

DIGITAL NURSING SERVICE MODEL USING THE ANDROID APPLICATION "ATASI CABG" TO IMPROVE THE QUALITY OF LIFE OF CABG PATIENTS

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ABSTRACT

Introduction: The quality of life of patients is determined by the success of treatment for Coronary Artery Bypass Graft (CABG) patients. In an effort to support the transformation of health technology and improve the quality of life of patients, a digital application platform is needed that aims to help health workers provide education to patients and families about their needs during the CABG procedure. **Objectives:** Creation of an Android-based application model to identify pre- and post-CABG surgery care needs in order to improve patient quality of life. **Methods:** This study used an exploratory sequential mixed method approach. Qualitative research is conducted with a phenomenological approach. While quantitative research uses the SF36 questionnaire to see the quality of life of patients after CABG. The number of participants is 18 CABG Patients. **Results:** Treatment in CABG patients is divided into 3 phases, namely the inpatient phase, the outpatient phase, and the maintenance phase. The needs of care in the Inpatient Phase are psychological needs, sleep breaks, physical activity, self-care, oxygenation, a sense of security and educational needs. Treatment needs in the Outpatient Phase are pain management, surgical wound care, medical needs, physical activity (exercise and mobilization), rest and education needs. The Need for the Maintenance Phase is the need for medical rehabilitation in fulfilling physical activity. The Digital Application Platform for nursing services "ATASI CABG" can be seen on the Google Playstore which can be accessed for free. **Conclusions:** Postoperative patient care needs are adjusted to the CABG patient care phase. **Keywords:** Nursing service, Android Application, CABG patient.

ABSTRAK

Pendahuluan: Kualitas hidup pasien sangat dipengaruhi oleh keberhasilan penanganan dalam prosedur Coronary Artery Bypass Graft (CABG). Untuk mendukung transformasi teknologi kesehatan sebagai bagian dari pilar ke-6, serta untuk meningkatkan kualitas hidup pasien, diperlukan sebuah platform aplikasi digital yang membantu tenaga kesehatan memberikan edukasi kepada pasien dan keluarganya terkait kebutuhan yang perlu diperhatikan selama

prosedur CABG berlangsung. Tujuan: Mengembangkan model aplikasi berbasis Android yang berfungsi untuk mengidentifikasi kebutuhan perawatan sebelum dan sesudah operasi CABG, demi meningkatkan kualitas hidup pasien. Metode: Penelitian ini menggunakan pendekatan metode campuran dengan urutan eksplorasi kualitatif dan kuantitatif. Studi kualitatif dilakukan menggunakan pendekatan fenomenologis, sedangkan studi kuantitatif menggunakan kuesioner SF36 untuk menilai kualitas hidup pasien setelah CABG. Partisipan penelitian terdiri dari 18 pasien CABG. Hasil: Penanganan pasien CABG terbagi menjadi tiga fase, yaitu fase rawat inap, fase rawat jalan, dan fase pemeliharaan. Pada Fase Rawat Inap, pasien membutuhkan dukungan psikologis, tidur yang cukup, aktivitas fisik ringan, perawatan diri, oksigenasi, keamanan, serta edukasi. Fase Rawat Jalan mencakup kebutuhan seperti manajemen nyeri, perawatan luka operasi, kebutuhan medis, aktivitas fisik (olahraga dan mobilisasi), istirahat, dan edukasi. Pada Fase Pemeliharaan, diperlukan rehabilitasi medis untuk mendukung aktivitas fisik pasien. Platform aplikasi digital untuk pelayanan keperawatan, "ATASI CABG," dapat diakses secara gratis di Google Playstore. Kesimpulan: Kebutuhan perawatan pasien setelah operasi disesuaikan dengan setiap fase perawatan dalam proses pemulihan CABG.

Keywords: *Asuhan Keperawatan, Aplikasi Android, pasien CABG*

INTRODUCTION

Coronary Heart Disease (CHD) is an abnormal condition of the heart due to narrowing of the coronary arteries that supply blood to the heart. The management of CHD is carried out by revascularization by means of Percutaneous Intervention (PCI) and Coronary Artery Bypass Graft (CABG) (Dewi, 2021). According to the World Health Organization, about 50.000 CABG surgeries are conducted in India each year, with more than 800.000 CABG surgeries performed worldwide (Pulimala S., et al., 2020). In the United States, 219.000 CABG surgeries were conducted in 2010 (Albilasi, T., et al., 2018). CABG has a 3% overall mortality rate, while elective primary Coronary Bypass has a 1,7% mortality rate. Furthermore, there is the risk of a severe complication following surgery (Khalifa, Y., Elsa, K., Bary, M., Ismail, H., & Taha, A., 2018).

CABG is a surgical procedure performed to increase blood flow to the heart with indications of severe coronary heart disease. Coronary Heart Disease (CHD) causes a buildup of plaque in the coronary arteries resulting in reduced blood flow to the heart muscle. CABG is a procedure that provides a new way for blood to flow smoothly to the heart ventricles. This procedure involves taking healthy blood vessels from the legs, arms or chest and connecting them to blocked arteries in the heart. After surgery, the heart organ returns to working on its own. The surgeon will close the incision with a special wire and the wire will be removed when the bone has recovered. This CABG action can cause complications. Some of the complications of post CABG are cardiac complications, pulmonary complications, kidney function disorders, and even stroke. Other problems that often occur after CABG are pain, sputum buildup, bronchopneumonia, muscle spasm, lower extremity edema and surgical scar infection. This is where rehabilitation plays a role for CABG patients to reduce the risk of some complications.

The goal of CABG post op care is to return patients to optimal physical, mental, social and vocational conditions, increase their functional capacity, increase coronary blood flow, improve cardiovascular system efficiency, improve risk factors, increase activities of daily living and improve quality of life. Some studies explain that edema postoperative patients with CABG have a

poor quality of life of 74% (Amal Bakr Abo El-Ata, Sobeh, & Mansor, 2021). Postoperative care for CABG is carried out from the time the patient is treated postoperatively until the patient is discharged from the hospital. Treatment phase I (inpatient phase) prevents complications after surgery. The treatment began with an assessment of the patient and education on lifestyle modifications before surgery, for secondary prevention, namely routine aerobic exercise, blood pressure control, cholesterol and blood sugar levels, smoking cessation, stress management. The second phase of care after CABG (outpatient phase) surgery begins 1-3 weeks after discharge from the hospital with supervision in the implementation of physical exercise. The types of exercises given at this stage are endurance and resistance training, as well as Flexibility training which aims to increase Range of Motion, relieve pain, and increase muscle strength. At this stage of treatment, it is necessary to pay attention to the signs and symptoms of sternal instability when doing physical exercise. Flexibility exercises are carried out starting 3-5 weeks after the patient is discharged from the hospital. The Maintenance Phase III is the most important phase where the benefits obtained during phase I and phase II if you stop doing physical exercise. This phase is carried out for 3-6 months.

Post-CABG treatment is carried out in the intensive care unit for several days until stable, then the patient undergoes cardiac rehabilitation to speed up the recovery process in the hospital and most patients can continue their activities at home. Some of the results of the study explain that 67.7% of patients have a good quality of life. The quality of life has improved from the physical, family, and work environment aspects. Rosidawati's (2016) research stated that the quality of life of post-CABG patients was better than when the patient was before surgery. Nurses assist patients in achieving an optimal quality of life by increasing patient self-efficacy through mentoring and providing information and education [8]. Improvement in quality of life can be determined by meeting the needs of patients in treatment. Identification of what needs are needed by patients is the first step to improve the patient's ability to carry out daily activities.

Digital transformation has been a fundamental shift in the way organizations operate and compete in the modern era (Wijoyo, Rizkiyah, Raihan, Al Mukmin, & Dumilah, 2023). Digital transformation can be interpreted as the process of utilizing existing digital technology, such as virtualization technology, mobile computing, cloud computing, integration of all existing systems and so on (Loonam, Eaves, Kumar, & Perry, 2018). Currently, the existence of information systems affects the performance of organizations effectively and efficiently (Khashman & Khashman, 2016). Digital Transformation is the process of utilizing existing digital technologies such as virtualization technology, mobile computing, cloud computing, integration of all systems in the organization and so on. In health services, it is directed to support digital transformation in the health sector. Nursing services carried out on CABG patients are a continuous service starting from the patient being treated to the patient needing treatment at home for a long time. For this reason, there is a need for innovation in the field of digitization of nursing services to help patients gain knowledge about CABG Care.

METHODS

This study used an exploratory sequential mixed method approach. Qualitative research is conducted with a phenomenological approach. While quantitative research uses the SF36 questionnaire to see the quality of life of patients after CABG. The number of participants is 18 people consisting of Cardiac Surgeons, Inpatient Nurses, Outpatient Nurses, Medical Rehabilitation Officers and CABG Patients from Government Hospitals and Private Hospitals.

There are 4 phases in this study:

- 1) Stage 1 Qualitative Study (Higher Priority), namely the collection of qualitative data using interviews / FGDs so that saturated data is obtained.

- 2) Stage 2 Quantitative Study (Lower Priority), namely the collection of quantitative data using the Short Form Survey 36 Questions (SF36) questionnaire developed by RAND, the Indonesian version, which is distributed to outpatient CABG patients. Measurement of patient quality of life was carried out on patients with inclusion criteria who were postoperative patients for more than 6 months, willing to be respondents and did not experience communication barriers. The scaled score on the SF-36 survey are the weighted sums of the questions in their respective segment. The scoring is done in two steps. To begin, pre-coded numeric values are recoded according to the scoring key provided. Furthermore, each item is rated on scala of 0-100.
- 3) Stage 3 Combine and Interpretation of Results
- 4) Stage 4 is the creation of the "ATASI CABG" Digital Application Platform. The data analysis process is carried out in three stages, namely data reduction, data presentation and conclusion drawn.

This research has passed the Ethics Assessment by the Health Research Ethics Committee (HREC) of the Riau Ministry of Health Polytechnic with a Certificate Number No.LB.02.03/EA/KEPK-PKR/11/2024.

RESULTS AND DISCUSSION

The results of qualitative data collection on Inpatient Nurses, Outpatient Nurses, CABG Surgeons, Post CABG Patients were obtained several post-hospital care needs ranging from the Inpatient Phase, Out Patient Phase, and Maintenance Phase through FGD / Interviews on informants and Key Informants.

Table 1 Research Stages

Phase in Research	Action	Output
Phase 1 Qualitative Study (Higher Priority)	Identification of Pre and Post CABG Care Needs through Interviews with Informants and Key Informants until the data is saturated so that 18 participants consisting of doctors, inpatient nurses, outpatient nurses, physiotherapists and patients who are being treated	Pre-Operative Needs, Post-Operative Needs, Follow-up Care Needs
Phase 2 Quantitative Study (Lower Priority)	The measurement of Quality of Life of Post CABG Patient was carried out through Total Sampling on all patients who had undergone CABG for the last year by asking questions through the SF36 questioner developed by RAND Indonesian Version. The number of willing respondents was 10 people.	After CABG surgery in the last 6 months to 1 year, the quality of life has improved
Phase 3 Combination and Interpretation of Results	Combination of qualitative and quantitative results Making the interpretation of the results into the theme presented into the content/application material	There are 3 phases of care needs: Fase Inpatient Fase Outpatient Fase Maintenance

Phase 4 Digital Application Platform	Application Development using MIB Lab Semarang Provider	CABG ATASI application that can be accessed on Google Play Store for free
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Based on the table above, it can be explained that there are 4 stages carried out in this study, starting with collecting qualitative data as a higher priority in the research so as to form several themes based on the results of the data reductions found. Then the results found were verified to all research subjects. The data of the research subjects are as follows:

Table 2. Data of Research Subjects for qualitative research

No.	Informant's Name	Position	Interview Date
1.	Informant 1	Nurse of the Krisan Nursing Room in Government Hospitals	20 Agustus 2024
2.	Informant 2	Nurse of the Krisan Nursing Room in Government Hospitals	20 Agustus 2024
3.	Informant 3	Nurse of the Krisan Nursing Room in Government Hospitals	20 Agustus 2024
4.	Informant 4	Nurse of the Krisan Nursing Room in Government Hospitals	20 Agustus 2024
5.	Informant 5	Cardiac Poly Nurse in Government Hospitals	20 Agustus 2024
6.	Informant 6	CABG Patients in Government Hospitals	21 Agustus 2024
7.	Informant 7	CABG Patients in Government Hospitals	21 Agustus 2024
8.	Informant 8	CABG Patients in Government Hospitals	21 Agustus 2024
9.	Informant 9	CABG Patients in Government Hospitals	29 Agustus 2024
10.	Informant 10	CABG Patients in Government Hospitals	23 September 2024
11.	Informant 11	Dokter Spesialist in Private Hospital	18 September 2024
12.	Informant 12	Nurse in Inpatient Room (Private Hospital)	18 September 2024
13.	Informant 13	Nurse in Inpatient Room (Private Hospital)	18 September 2024
14.	Informant 14	Nurse in Inpatient Room (Private Hospital)	18 September 2024
15.	Informant 15	Nurse in Outpatien Room (Private Hospital)	18 September 2024
16.	Informant 16	Nurse in Outpatien Room (Private Hospital)	18 September 2024
17.	Informant 17	Physiotherapy staff in the Medical Rehabilitation room	18 September 2024
18.	Informant 18	Physiotherapy staff in the Medical Rehabilitation room	18 September 2024

a. Qualitative Study

In this qualitative research, data collection was carried out using structured interviews / FGD by collecting several subjects in several places and adjusting to the agreed time of each subject.

Based on the results of interviews about Postoperative Patient Needs (Post Op Day 3) in Nursing Room, the following data was obtained:

1) **Patient complaints** that often appear in Post Op Day 3 patients are

“Pasien mengeluh nyeri luka operasi, mual, sesak nafas, batuk berdarah bercampur darah, keluhan nyeri dapat diatasi dengan pemberian analgetik” (Informant 1)
“Pasien mengeluh nyeri daerah operasi, nyeri dirasakan hebat. Namun pada hari ke 4 post operasi, pasien sudah dapat mengatasi nyeri dengan teknik distrasi, relaksasi dan pemberian obat analgetik” (informant 2)
“Post op hari ke 4 pasien mengeluh nyeri pada daerah operasi. Skala Nyeri 4 lah.. pasien sudah dapat mentolerir nyeri selama di ruang rawatan” (informant 3)
“pasien mengeluh nyeri bekas operasi, batuk berdarah” (informant 4)
“Nyeri pada luka kaki dan kaku di daerah dada” (informant 11)

2) Patient's Physical Activity Needs While in the Treatment Room and Conditions at Discharge.

“seluruh aktivitas pasien dibantu. Pasien Pulang umumnya pada hari ke 6 dengan menggunakan kursi roda” (informant 1)
“Pasien umumnya distabilkan di ICU bedah torak selama beberapa hari, seluruh aktifitas di bantu, pada hari ke 4 pasien dipindahkan ke ruang rawat, aktivitas pasien selama di ruang rawat dibantu sebagian. Pasien diminta melakukan aktivitas bertahap seperti duduk. Pada umumnya pasien pulang pada hari ke 7 post operasi dan menggunakan kursi roda” (informant 2)
“Aktivitas Fisik dibantu sebagian. Pasien rata-rata pulang pada hari ke 7 dengan menggunakan kursi roda” (informant 3)
“Semua aktivitas pasien dibantu oleh perawat dan keluarga, pada umumnya pasien pulang pada hari ke 6 dengan menggunakan kursi roda” (informant 4)
“Seluruh aktivitas dibantu” (informant 11)
“Aktivitas terbatas, pada awalnya akan dibantu oleh fisioterapi yang datang ke ruangan. Rata-rata pasien pulang pada hari ke 4-5 setelah operasi, dengan menggunakan kursi roda ” (informant 12)

3) Psychological Needs (Patient's Emotional Health Issues)

“Pasien lebih mudah cemas, bahkan mudah panik” (Informant 1)
“Pasien merasa cemas, takut melakukan aktivitas, tetapi pasien” (informant 2)
“Pasien cenderung merasa cemas dan takut terutama saat melakukan mobilisasi bertahap” (Informant 3)
“Emosional pasien Post CABG sering mengeluh dan bertanya-tanya, apakah bisa sembuh luka bekas operasi” (informant 4)
“Pasien ada sebagian cemas dan sebagian emosi stabil” (informant 11)
“Emosi pasien labil” (informant 12)

4) Educational Needs

“Pasien diberikan penjelasan tentang pola hidup, batasi aktivitas, minum obat teratur, perawatan luka dan saat pulang diberikan edukasi segera ke RS bila ada keluhan di rumah” (informant 1)
“Pasien diarahkan untuk kontrol ulang post rawat inap, minum obat secara teratur, jaga pola makan, perawatan luka post operasi, manajemen stress, dan belajar aktivitas dan olahraga ringan” (informant 2)
“Edukasi yang diberikan adalah waktu kontrol, minum obat teratur, pola aktivitas di rumah, makanan / minuman yang boleh dan yang tidak boleh dikonsumsi” (Informant 3)
“sebelum pasien pulang, biasanya saya memberikan Edukasi pola makan, kontrol ke RS sesuai jadwal, aktivitas yang boleh dan yang tidak boleh dilakukan, minum obat secara teratur, jaga kebersihan luka operasi” (Informant 4)
“Mematuhi minum obat, relaksasi nafas dalam jika nyeri, menjaga kebersihan daerah luka operasi” (informant 11)

5) Complications / complaints that cause the patient to return to treatment

“pasien pernah ada yang datang dirawat kembali ke RS dengan keluhan yang berbeda atau dirawat dengan diagnosa pendamping seperti pneumoni atau DM” (informant 1)

“Pasien jarang sekali dirawat kembali, walaupun ada dengan gejala dan keluhan berbeda atau dengan penyakit lain” (informant 2)
“jarang sekali pasien masuk dengan keluhan yang sama seperti nyeri dada” (informant 3)
“Ada pasien dirawat kembali, biasanya dengan keluhan yang berbeda atau dengan penyakit lain” (informant 4)
“Ada pasien dirawat lagi dengan keluhan berbeda” (informant 11)
“Biasanya pasien dirawat lagi dengan masalah yang berbeda dengan penyakit lain seperti DM” (informant 12)

Based on the results of the interview with the **Cardiac Polyclinic Nurse and Physiotherapy staff** in the Medical Rehabilitation room, the following data was obtained:

1) Patient complaints during control

“pada saat kontrol pertama, Pasien mengeluh nyeri pada lokasi pembedahan, merasa belum nyaman pasca operasi, dan batuk yang membuat timbul nyeri. Keluhan nyeri berbeda-beda antar pasien, pada umumnya sudah bisa teratasi dengan farmakologi dari dokter” (Informant 5)
“nyeri pada luka operasi” (informant 15)
“Nyeri bagian luka operasi bisa sampai 6 bulan. Pasien mengeluh nyeri karena mengganggu tidur. Pasien bilang nyeri menembus sampai ke punggung” (informant 16)
“Nyeri pada luka , mudah lelah saat terapi dan beraktivitas lain. Nyeri bisa ditoleransi dengan latihan pernafasan” (informant 17)
“Nyeri pada bagian incisi atau operasi, pasien mudah lelah saat awal latihan. Pemberian latihan terapi sesuai toleransi dan pemberian breathing untuk relaksasi dan mengurangi nyeri” (informant 18)

2) Patient Activity Needs during Control and Therapy

“...Setiap pasien berbeda-beda, kebanyakan dibantu tetapi beberapa pasien CABG yang kontrol, sudah bisa mandiri” (Informant 5)
“..kontrol pertama biasanya aktivitas di bantu, namun setelah kontrol berikutnya pasien lebih mandiri” (informant 15)
“..untuk pasien yang dipoli jantung dominan dibantu karena banyak pasien yang memiliki penyakit penyerta” (informant 16)
“...ada pasien yang mandiri dan ada yang perlu bantuan selama dilakukan terapi. Sebagian besar pasien berjalan mandiri” (informant 17)
“..Biasanya pasien datang dengan kursi roda bahkan berjalan kaki jika kondisinya baik setelah operasi. Namun pada pasien yang membutuhkan perawatan lama, petugas fisioterapi datang ke ruang rawat pasien” (informant 18)

3) Psychological Needs : Patients' Emotional Health Problems During Outpatient Treatment

“...Pasien Post CABG yang kontrol pada umumnya emosinya stabil karena sudah diberi edukasi” (Informant 5)
“... kontrol pertama biasanya pasien masih labil emosinya, namun setelah kontrol berikutnya mulai stabil. (informant 15)”
“...Emosional pasien tidak stabil karena pasien banyak memiliki keluhan-keluhan tertentu” (informant 16)

4) Condition of patients coming and going home

“..Kondisi pasien CABG bervariasi, sebagian pasien sudah mampu berjalan tanpa kursi roda dan Bed. Sebagian masih menggunakan kursi roda” (informant 5)
“...menggunakan kursi roda dan sebagian besar bisa berjalan pelan” (Informant 15)
“...Pasien datang jalan kaki mandiri dan pulang juga jalan kaki (mandiri) (Informant 16)”

5) Educational Needs

“....pasien perlu diberikan edukasi berupa minum obat rutin, makan makanan yang real food, olahraga rutin dan tidak terlalu berat, pola hidup sehat, jika nyeri berat dan sesak bertambah atau keluhan memberat langsung ke UGD, itu yang biasa disampaikan pada pasien”
(informant 16)

“....selama terapi fisik, pasien harus memiliki target yang harus dicapai”(informan 18)

Education provided to patients at the polyclinic:

- 1) The pain felt will gradually disappear in about 1 month, so patience is very necessary
- 2) The surgical wound should not get wet and keep the wound clean
- 3) Medicines must be taken regularly as stated on the drug label
- 4) Patients will undergo mobilization exercises – physical exercises for approximately 1 month in medical rehabilitation
- 5) Get enough rest, eat nutritious food for recovery
- 6) Control again according to the control letter given.

Based on the results of interviews with CABG patients, most patients said that the quality of life improved after CABG surgery. For clarity, it can be seen in the subjective narrative as follows:

“..saat ini saya merasa kualitas hidup saya lebih baik dibandingkan sebelum operasi, saya bisa melakukan aktivitas namun sesekali ada sesak” (Informant 6)

“..saya jauh lebih sehat dibandingkan sebelum operasi, saya bisa berjalan dan bekerja kembali, keluhan sesekali nyeri bekas operasi bila saya batuk” (informant 7)

“..pada awalnya nyeri dada harus diatasi dengan obat-obatan tetapi fase pemulihan saat ini saya merasa nyeri sudah tidak separah sewaktu beberapa minggu setelah operasi, saya sulit tidur karena menjaga posisi tidak miring kiri dan kanan” (informant 8)

b. Quantitative Study

The measurement of Quality of Life of Post CABG Patient was carried out through Total Sampling on all patients who had undergone CABG for the last year by asking questions through the SF36 questioner developed by RAND Indonesian Version. The number of willing respondents was 10 people.

The Quantitative Research Questionnaire consisted of 8 sub-variables of quality of life consisting of physical function 10 questions, physical role limitations 4 questions, body pain 2 questions, general health 5 questions, vitality/energy/fatigue 4 questions, social function 2 questions, emotional role limitations 3 questions and emotional well-being 5 questions.

Table 3. Distribution of patients based on Quality of Life of Post CABG Patients 6 – 12 months (n = 10)

No	Sub Variable	Mean	SD
1	Physical functioning	64,50	5,99
2	Role functioning/physical	67,50	16,87
3	Role functioning/emotional	76,50	3,16
4	Energy/fatigue	61,00	3,16
5	Emotional well-being	77,50	5,27
6	Social functioning	70,00	10,54
7	Pain	57,20	3,29

8	General health and Health Change	77,50	5,62
	Average Quality of Life of Composite CABG Patients (Good, if the Score is 50 – 100)	68,96	

Based on the results of the study, it was found that the average quality of life of patients with CABG was in the Good category (Mean = 68.96). The explanation of each variable is as follows:

1) Physical Functioning

Question: 3, 4,5,6,7,8,9,10,11,12

The limitations of the physical function of CABG patients are related to the patient's ability to perform activities that require a lot of energy to lift heavy objects, do heavy exercise, climb stairs, walk, shower and use clothes independently. Based on the results of the study, it was found that the average patient had a good quality of life when viewed from physical functioning with a Mean of 64.50. This shows that Postoperative CABG patients aged 6 months – 1 year have a good quality of life and are able to do activities but still need help but there are patients who are limited to doing strenuous exercise.

There are several studies explaining that to improve physical function after CABG through physical activity, one of them is the 6-min walk test (6MWT) method. The results of the research by Rengo, et al prove that the utility of Neuromuscular Electrical Stimulation (NMES) to accelerate recovery of physical function after CABG surgery (Rengo, et al., 2022).

2) Role Functioning / Physical

Questions: 13,14,15,16

Most patients spend all their time doing activities but there are some patients who do not complete their work on time. Difficulty doing daily activities or work due to limited mobility so that they need family help in meeting their daily needs.

3) Role Functioning / Emotional

Questions: 17,18,19

In completing the work there is caution and doing it with a plan. It trains patience and the patient in performing the Action/activity. Patients spend a lot of time doing activities. Several studies have shown patients who were anxious pre-intervention with CABG reported experiencing more pain, less postoperative symptom relief, and more readmissions (Amjadian M., et al., 2020)

4) Energy / Fatigue

Questions: 23,27,29,31

The activities carried out require a lot of energy so that patients complain that they often feel tired. Fatigue is a major long-lasting problem in heart patients. Although CABG heart surgery is successful, some patients continue to experience fatigue after surgery. This fatigue can be associated with physiological function, and physical activity during recovery. Fatigue can also be associated with psychological factors

such as depression. Continuous fatigue can hinder early recovery after CABG surgery. While the severity and frequency of fatigue peaked at 6 weeks among male CABG subjects, women did not experience peak fatigue levels until 3 months after CABG surgery. Fatigue persisted in 84% of female subjects at 3 months after CABG surgery (Barnason, et al., 2009).

5) Emotional Well Being

Questions: 24,25,26,28,30

The patient stated that he occasionally felt pressured but his family supported and provided warmth so that the patient was full of enthusiasm. With restrictions on activities, patients sometimes feel tired quickly, feel bored and desperate and sad.

This is in accordance with the study of the cohort in the West Bank, of the 200 participants, 116 were men (58%). High levels of depression, anxiety, and stress were observed both before and after surgery, with statistically significant reductions in all these variables after surgery ($p < 0.001$). Regarding demographic factors, age displayed a weak positive correlation with depression ($r = 0.283$; $p < 0.001$), anxiety ($r = 0.221$; $p = 0.002$), and stress ($r = 0.251$; $p < 0.001$). Sex showed a weak correlation with stress pre-surgery ($r = -0.160$; $p = 0.024$) (Sawalha, Ariza-Vega, Alhalaiqa, Rodriquez, & Romero-Ayuso, 2024).

6) Social Functioning

Question: 20. 32

The results of this study state that Physical health today does not interfere with social activity problems such as communicating with family, friends, neighbors and the community as usual. It's just that it requires more energy because it gets tired easily. In contrast to the results of research at universal Health Insurance Hospitals and Private Hospitals. Most of the studied patients had poor quality of social life, they hadn't participated in normal social activities with their families, friends, neighbors or group. From the point of view of the researcher, this may be attributed to a reduced level of physical functioning impacting their social lives, as well as being older and having chronic illnesses, according to the researcher (Amal Bakr Abo El-Ata, Sobeh, & Mansor, 2021).

7) Pain

Questions: 21.22

Most patients explained that they still experience pain after CABG surgery. The pain is on a mild scale. This pain does not interfere with activities because it is still under the influence of painkillers. Some patients explain that every time they do strenuous activities, the pain will feel heavy. In the last 4 weeks, the pain was mild and did not interfere with activities because it was still tolerable.

8) General Health dan Health Change

Questions: 1,33,34,35,36, 2

Based on the results of the study, it was found that the patient stated that his current health was very good and was getting better than before the surgery. However, his

activities are not the same as other healthy people. Most patients say that the current condition is good. And much better than last year.

These findings are consistent with (Pac̆aric, 2020), who reported that After the CABG surgery, there was an improvement in general health (GH), which may be related to the reduction or elimination of angina and chest pain . In addition, (Albilasi, T., et al., 2018) who reported that the patients enjoyed good general health after CABG. This finding explained as the government provides fee health-care services for all citizens, patients in this study were not having any concerns about the surgery discharge before and after the operation. Therefore, post-operative complications will be decreased.

The quality of life of patients has improved in terms of physical, family and work environment. In line with the research that has been carried out on the quality of life of CABG patients. Based on the results, it was found that there are several basic care needs that must be met by postoperative CABG patients. This need requires education related to how patients undergo treatment during the inpatient phase, the outpatient phase and the Maintenance phase. Each phase has a problem that must be solved through education to increase the understanding of patients and families in caring for and increasing self-efficacy, namely the ability to carry out self-care to overcome the health problems faced.

c. Combination and Interpretation of Research Results

Based on the results of qualitative and quantitative research, the treatment needs of CABG patients are as follows

Phase Inpatient (Pre - Post CABG)

In this phase, patients are generally treated 2 days before the surgery. Surgical preparation is done to overcome psychological problems such as anxiety and physical preparation before surgery is performed. The needs that must be met are:

- 1) Psychological Needs: Patients tend to feel anxious before surgery. After surgery, the patient experiences emotional instability.
- 2) The need for sleep breaks. Before surgery, the patient felt anxious so that it caused difficulty sleeping, while after the surgery the patient had difficulty sleeping because he had to maintain a position to stay lying in a supinasi position (supine) to prevent bone shifting after thoracic surgery. At this time the patient must maintain a position.
- 3) Physical Activity Needs. Before surgery, it was difficult for patients to undergo physical activity. After surgery, physical activity during the treatment room is completely assisted. On the 4th day, the patient has started to do activities gradually such as sitting. In general, patients can go home on day 6-7 treatment rooms. When the patient goes home, the mobilization of the patient to go home using a wheelchair.
- 4) Self-care needs. Before surgery, patients are able to carry out self-care activities such as bathing, dressing, and decorating. After surgery, self-care needs are assisted by family and facilitated by nurses in the room.
- 5) Oxygenation needs. The postoperative patient while in the treatment room complained of tightness and coughing. Even coughing sometimes bleed. Patients should not be swollen as it can cause severe pain in the surgical scars.
- 6) The need for a sense of security. The patient experiences pain, but the pain can still be treated with analgesic drugs. The Pain Scale will drop to reach a scale of 3 before the

patient goes home

- 7) Educational needs. Before the patient goes home, the patient is given education in the form of: lifestyle, limiting activities (activities that can be done and those that are not allowed), taking medication regularly, wound care and maintaining the condition of the wound, stress management, eating and drinking what is allowed and what is not allowed, control time according to the schedule, conditions when to go to the hospital immediately.

Out Patient Phase (Patient Care During Outpatient Care)

In this phase, patients are given education about:

- 1) The pain felt will gradually disappear in about 1 month, so patience is very necessary
- 2) The surgical wound should not get wet and keep the wound clean
- 3) Medicines must be taken regularly as stated on the drug label
- 4) Patients will undergo mobilization exercises – physical exercises for approximately 1 month in medical rehabilitation
- 5) Get enough rest, eat nutritious food for recovery
- 6) Re-control back as per the given control letter.

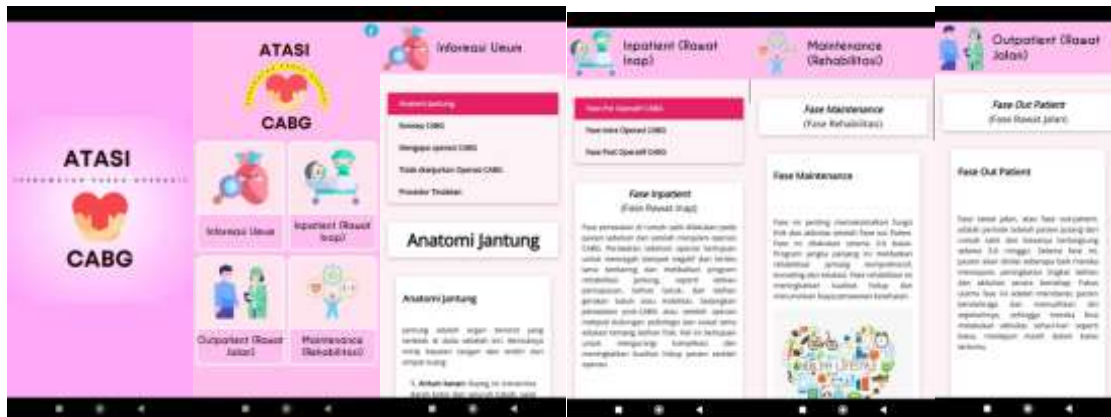
Maintenance Phase (Advanced maintenance and Rehabilitation phase)

In this phase, the patient is given physical exercise in medical rehabilitation and the patient begins to gradually carry out activities independently to improve his quality of life. In Phase III Rehabilitation (*Maintenance phase*) is the most important phase where the benefits obtained during phase II can be lost if the patient stops doing physical exercise. This phase is carried out for 3-6 months. A cardiac rehabilitation program is a comprehensive, long-term program that involves medical evaluation, supervised exercise, modification of heart risk factors, education, and counseling. CABG exercise-based cardiac rehabilitation limits the physiological and psychological effects of heart disease, controls heart failure symptoms, stabilizes or reverses atherosclerotic processes, improves psychosocial status, and reduces the risk of sudden death of recurrent infarction. Cardiac rehabilitation reduces risk factors, increases physical exercise capacity, medication adherence to secondary preventive therapies, and survival after CABG surgery (Dewi, Dewi, Tanojo, Mulia, & Adriana, 2021).

d. Digital Application Platform

Confirmation of the model proposal to the information system analyst/designer is carried out to ensure that the digital transformation model can be implemented. This is adjusted to the general stages of system design including planning, system analysis, designing the system, and implementing it so that the required system is formed. Considering that this system model is adapted to the needs of post-CABG patients, the phases of treatment are adjusted to show the process starting from reviewing, understanding the needs of patients, reviewing and testing software options, building and developing applications, testing applications on patients, and in relevant locations and making revisions so that the system can be beneficial to the community.

Based on the results of the research and the interpretation of the research results, the next stage is to design the application with several meetings. The design of this application involves the developer of the MIB Lab Semarang Application so that a special digital application platform for CABG patients was created called ATASI CABG. The description of this application is as follows:



CONCLUSION

Treatment in CABG patients is divided into 3 phases, namely the inpatient phase, the outpatient phase, and the maintenance phase. The needs of care in the Inpatient Phase are psychological needs, sleep breaks, physical activity, self-care, oxygenation, a sense of security and educational needs. Treatment needs in the Outpatient Phase are pain management, surgical wound care, medical needs, physical activity (exercise and mobilization), rest and education needs. The Need for the Maintenance Phase is the need for medical rehabilitation in fulfilling physical activity. Postoperative patient care needs are adjusted to the CABG patient care phase.

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