahuja M; Journal of Physician Assistant Education (Physician Assistant Education Association), 2009; 20(3): 15-21. 7p. (Journal Article - glossary, research, tables/charts) ISSN: 1941-9430	+	+	-
CINAHL	117- Comparison of medical and physician assistant student performance in interprofessional pharmacology and clinical medicine courses.	Hegmann TE; Kasson BG; Stafford HA; Asprey D; Journal of Physician Assistant Education (Physician Assistant Education Association), 2009; 20(4): 21-25. 5p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	-	-
CINAHL	118- Nurse first surgical assistant (NFSA): a rewarding career.	Arpin J; Canadian Operating Room Nursing Journal, Dec2005; 23(4): 32-36. 2p. (Journal Article) ISSN: 0712-6778 PMID: 16466185	+ CH	+ O	+ SE
CINAHL	119- Incorporation of the Competencies for the Physician Assistant Profession into Physician Assistant Education.	Essary AC; Stoehr J; Journal of Physician Assistant Education (Physician Assistant Education Association), 2009; 20(1): 6-14. 9p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	+	-
CINAHL Doubled!	120- The Circulating Nurse's Role in Error Recovery in the Cardiovascular OR.	Yang, Y Tony; Henry, Linda; Dellinger, Mary; Yonish, Kersten; Emerson, Brett; Seifert, Patricia C; AORN Journal, Jun2012; 95(6): 755-762. 8p. (Journal Article - research, tables/charts) ISSN: 0001-2092 PMID: 22633382	-	-	-
CINAHL	121- Postgraduate physician assistant training programs in the United States: emerging trends and opportunities.	Wiemiller MJP; Somers KK; Adams MB; Knott P; Journal of Physician Assistant Education (Physician Assistant Education Association), 2008; 19(4): 58-63. 6p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	+	-
CINAHL	122- Training the physician assistant in the Netherlands.	(includes abstract) Spenkelink-Schut G; ten Cate OTJ; Kort HSM; Fahringer D; Journal of Physician Assistant Education (Physician Assistant	+	+	-

		Education Association), 2008; 19(4): 46-53. 8p. (Journal Article - statistics, tables/charts) ISSN: 1941-9430			
CINAHL	123- The physician assistant in general practice in the Netherlands.	Simkens ABM; van Baar ME; van Balen FAM; Verheij RA; van den Hoogen HJM; Schrijvers AJP; Journal of Physician Assistant Education (Physician Assistant Education Association), 2009; 20(1): 30-38. 9p. (Journal Article - research, tables/charts) ISSN: 1941-9430	+	-	-
CINAHL	124- AORN Position Statement: Advanced Practice Registered Nurse Practicing in the Perioperative Setting.	AORN Journal, Mar2013; 97(3): 299-301. 3p. (Journal Article - standards) ISSN: 0001-2092	+	+	-
CINAHL	125- ROLES FOR RN FIRST SURGICAL ASSISTANTS.	Kai Tiaki Nursing New Zealand, May2012; 18(4): 9-9. 1p. (Journal Article - brief item) ISSN: 1173-2032	+	+	-
CINAHL	126- The Ethics of Substituting Physician Assistants, Nurse Practitioners, and Residents for Attending Physicians.	Jecker NS; American Journal of Bioethics, Aug2010; 10(8): 11-13. 3p. (Journal Article - commentary) ISSN: 1526-5161 PMID: 20694897	+	+	-
CINAHL	127- External organizational influences on physician assistant education.	Lombardo P; Journal of Physician Assistant Education (Physician Assistant Education Association), 2007; 18(3): 71-75. 5p. (Journal Article) ISSN: 1941-9430	+	+	-
CINAHL	128- Home study program. Evolution of robotics in surgery and implementing a perioperative robotics nurse specialist role.	Francis P; AORN Journal, Mar2006; 83(3): 629-646. 16p. (Journal Article - CEU, exam questions, forms, pictorial, tables/charts) ISSN: 0001-2092 PMID: 16579121	+	-	-
CINAHL	129- Report on physician assistant role out.	Kai Tiaki Nursing New Zealand, Aug2015; 21(7): 7-7. 1p. (Journal Article - brief item) ISSN: 1173-2032	+	+	-
CINAHL	130- Reviewing roles: nurses vs physician assistants.	While, Alison; British Journal of Community Nursing, Jul2015; 20(7): 362-362. 1p. (Journal Article) ISSN: 1462-4753 PMID: 26140324	+	-	-
CINAHL	131- Developments in the RN first assistant role: during the Korean war.	Hallquist DL; AORN Journal, Oct2005; 82(4): 644-647. 4p. (Journal Article - pictorial) ISSN: 0001-2092 PMID: 16370234	+	+	-
CINAHL	132- Health policy issues. State laws requiring RN first assistant reimbursement.	Becker EC; AORN Journal, Nov2005; 82(5): 881-887. 5p. (Journal Article) ISSN: 0001-2092	+	+	-
CINAHL 2005 год	133- AORN standards for RN first assistant education programs.	Association of periOperative Registered Nurses; AORN Journal, Sep2005; 82(3): 457-460. 4p.	+	+	-

		(Journal Article - glossary, standards) ISSN: 0001-2092 PMID: 16309072			
CINAHL	134- Benefits of preoperative education for adult elective surgery patients.	Kruzik N; AORN Journal, Sep2009; 90(3): 381-387. 5p. (Journal Article) ISSN: 0001-2092 PMID: 19735761	+	+	_
CINAHL	135- What it means to be a physician assistant student.	Lisowski V; Journal of Physician Assistant Education (Physician Assistant Education Association), 2009; 20(4): 52-54. 3p. (Journal Article - anecdote) ISSN: 1941-9430	+		
CINAHL	136- Home study program. The RN first assistant as OR concierge.	Robbins K; Mann WJ Jr.; AORN Journal, Jul2004; 80(1): 83-82. 4p. (Journal Article - CEU, exam questions) ISSN: 0001-2092 PMID: 15315275	+	+	-
CINAHL	137- Financial and organizational factors affecting the employment of nurse practitioners and physician assistants in medical group practices.	Kaissi A; Kralewski J; Dowd B; Journal of Ambulatory Care Management, Jul-Sep2003; 26(3): 209-216. 8p. (Journal Article - research, tables/charts) ISSN: 0148-9917 PMID: 12856500	+	+	_
CINAHL	138- Prolonged standing in the OR: a Dutch research study.	Meijsen P; Knibbee HJJ; AORN Journal, Sep2007; 86(3): 399-414. 13p. (Journal Article - pictorial, questionnaire/scale, research, tables/charts) ISSN: 0001-2092 PMID: 17822644	+	+	-
CINAHL	139-PAs and NPs: how they boost practice earnings.	Weiss GG; Contemporary OB/GYN, Jul2007; 52(7): 52-58. 4p. (Journal Article - forms, pictorial) ISSN: 0090-3159	+	+	-
CINAHL	140- The Role of US Physician Assistants in Global Health Workforce Education.	Knoble, Stephen; Journal of Physician Assistant Education (Physician Assistant Education Association), 2014; 25(3): 45-45. 1p. (Journal Article - brief item) ISSN: 1941-9430	+	+	_
CINAHL	141- Introducing the physician assistant.	Nassar A; Bethel J; Emergency Nurse, Mar2009; 16(10): 12-14. 3p. (Journal Article - pictorial, tables/charts) ISSN: 1354-5752 PMID: 19361087	+	+	-
CINAHL	143- Psychosocial stress among hospital doctors in surgical fields: results of a nationwide survey in Germany.	von dem Knesebeck O; Klein J; Frie KG; Blum K; Siegrist J; Deutsches Aerzteblatt International, 4/9/2010; 107(14): 248-253. 6p. (Journal Article - research, tables/charts) ISSN: 1866-0452 PMID: 20436777 PMCID: PMC2861767	+	-	-
Chosen	**561**	**DUBLICATED**	**554**	**379**	**11**

Appendix 2. List of double articles

Database	Doubled Articles		№
Cinahl-Cinahl	(9 =109) The role of the assistant practitioner in the clinical setting: a focus group study.	Henshall, Catherine; Doherty, Andrea; Green, Helen; Westcott, Liz; Aveyard, Helen; BMC Health Services Research, 9/10/2018; 18(1): N.PAG-N.PAG. 1p. (journal article) ISSN: 1472-6963 PMID: 30200943	1
Cinahl-Cinahl	(237=241)- New RN First Assistant Guide to Practice available.	AORN Journal, Feb2008; 87(2): 312-312. 1p. (Journal Article - book review, brief item, website) ISSN: 0001-2092	2
Pubmed-Cinahl	(115=64) -Physician Assistant Education in India.	Kuilman, Luppo; Sundar, Gomathi; Cherian, K. M.; Journal of Physician Assistant Education (Physician Assistant Education Association), 2012; 23(3): 56-59. 4p. (Journal Article - tables/charts) ISSN: 1941-9430	3
Pubmed-Cinahl	(123=120)-The circulating nurse's role in error recovery in the cardiovascular OR.	Yang YT, Henry L, Dellinger M, Yonish K, Emerson B, Seifert PC. AORN J. 2012 Jun;95(6):755-62. doi: 10.1016/j.aorn.2011.09.022. PMID:22633382	4
Pubmed-Cinahl	(74=60)- Cardiac Risk Assessment: Decreasing Postoperative Complications.	Thanavaro, Joanne L.; AORN Journal, Feb2015; 101(2): 201-212. 12p. (Journal Article - algorithm, tables/charts) ISSN: 0001-2092 PMID: 25645037	5
Pubmed-Cinahl	(104=83)-A retrospective review of leg wound complications after coronary artery bypass surgery.	East SA, Lorenz RA, Armbrecht ES. AORN J. 2013 Oct;98(4):401-12. doi: 10.1016/j.aorn.2013.07.016. Review. PMID:24075335	6
Pubmed--Cinahl	(140-3)The RN first assistant: an expert resource for surgical site infection prevention.	Pear SM, Williamson TH. AORN J. 2009 Jun;89(6):1093-7. doi: 10.1016/j.aorn.2009.03.019. PMID:19500700	7

Appendix 3 Analysis of the determinants of selected articles

№	Title/Country	Authors Source Year of publication	Design	Determinants			
				competency	education	benefits	inhibit
1	Waikato Hospital introduces new nursing role. (New Zealand)	Kai Tiaki Nursing New Zealand, Apr2013; 19(3): 10-10. 1p. (Journal Article - brief item, pictorial) ISSN: 1173-2032	Qualitative research. Primary research. Descriptive method.	As role of theatre nurses (RNFSA) and involves directly assisting the surgeon in the operating room. Have unique clinical skills (harvest the vein from patient's leg for CAB surgery and then suture the leg, assist with the opening and closing the chest, putting the patient on cardiopulmonary bypass and	Programme is offered through the University of Auckland, supported by HWNZ (New Zealand). This program well established in the USA, Canada and UK in 2010.	The heavy study load and additional commitments held by junior doctors prevent them from being consistently available in theatre. It provides a new career pathway for experienced nurses and enables release time for junior medical staff to complete more complex surgical tasks. Significantly enriches the quality of cardiothoracic department service. Fewer complications with the wound because he/she's not someone in training: he/ she's done it, he/she can do it.	In the Public sector of NZ, the FSA role is commonly performed by registrars or junior doctors. The problem in that they are not constantly available in theatre.

				weaning the patient off.		There are fewer complications with RSA cause she/he is not training. They always continue adding their skills and teach junior doctors.	
2	The 80-hour work week: why safer patient care will mean more health care is provided by physician extenders. (USA)	McLean, T.R.; Journal of Legal Medicine, Sep2005; 26(3): 339-384. 46p. (Journal Article - legal case, review) DOI: 10.1080/01947640500218349 ISSN: 0194-7648	Qualitative research. Primary research. Analytical study.	PAs are specifically trained to perform many routine functions a physician performs (PAs routinely are allowed to harvest leg viens during cardiac surgery and close lacerations in emeggency room (ER)).	There are guidelines define what activities can be performed by PAs and APNs to make maximum use of physician extenders.	Restriction of physician work time are going to have to allow physicians to delegate even more responsibilities to physician extenders. Which in it's case raises multiple legal and business ramifications. So better to use PAs as physician extenders rather than APNs. Physicians require many years to train and increase number extenders in substantially less time. Moreover, the concept of professional work restriction will cause seismographic changes in health care, cause health care will need to be provided in shifts by teams of physician extenders to comply with the work-time restriction. Ramping up the education system to create more extenders is the catalyst that will makeshift work health care delivery possible. Health care will	An unintended consequence of the Accreditation Council for graduate Medical Education (ACGME) 80-hour-work-week policy to restrict work hours for residents-in-training. The main concept of it is to restrict physician work hours to not harm patients in

						be rendered in more effective manner cause less remedial care will need to be provided. Health care will be made safer as it will not provided by sleep-deprived doctors. Medical necessity guidelines help to control health care costs by reducing the overutilization of medical services, it also would reduce the need for health care providers. Guidelines would go a long way toward controlling health care costs. Not only would medical necessity.	sleep-deprived states. US does not have enough PAs to fiil all physicianextentder positions, coverage physicians at night or on weekends and holidays. Because of the small number of PAs not been perceived in medicine. If doctors doing shift work there are not enough physicians then the shortage of PAs do exist.

							US exporting jobs overseas. Expanding extenders increase direct health care cost by expansion of provider wages and benefits. Additionally, how we provide liability insurance for health care providers will remain problematic. In fact, if we allow more health care to be delivered by physician extenders,

							we will have to make a Hobson's choice: either we will pay more for professional liability insurance or the tort system will need to be changed. While guideline-drivenhealthcaremaylimitthetotalnumberofphysician extenders who need to be insured, medical guidelines will be less effective at controlling insurance

							costs than some other costs, for three reasons: (1) physician extenders are not as well trained as physicians; (2) physician extenders will increase the complexity of health care; and (3) clinical guidelines will not eliminate health provider errors. Extenders' judgement is more often incorrect

							than physician cause their's trainings consider the following hypothetical situations.
3	Physician assistants in cardiothoracic surgery. (USA)	Bunnell D.J., JAAPA. 2016 Jan; 29(1):9-10. doi: 10.1097/01.JAA.0000475470.94509.ff. No abstract available. PMID:26656381	Qualitative research. Secondary study. Descriptive study.	PAs are key members in cardiothoracic surgery team, close coordinate with surgeon ensuring proper pre- and post operative care, coordinating the team effort and being a resourse to hospital staff, referring physicians and the community. PAs in cardiovascular surgery are called upon to perform	Emory University also puplished an account of its 30-year positive experience of using PAs in cardiovascular departments. This success was embraced across the cardiac world and in 1981 resulted in the development of the Association of Physician Assistants in Cardiovascular Surgery (APACVS), which seeks to provide education, networking, and advocacy for what	3- The demand for PAs in cardiovascular surgery has taken on a greater urgency for two additional reasons: • Regulations in resident duty hours have created a demand for PAs to support surgical services.4,5 • PAs in the cardiac specialty also have filled a staffing void left as a result of the difficulty in filling cardiothoracic residency positions in recent years. To manage patients, cause of resident duty hour limitation, improving access to care, improve continuity of care and throughput and improving safety and quality of care. PAs in cardiothoracic surgery are employed by private practices, university hospitals, community	4- Another challenge is to address the issue of a work and life balance. Although PAs are seen as a solution to limitations in resident hours as well as meeting the needs of community-based programs, they can fi nd it difficult to

				technical procedures requiring significant dexterity in a setting where every millimeter is critical and time matters. They must have the knowledge base and judgment to understand the complexity as well as the importance of a particular phone call from the ICU, general patient care area, or office during the day or in the middle of the night. Dynamic combination of skill, knowledge, and judgment in a setting. PAs could be trained to	was then a fledgling PA specialty. Career paths, educational opportunities, and legislative efforts need continued development to meet the demand.	hospitals, and by the federal government. PAs in cardiovascular surgery engage in a high-profi le, challenging specialty. They continue to meet the needs of patients, surgeons, and institutions.	be expected to work resident hours throughout their careers. Strategies to use PAs in a way that does not lead to burnout are vital. PAs also still face laws that create barriers to PA practice. For example, California is often cited as a healthcare innovator but still prohibits PAs as first assistants to surgeons while a patient is on

				manage many of tasks traditionally performed by surgeons. They have proven to be safe and effective first assistants in cardiac surgery. PAs operate, serve as critical care intensivists, educate patients and staff, manage their services, and maintain databases that are used to better understand and improve the field. They work long hours and can provide 24/7 in-house coverage or can be on call when they are away from the hospital.			cardiopulmonary bypass, thus preventing patients from receiving the proven expertise and cost-effectiveness of PAs.

4	A retrospective review of leg wound complications after coronary artery bypass surgery. (USA)	East S.A., Lorenz R.A., Armbrecht E.S. AORN J. 2013 Oct; 98(4):401-12. doi: 10.1016/j.aorn.2013.07.016. Review. PMID:24075335	Quantitative research. Primary research. Retrospective review. Was conducted a database search at institution and identified 418 patients ((418 patients (300 men and 116 women)) 30 to 89 years (mean age 67.5) of age who had undergone CABG with	The scope of practice for the RNFAs at facility includes --- intraoperative activities, such as (using critical thinking, helping to ensure patient safety, retracting, tying sutures, clamping vessels, n harvesting veins, and closing incisions) and ---- preoperative and postoperative tasks, such as (obtaining patient histories and conducting physical examinations, providing patient education, and evaluating laboratory and	QI project at a 480-bed suburban Midwest hospital in which approximately 750 open-heart procedures are performed per year, including CABG procedures. The hospital's CABG team is made up of six board-certified cardiothoracic/vascular surgeons and five RNFAs. Three of the RNFAs have associate degrees and two have doctorate degrees in nursing practice. Cardiothorathic surgical team that includes the RNFA.	0	0

			saphenous vein harvesting by RNFA from July 1, 2009, through June 30, 2010. To determine the effectiveness of wound closure by suturing and staples when collecting the great saphenous vein. A project to improve the quality of prevention of wound complications	diagnostic test results. The RNFAs work in collaboration with the surgeons and other health care team members to achieve optimal patient outcomes. The technique used for saphenous vein harvest was for the RNFAs to - make linear incisions over the vein, starting at the medial thigh, staying over the vein, and making short 1- to 1.5-inch incisions			

			(infection, seroma, hematoma, seam divergence) was taken into account. Data included: patient demographics (ie, age, gender, ethnicity), n risk factors for wound complications as documented in the medical records (ie, BMI, diabetes, PVD,	with bridging segments, up to the length of vein required for harvesting to accommodate the number of bypasses needed; - harvest the vein without removing any subcutaneous tissues, taking care not to damage the saphenous nerve;			

			chronic renal insufficiency), and n postoperative wound complications (ie, hematoma, infection, wound dehiscence, seroma) that occurred during hospitalization as documented in the medical records and office charts, and at the patients' six-week	- clip side branches of the veins; - close the wounds in a single- or two-layer closure by using a stapler or subcuticular skin sutures; and - place a suction drain in the incisions when they deemed it necessary to reduce the risk of hematoma formation or excessive leg edema.			

			follow-up visits. We included 416 patients (ie, 300 men and 116 women) with a mean age of 67.5 years in the analysis. One hundred eighty-nine (45.4%) met the criteria for obesity (ie, BMI > 30 kg/m2) and 151 (36.3%) had a diagnosis of diabetes.				

			The patients diagnosedwithdiabeteshadameanBMIof32.8kg/m2 (range, 19.4-57.4 kg/m2) and a mean hemoglobin A1c level of 7.84% (range, 4.8%-13.0%), indicating that this subpopulation of patients were at high risk for complications, particularly infection.20 One				

			hundred thirty-nine patients had their leg wounds closed by using staples, and the surgical wounds of the remaining 277 were closed with subcuticular sutures. A Pearson chi-square test comparing the preintervention demographic and clinical risk factor characteristics of the				

			patients with subcuticular sutures versus those with staples showed no significant difference between the two groups (Table 2). Ninety-five patients (22.8%) experienced some type of wound complicatio n during the six weeks after surgery (Table 3). The univariate				

			logistic regression analysis revealed that there was no statistically significant association between closure type and complications (ie, infection, seroma, hematoma, dehiscence, odds ratio [OR] 1.01 [95% CI, 0.62-1.64]).Themultivariatemodel,whichincluded adjustments for male				

			gender, PVD, chronic renal insufficiency, diabetes, and obesity (ie, BMI > 30 kg/m2) confirmed the nonsignificant findings from the univariate analysis, OR 0.99 (95% CI, 0.601.63). None of the covariate risk factors were independently associated with leg wound				

			complications.				
5	Core competencies required for the cardiac surgical nurse practitioner. (USA)	Foster S.S., Journal of American Academy Nurse Practioners, 2012 Aug; 24(8):472-5. doi: 10.1111/j.1745-7599.2012.00727.x. Epub 2012 May 3. Review. PMID:22845030	Descriptive method Qualitative research Secondary study	CSNP directed the care of the surgical patient 24 h a day, 5 days a week. The CSNP collected histories, performed physical examinations, ordered and interpreted diagnostic studies, diagnosed acute and chronic illnesses, made referrals to other providers, managed medication therapies, and provided follow-up care. Thus, the CSNP begins to care for the patient during a preoperative visit,	0	In cardiovascular care, cardiac surgery nurse practitioners (CSNPs), in collaboration with the cardiac surgeons and cardiologists, help streamline the delivery of care and reduce the length of stay. The CSNP by no means replaces the resident. In addition, the CSNP provides continuity for these patients during their pre- and postsurgical stay. CSNPs also serve as a resource for the residents in regard to management of specific post cardiac surgical issues.	For now, hospitals that recognize the role of the CSNP must rely on their own resources to establish and monitor processes to clearly articulate the role and gather outcomes data on this vulnerable population of cardiac surgical patients.

				continues to care for the period after the surgical procedure until a postoperative visit (Meyer & Meir, 2005). Multifaceted role and the potential financial benefit of this suggested CSNP role, but to date there are no set competencies for a CSNP. The CSNPs role must encompass all of these tasks in addition to coordination and division of tasks with other disciplines such as the surgeon, nurse, medical consultants, pharmacist, social worker, case			

				manager, and physical therapist (Munro & Taylor-Panek, 2007). This role includes the major components of the scope and standards of practice for ACNPs published by the AACN: professional practice, education, collaboration, ethics, systems management, and resource utilization (Bell, 2006). The CSNP performs and documents a full history and physical examination that is communicated to all of the other CSNPs and care providers via paper or through the			

				electronic medical record. In this article written lists of CSNP's skills, procedures and managements.			
6	The RN first assistant: an expert resource for surgical site infection prevention. (USA)	Pear S.M., Williamson T.H. AORN J. 2009 Jun; 89(6):1093-7. doi: 10.1016/j.aorn.2009.03.019. PMID:19500700	Quantitative research. Primary research. Case-control.	Depending on the setting and degree of administrative support, RNFAs may perform the surgical first assistant role daily or crossfunctionally, having also to perform the role of circulating or scrub nurse as staffing permits or demands.	Due to his experience and education, RNFA is qualified to assist in a number of different surgical procedures. Fence of the great saphenous vein during cardiac surgery.	To fill the lack of clinical resources of a financial or human nature. The use of PHFA in surgery can improve patient outcomes; replacing surgeons with PHFA did not reveal any side effects. Results where, instead of cardiac surgery patients, RNFA were used to collect veins better. The operation time is significantly reduced, and the infection rate of wounds is reduced. The morbidity and mortality rates did not depend on the type of assistant. RNFA increase patient safety.	It depends on the conditions and the degree of administrative support for this specialty.
7	The transition from open	Lai T., Babb Y., Ning Q., Reyes L., Dao	Quantitative research.	Open saphenous vein harvesting (OVH) and	Before the study period began, each PA had completed an	0	The transition from open to

	to endoscopic saphenous vein harvesting and its clinical impact: The Texas Heart Institute experience. (USA)	T., Lee V.V., Mitchell L., Gentry L.O., Reul R.M., Ott D.A., Tex Heart Inst J. 2006; 33(3):316-320. PMID:17041688	Retrospective, RCT. Secondary study Retrospectively analyzed data from 1,573 consecutive coronary artery bypass procedures performed at our institution during a 20-month period. Each procedure included saphenectomy by endoscopic vein	Endoscopic vein harvesting (EVH)	industry-sponsored training event that included observation and cadaveric surgical experience.		endoscopic vein harvesting can be challenging in institutions, it can be successful if operators receive adequate training in endoscopic technique and are supported by surgeons and staff. Despite the proven benefits of EVH, many surgical and heart centers continue to harvest SV segments using open techniques.

			harvesting (n=588) performed by physician assistants, or by traditional open vein harvesting (n=985) performed by physicians or physician assistants. Both groups were similar in terms of preoperative risk factors. After surgery, leg wound infections were significantly less				This resistance to change has been attributed to various concerns about EVH, including increased cost, potential vein-quality problems, increased technical difficulty, and longer harvesting times.

			frequent in the endoscopic vein harvesting group (3/588, 0.5%) than in the open vein harvesting group (27/985, 2.7%; *P* <0.002). The most common organism involved in leg infections was *Staphylococcus* (20/30, 66%): *S. aureus* was present in 14 of 30				

			infections (47%). Open vein harvesting was the only significant independent risk factor for leg infection. Conclude that endoscopic vein harvesting reduces leg wound infections, is safe and reliable, and should be the standard of care when venous conduits are				

			required for coronary artery bypass grafting and vascular procedures. OVH was performed either by a surgeon or PA. EVH was performed by 1 of 3 of PAs. EVH should be the standard vein harvesting method for cardiac and vascular procedures requiring the use of a				

			greater SVG.				
8	Effect of subcutaneous suture line and surgical technique on wound infection after saphenectomy in coronary artery bypass grafting: a prospective randomised study. (Norway)	Stenvik M., Tjomsland O., Lien S., Gunnes S., Kirkeby-Garstad I., Astudillo R. Scandinavian Cardiovascular Journal, 2006 Aug; 40(4):234-237. PMID:16914415 DOI: 10.1080/14017430600812813	Prospective randomized study. Quantitative research, RCT Secondary study Objective. The aim of the study was to evaluate the impact of an additional subcutaneous suture line on the incidence of postoperative (p.o.) infection at the vena	Vein harvesting.	0	Reduces wound infection, thereby reducing the time spent in hospital, reduces the cost of patient treatment, improves the quality of medical care, life quality is better. The frequency of infection is lower when collecting experienced PA than with a resident.	0

			saphena magna harvesting site (VSMHS) after coronary artery bypass grafting (CABG). Methods. Two hundred and forty three patients undergoing CABG were included. Patients in Group A (n /119) all operated by one physical assistant (PA) were				

			prospectively randomised into Group A1 (n /59) receiving intracutaneous closure suture alone whereas 60 patients (Group A2) received an additional subcutaneous suture line. Group B (n /120), operated by surgical residents, served as control population. All patients were due to follow-up at				

			six weeks p.o. Results. Subcutaneous suture did not impact the p.o. infection rate (A2 vs. A1; 4/60 vs. 2/59, n.s.). A significant lower p.o. infection rate was observed in Group A vs. Group B (6/119 (5%) vs. 15/120 (13%) pB /0.05). Conclusion. Subcutaneous suture did not impact the p.o.				

			infection rate at VSMHS. The infection rate observed in patients operated by an experienced PA was significantly lower than in patients operated by various surgical residents.				
9	Physicians assistants in cardiothoracic surgery: a 30-year experience in a	Thourani V.H., Miller J.I. Ann Thorac Surg. 2006 Jan;81(1):195-9; discussion 199-200.	Retrospective review Quantitative research. Secondary study	CTS PA duties ranges from varying from history and physical examination, conduit harvesting, insertion of invasive catheters	0	Resolve problems of work assignment, effective surgical team without increasing the number of categorical CTS residents. Relationship between PAs and nursing staff not problematic, they do not infringe on the territory of nursing service. PA as middle person between staff surgeon and	0

	university center. (USA)	PMID:16368363 DOI:10.1016/j.athoracsur.2005.07.031	23 HA in 30 years experience.	and chest tubes, surgical first assisting, closure of the chest, and optional primary intensive care unit night-time in-house call. In CTS PA utilized for pre-intra-postoperative care. Описаны в таблице пре интра и пост оперативном периоде обязанности PA. Education of patients, families, nurses, PA students, general surgery and cardiothoracic residents in training, administrative functions of the planning of admissions,		nurses, patients etc. PA ideal first assistant and knowledgeable of the surgeon/s idiosyncrasies by clinical experiences. Сорашение часов резидентов увеличивает потребность в PA.	

				scheduling of operations and special procedires, arranging and presenting information to patient care conferences and maintaining records required for quality assurance, long-term patient evaluation and clinical research, communication between physician, and other consulting specialists and surgical assistant during the performance of surgical procedures. Work 40-60 hours each week. Harvest vein, radial arteries by			

				open and endoscopic techniques. After preparation conduit, PA continue as 1 -2 assists in operation (provide retraction, closure of the incision in the lower extremity, assist in cannulation and decannulation, and closure of the chest.			
10	Surgical nurse assistants in cardiac surgery: a UK trainee's perspectiv e. (UK)	Alex J., Rao V.P., Cale A.R.J., Griffin S.C., Cowen M.E., Guvendik L. ery, 2004 Jan; 25(1):111-5. PMID:146907 41	Quantitativ e research, RCT. Primary research.	Cardiac catheterization, cardiac surgical nurse assistants are involved in the harvesting of conduits, median sternotomy and closure, thoracotomy and closure, and also	Within the present system, the duration of cardiothoracic training in the United Kingdom takes between 13- and 16-years following graduation from medical school. During junior surgical training the first year	Some nurse are ready to climb and acquire the skills of a surgical assistant. The incidence of complications did not increase with the use of RA instead of medical interns.	The major drawback, significant to a surgical trainee, is that the reforms shortened the duration of higher specialist

		DOI:10.1016/s1010-7940(03)00578-5		function as first assistants – all procedures and experiences that a junior surgical trainee would immensely benefit from.	is spent as a house officer (HO) followed by 3 years as a senior house officer (SHO) undertaking the basic surgical training (BST) rotation in a variety of surgical specialities. The BST period is followed by 1–3 years as a speciality SHO gaining specific skills and a further 2–3 years in research before starting higher specialist training. Junior surgical trainees need the assistance from nurses and paramedical staff in reducing their workload, but a greater involvement of specialist nursing staff in pre-assessment and follow-up clinics,		training from about 10 years in the old system to 6 years with the new system.

					phlebotomy, liaising with radiology and laboratory services, and discharge planning, may be more judicious measures which would not compromise the surgical training requirement of the juniors. Another alternative would be for the 1–3 years spent as a speciality SHO to be scheduled in such a way that the first year is spent gaining experience on the wards, intensive therapy unit and clinics followed by a period spent solely in theatre performing the role of a surgical assistant and gaining		

					basic surgical experience.		
11	Nurse first surgical assistant (NFSA): a rewarding career. (CANADA)	Arpin J.; Canadian Operating Room Nursing Journal, Dec2005; 23(4): 32-36. 2p. (Journal Article) ISSN: 0712-6778 PMID: 16466185	Qualitative research. Secondary research. Descriptive method.	The functions authorized for the nurse's first surgical assistants during the operating phase are: Positioning; Prepping; Draping; Achieving haemostasis by electric or mechanical means; Clamping, cauterizing or tying vessels; Assuring organ and tissue exposure through suctioning, sponging, placing and holding retractors, irrigating the	0	0	0

				operative site, cutting tissue as determined by the surgeon, and placing sponges around operative sites; Suturing fascia, sub-cutaneous tissue and skin; Choosing sutures and needles, suturing, cutting and making knots; and Using any instruments at the surgeon's request, manipulating laparoscopes, hitting the osteotome, etc. a nurse who has experience assisting in cardiac surgery can harvest the saphenous vein and the radial artery. The NFSA's			

				role and function in the clinical field calls for the development of specific skills from both a theoretical and a practical point of view. For those interested in learning more about the role of nurses first surgical assistant, RIPAC created two documents: 1. "Description de fonction de I'infirmiere premiere assistante en chirurgie" (Description of the Function of the Nurse First Assistant in Surgery) and 2.			

				"Protocole d'actes delegues de l'infirmiere premiere assistante en chirurgie" (Protocol of Delegated Acts of the Nurse First Assistant in Surgery).			