Clinical Pathway Implementation in ACS STEMI Patients

Wiedya Kristianti Angeline[1], Martina[1], Ermi Girsang[2*], Ali Napiah Nasution[2]

[1]Department of Hospital Management, Faculty of Medicine, Universitas Prima Indonesia
[2]Department of Public Health, Faculty of Medicine, Universitas Prima Indonesia

A B S T R A C T

Delay in handling patients with Acute ST-elevation myocardial infarction (STEMI) is the cause of high mortality and the incidence of MACE (Major Adverse Cardiac Event), so efforts are needed to reduce it by handling patients with Acute Coronary Syndrome (ACS) with the implementation of clinical pathways. This study evaluates the application of clinical pathways for ACS STEMI patients based on content and quality and evaluates the effectiveness of clinical pathways based on length of stay, total costs, and outcomes between ACS STEMI patients with clinical pathways and non-clinical pathways. This research uses mixed methods with an exploratory sequential approach. Evaluation of clinical pathways for ACS STEMI patients with a qualitative approach through in-depth interviews using the Integrated Care Pathway Appraisal Tool (ICPAT) questionnaire. Furthermore, a comparative approach is used to determine the effectiveness of clinical pathways based on length of stay, total costs and outcomes (outcomes) between ACS STEMI patients who have and do not have a clinical pathway. The study was conducted from November 2021 to April 2022 at the Cardiology Section of Murni Teguh Hospital, Medan. The results show that the implementation process is of good quality, but the content still needs to be improved. From the test results with the Mann-Whitney U Test, it can be seen that there is an effect of using the application of clinical pathways on length of stay, total costs and outcomes in ACS STEMI patients. It is suggested to the hospital management to determine a strategy in increasing the compliance of doctors and nurses to the clinical pathway.

A B S T R A K

Keterlambatan penanganan pasien Acute ST-elevation myocardial infarction (STEMI) menjadi penyebab tingginya mortalitas dan kejadian MACE (Major Adverse Cardiac Event), maka diperlukan upaya dalam menguranginya melalui penanganan pasien Acute Coronary Syndrome (ACS) dengan diberlakukannya clinical pathway. Penelitian ini bertujuan mengevaluasi penerapan clinical pathway pasien ACS STEMI berdasarkan konten dan kualitas serta mengevaluasi efektivitas clinical pathway berdasarkan lama rawat, biaya total dan hasil antara pasien ACS STEMI dengan clinical pathway dan non clinical pathway. Penelitian ini menggunakan mix methods dengan pendekatan exploratory sequential. Evaluasi clinical pathway pasien ACS STEMI dengan pendekatan kualitatif melalui wawancara mendalam menggunakan kuesioner Integrated Care Pathway Appraisal Tool (ICPAT). Selanjutnya pendekatan komparatif digunakan untuk mengetahui efektivitas clinical pathway berdasarkan lama rawat, biaya total dan hasil (outcomes) antara pasien ACS STEMI yang memiliki dan tidak memiliki clinical pathway. Studi dilakukan selama bulan November 2021 hingga April 2022 di Bagian Kardiologi Rumah Sakit Murni Teguh Medan. Hasil penelitian menunjukkan proses implementasi yang

dilakukan sudah baik untuk mutu, namun konten masih perlu ditingkatkan. Dari hasil uji dengan Mann Whitney U Test terlihat bahwa ada pengaruh penggunaan penerapan clinical pathway terhadap lama rawat, biaya total dan hasil pada pasien ACS STEMI. Disarankan pada pihak manajemen rumah sakit untuk menentukan strategi dalam meningkatkan kepatuhan dokter dan perawat terhadap clinical pathway.

INTRODUCTION

Acute coronary syndrome (ACS) is a type of coronary heart disease (CHD) that results in one-third of the total deaths in people older than 35 years (James and Bueno, 2018; Zègre-Hemsey et al., 2019). In Indonesia, the prevalence of heart disease based on doctor's diagnosis in Indonesia reaches 1.5% (Kementerian Kesehatan, 2018). The Institute for Health Metrics and Evaluation (IHME) reports that 14.4% of the causes of death in Indonesia are coronary heart disease, and it has been reported that 50% of patients with coronary heart disease can experience sudden cardiac arrest (Institute for Health Metrics and Evaluation, 2018).

Acute coronary syndrome (ACS) includes Unstable Angina (UA) and evolving Myocardial Infarction (MI) which is usually divided into ST-segment elevation Myocardial Infarction (STEMI) and ACS without ST-segment elevation (NSTEMI) (Longmore, 2014). ACS with ST Elevation Myocardial Infarction (STEMI) is the highest cause of death due to cardiovascular disease. STEMI is classified as a severe type of heart attack that requires immediate treatment (Vernon et al., 2019). The problem that often occurs is the lack of attention by health workers to the importance of immediate treatment of STEMI patients (Chandrashekhar et al., 2020). This in addition to affecting clinical outcomes in the form of morbidity and mortality, also impacts the quality of patient care (Rehman et al., 2019; Scholz et al., 2018).

An effort made to minimize the risk of ACS STEMI is to implement clinical pathways. Clinical pathways have been widely used as standard therapy because they can reduce length of stay, reduce treatment costs and improve safety and therapeutic outcomes (Rotter et al., 2011; Schmidt et al., 2018). Clinical pathways show in detail the important stages in health services, including the expected results (Lawal et al., 2016). Several obstacles that arise in the implementation of clinical pathways are the lack of equipment resources, and health facilities or can occur due to negligence of technical implementers (Rotter et al., 2019; Urizar et al., 2018). Similar problems also arise in hospitals in Indonesia. Organizational aspects, unpreparedness to implement human resources, and evaluation monitoring processes are obstacles to implementing clinical pathways (Helzainka, 2021). The Hospital Accreditation Committee in Indonesia also includes clinical pathways in the accreditation standard (Astuti et al., 2017).

One of the hospitals in Medan City that serves many patients with cardiovascular disease is Murni Teguh Hospital. Murni Teguh Hospital has implemented a clinical pathway as a standard for health services since 2015. The results of a preliminary survey revealed that until now, Murni Teguh Hospital in Medan has implemented a clinical pathway for several types of diseases, one of which is cardiovascular. The application of clinical pathways in this hospital does not always run well. The information obtained was caused by a shortage of medical equipment and human resources. Another cause is the negligence of medical personnel (doctors and specialists) in its application. This condition impacts the quality of health services to decrease so that it tends to be damaging to patients as the party receiving services. This study evaluates the application of clinical pathways for STEMI patients based on content and quality and evaluates the effectiveness of clinical pathways based on length of stay, total costs, and outcomes between STEMI patients with clinical pathways and non-clinical pathways.

METHOD

Study Design

This study is mixed-methods research with an exploratory sequential design so that the data obtained is more comprehensive, valid, reliable, and objective. Data collection begins with collecting quantitative data and then continues with qualitative data collection to help analyze the data obtained quantitatively. Qualitative data is collected first to explore the existing phenomena first, then quantitative data is used to explain the relationship of variables found in qualitative data (Creswell, 2014). Evaluation of clinical pathways for ACS STEMI patients with a qualitative approach through in-depth interviews using the Integrated Care Pathway Appraisal Tool (ICPAT) questionnaire. Furthermore, a comparative approach is used to determine the effectiveness of clinical pathways based on length of stay, total costs, and outcomes between ACS STEMI patients who have and do not have a clinical pathway. The study was conducted from November 2021 to April 2022 at the Cardiology Section of Murni Teguh Hospital.

Participant Recruitment

The population in this study is all clinical pathway data for ACS STEMI patients for the period January 2015 to March 2015 as many as 425 data (an average of 175 patients per month) and all data for ACS STEMI patients before the implementation of the clinical pathway as many as 425 (average 175 patients). per month) in the period January 2014 to March 2014. The sample size can be taken by 30% if the total population is greater than 100 people so the sample size of this study is 126 patients (Arikunto, 2014). With a comparison of the number of samples in the patient data group with clinical pathways and patient data groups without clinical pathways being 1:1, the total sample size is 252 patients. The sampling technique used was the purposive sampling technique with inclusion criteria being patients whose data were complete with clinical pathways and registers.

To get the right qualitative data, it is determined that the research informants are those who have the competence and are following the data needs (purposive). The selected informants include 1 coordinator, 1 radiographer, 2 nurses, and 6 nurses. Subjects were recruited by purposive sampling method based on the criteria of having worked for more than 2 years.

Data Collection

In collecting data, researchers conducted interviews aimed at evaluating the clinical pathways of ACS STEMI patients in terms of content and quality using the Integrated Care Pathways Appraisal Tools (ICPAT) questionnaire. ICPAT is an instrument that has been validated and can be used to evaluate the content and quality of clinical pathways which consists of 6 dimensions, namely: 1) ascertaining whether the form being assessed is a clinical pathway; 2) assessing the clinical pathway documentation process; 3) assessing the clinical pathway development process; 4) assessing the clinical pathway implementation process; 5) assessing the clinical pathway maintenance process, and 6) assessing the organizational role of the hospital. Data on patient characteristics (gender and age), length of stay (LOS), hospital costs (total cost), and outcomes were collected using the documentation method. Secondary data was collected in the form of clinical pathway data for ACS STEMI patients who have and do not have clinical pathways, and hospital records.

Data Analysis

Qualitative data obtained through the distribution of the ICPAT questionnaire method were analyzed on the content and quality of clinical pathways. If the score >75% is included in the good criteria, moderate with a value of 50-75%, and the criteria are less if the score is <50% (Whittle et al., 2008). Quantitative data were tested using the Mann-Whitney U test to compare the effectiveness of hospital costs, length of stay (LOS), and outcomes between patients before and after the implementation of clinical pathways.

RESULT AND DISCUSSION

Content and Quality Evaluation

Evaluation of the implementation of clinical pathways for ACS STEMI patients refers to the 6 dimensions of the Integrated Care Pathway Appraisal Tool (ICPAT). From the ICPAT assessment carried out, the overall content value is categorized as good, found in the 1st dimension, 4th dimension, and 5th dimension. The overall quality value is categorized as good, found in 5th dimension and 6th dimension, the rest of the quality values are less found in 2nd dimension and 6th dimension. This classification is used to determine the standard of each item of content and quality in the clinical pathway form.

In the first dimension, it can be seen that although the informants have understood the identification of clinical pathways, they are not necessarily in line with the quality produced. Improvements can be made through the provision of periodic training to improve the process and quality of patient documentation outcomes (Mater and Ibrahim, 2014). A study in Nigeria reported that the blended learning approach was quite effective in increasing the knowledge and competence of each healthcare professional on clinical pathways (Eguzo et al., 2021). The results of the quality assessment of dimension 1 show that the clinical pathway documentation is still not optimal. The lack of documentation process on the assessed forms will affect communication between officers, and lack of evidence related to medical audits (Bjerkan et al., 2021; Esposito and Dal Canton, 2014).

Table 1
Content and Quality Evaluation of STEMI Clinical Pathway

Dimension	Content			Content		
	Category	n	%	Category	n	%
1. Identification	Good	10	100,0	Good	-	-
	Moderate	-	-	Moderate	4	40,0
	Less	-	-	Less	6	60,0
2. Dokumentation	Good	3	30,0	Good	1	10,0
	Moderate	7	70,0	Moderate	6	60,0
	Less	-	-	Less	3	30,0
3. Development	Good	6	60,0	Good	6	60,0
	Moderate	4	40,0	Moderate	4	40,0
	Less	-	-	Less	-	-
4. Implementation	Good	-	-	Good	6	60,0
	Moderate	10	100,0	Moderate	-	-
	Less	-	-	Less	4	40,0
5. Maintenance	Good	10	100,0	Good	10	100,0
	Moderate	-	-	Moderate	-	-
	Less	-	-	Less	-	-
6. Organizational role	Good	-	-	Good	10	100,0
	Moderate	5	50,0	Moderate	-	-
	Less	5	50,0	Less	-	-

Based on ICPAT's assessment, the quality value of dimension 6 that serves to assess the role of the organization, is still not good. The results of the study show that the commitment of medical personnel that is still minimal impacts non-compliance in conducting clinical pathways so that clinical pathway forms are often not completed or not included in medical records. Previous studies reported that the lack of doctor participation could trigger the failure of clinical pathway implementation (Bjurling-Sjöberg et al., 2015). The complexity of clinical

pathway implementation requires careful consideration of facilitators and barriers to changing provider behavior in certain settings (Rotter et al., 2019). The selection of strategies to improve physician compliance with clinical pathways is important for management (Knai et al., 2013).

The differences between STEMI with and without clinical pathway

Table 2 shows the characteristics of the research sample from the ACS STEMI patient group with clinical pathways based on gender, the majority of which were male as many as 99 people (78.4%) the rest were women as many as 27 people (21.4%). Characteristics based on the age of the majority aged 51-60 years as many as 58 people (46.0%) the rest are aged 61-70 years as many as 26 people (20.6%); aged

41-50 years as many as 24 people (19.0%); aged 31-40 years as many as 9 people (7.1%); aged >70 years as many as 8 people (6.3%); and aged 20-30 years as many as 1 person (0.8%).

The characteristics of the research sample from the non-clinical pathway ACS STEMI patient group were based on gender, the majority were 109 men (86.5%) and the rest were 17 women (13.5%). Characteristics based on the age of the majority aged 51-60 years as many as 50 people (39.7%) the rest are aged 61-70 years as many as 34 people (27.0%); aged 41-50 years as many as 27 people (21.4%); aged > 70 years as many as 8 people (6.3%); aged 31-40 years as many as 5 people (4.0%); and aged 20-30 years as many as 2 people (1.6%).

Table 2
Characteristic of patients

Characteristic	ACS STEMI with clinical pathway		ACS STEMI non clinical pathway	
	n	%	n	%
Gender				
Female	27	21,4	17	13,5
Male	99	78,6	109	86,5
Age (year)				
20-30	1	0,8	2	1,6
31-40	9	7,1	5	4,0
41-50	24	19,0	27	21,4
51-60	58	46,0	50	39,7
61-70	26	20,6	34	27,0
>70	8	6,3	8	6,3

Based on the results of the Kolmogorov-Smirnov Test on the documentation data of ACS STEMI patients with clinical pathways and non-clinical pathways based on length of stay, total costs, and outcomes (outcomes), the data obtained were not normally distributed because all variable's p-value < 0.05. So the Mann-Whitney test was used to determine the effectiveness of the clinical pathway between ACS STEMI patients with clinical and non-clinical pathways.

Table 3
Effectiveness of Clinical Pathway between ACS STEMI patients with clinical and non clinical pathways

Variable	Mean Rank		p
	Clinical pathway	Non clinical pathway	
Length of stay	135,71	117,29	0,040
Cost	116,33	136,67	0,027
Outcome	131,50	121,50	0,039

Table 3 shows that between ACS STEMI patients with clinical and non-clinical pathways there are differences in length of stay (135.71±117.29); cost (116.33±136.67); and results (131.50±121.50) with a significance value of <0.05, respectively. Thus, from the average value of each length of stay, costs, and outcomes between ACS STEMI patients with clinical pathways and non-clinical pathways, it can be seen that ACS STEMI patients with clinical pathways are more effective than non-clinical pathway patients. Thus, it can be interpreted that there is an effect of the use of clinical pathway implementation on length of stay, total cost, and outcomes in ACS STEMI patients.

The results of previous studies reported that the application of clinical pathways affected patient length of stay (LOS) and total costs. The suitability of the clinical pathway affects the total cost of therapy paid by the patient, which is lower in the group that is following the clinical pathway than in the group that is not following the clinical pathway (Candradewi et al., 2021). A systematic review concluded that clinical pathways can reduce the average length of stay, hospitalization expenses, and improve service quality and patient satisfaction (Huang et al., 2015). The study at Sungai Dareh General Hospital also concluded that there was a significant difference between clinical pathways that were carried out and those that were not carried out in patient care (Armiyanti et al., 2021).

The findings of this study are also following the research of Hadira et al. (2020) who reported that there was a significant positive correlation between the application of clinical pathways and a reduction in clinical risk of patient care in hospitals. The clinical pathway can reduce the number of days of hospitalization for patients and the index of patient hospitalization costs. Over-procedure prevention measures can be taken to reduce unnecessary inspection actions such as the number of laboratory tests, the number of consultations, and drugs. The study conducted by Iroth et al. (2017) found that there was a significant difference in the cost of acute ischemic stroke treatment after the implementation of clinical pathways. However, this result is not in line with the study conducted by Fadilah & Budi (2018) which reported that it had no impact on patient outcomes, the implementation of clinical pathways could only reduce the average length of stay.

Clinical pathways have been widely used as standard therapy because they can reduce length of stay, reduce treatment costs and improve safety and therapeutic outcomes for patients hospitalized (Rotter et al., 2011). Through the implementation of clinical pathways, it is hoped

that the quality of service can be improved at affordable and estimated costs and reduce the readmission of patients in hospitals (Rosalina et al., 2018). In the end, the development and implementation of clinical pathways require high organizational commitment including the involvement of all medical staff (Trimarchi et al., 2021).

CONCLUSIONS AND SUGGESTIONS

Clinical pathway implementation process is good for quality, but the content still needs to be improved. The main thing that is important in implementation is to conduct training to improve the quality of officers. This study also concludes that the application of clinical pathways plays a role in reducing total hospital costs, and reducing LOS where hospitalization days are shorter than before using clinical pathways. It is suggested to the hospital management to determine a strategy in increasing the compliance of doctors and nurses to the clinical pathway.

ACKNOWLEDGEMENT

ETHICAL CONSIDERATION

Funding Statement

REFERENCES

Arikunto, S. (2014), *Prosedur Penelitian: Suatu Pendekatan Praktik*, Rineka Cipta, Jakarta.

Armiyanti, Dharma, S. and Wahyudi, W. (2021), "Pengaruh Penerapan Clinical Pathway Diabetes Melitus Tipe 2 Terhadap Lama Hari Rawat di RSUD Sungai Dareh", *Jurnal Kesehatan Medika Saintika*, Vol. 12 No. 1, pp. 114–122.

Astuti, Y.D., Dewi, A. and Arini, M. (2017), "Evaluasi Implementasi Clinical Pathway Sectio Caesarea di RSUD Panembahan Senopati Bantul", *Jurnal Medicoeticolegal Dan Manajemen Rumah Sakit*, Vol. 6 No. 2, pp. 97–111.

Bjerkan, J., Valderaune, V. and Olsen, R.M. (2021), "Patient Safety Through Nursing Documentation: Barriers Identified by Healthcare Professionals and Students ", *Frontiers in Computer Science*, available at: https://www.frontiersin.org/article/10.3389/fcomp.2021.624555.

Bjurling-Sjöberg, P., Wadensten, B., Pöder, U., Nordgren, L. and Jansson, I. (2015), "Factors affecting the implementation process of clinical pathways: a mixed method study within the context of Swedish intensive care", *Journal of Evaluation in Clinical Practice*, John Wiley & Sons, Ltd, Vol. 21 No. 2, pp. 255–261.

Candradewi, S.F., Perwitasari, D.A. and Nabilah, N. (2021), "Analisis Biaya dan Luaran Klinis Sindrom Koroner Akut Berbasis Clinical Pathway", *Jurnal Manajemen Dan Pelayanan Farmasi*, Vol. 11 No. 2, p. 91.

Chandrashekhar, Y., Alexander, T., Mullasari, A., Kumbhani, D.J., Alam, S., Alexanderson, E., Bachani, D., et al. (2020), "Resource and Infrastructure-Appropriate Management of ST-Segment Elevation Myocardial Infarction in Low- and Middle-Income Countries", *Circulation*, American Heart Association, Vol. 141 No. 24, pp. 2004–2025.

Creswell, J.W. (2014), *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, 4th ed., SAGE Publications, California.

Eguzo, K.N., Akpanudo, U., Oluoha, C., Ismaila, N., Jacob, A., Nnah, K., Tumba, N., et al. (2021), "Enhancing Nigerian Healthcare Providers Competence in Breast Cancer Clinical Pathway Development using Blended Learning Approach", *Asian Pacific Journal of Cancer Care*, Vol. 6 No. 3, pp. 271–276.

Esposito, P. and Dal Canton, A. (2014), "Clinical audit, a valuable tool to improve quality of care: General methodology and applications in nephrology", *World Journal of Nephrology*, Baishideng Publishing Group Inc, Vol. 3 No. 4, pp. 249–255.

Fadilah, N.F.N. and Budi, S.C. (2018), "Efektifitas Implementasi Clinical Pathway Terhadap Average Length Of Stay dan Outcomes Pasien DF-DHF Anak di RSUD Kota Yogyakarta", *Jurnal Kesehatan Vokasional*, Vol. 2 No. 2, p. 175.

Hadira, Syahrul, S. and Rachmawaty, R. (2020), "Efektivitas Penerapan Integrated Clinical Pathway (ICP) Terkait Manajemen Risiko Terhadap Kualitas Pelayanan di Rumah Sakit: Literatur Review", *Jurnal Keperawatan Muhammadiyah Edisi Khusus*, pp. 97–105.

Helzainka, A.A. (2021), "Challenges in the Implementation of Clinical Pathway in Indonesia: A Systematic Review", *Cermin Dunia Kedokteran*, Vol. 48 No. 7, pp. 430–434.

Huang, D., Song, X., Tian, J., Cui, Q. and Yang, K.-H. (2015), "Effects of clinical pathways in stroke management: A meta-analysis", *Neurology Asia*, Vol. 20, pp. 335–342.

Institute for Health Metrics and Evaluation. (2018), "Findings from the Global Burden of Disease Study 2017", Seattle, available at: http://www.healthdata.org/sites/default/files/files/policy_report/2019/G BD_2017_Booklet.pdf [20 Mei 2019.

Iroth, J.S., Ahmad, R.A. and Pinzon, R. (2017), "Dampak Penerapan Clinical Pathway Terhadap Biaya Perawatan Pasien Stroke Iskemik Akut di RS Bethesda Yogyakarta", *Berkala Ilmiah Kedokteran Duta Wacana*, Vol. 2 No. 1, p. 267.

James, S. and Bueno, H. (2018), "Epidemiology of acute coronary syndromes", Oxford University Press, Oxford, UK, available at:https://doi.org/10.1093/med/9780198784906.003.0305.

Kementerian Kesehatan. (2018), *Riset Kesehatan Dasar 2018 (2018 Basic Health Research)*, Jakarta.

Knai, C., Hawkesworth, S., Pannella, M., Sermeus, W., McKee, M., Cluzeau, F., Van Zelm, R., et al. (2013), "International experiences in the use of care pathways", *Journal of Care Services Management*, Taylor & Francis, Vol. 7 No. 4, pp. 128–135.

Lawal, A.K., Rotter, T., Kinsman, L., Machotta, A., Ronellenfitsch, U., Scott, S.D., Goodridge, D., et al. (2016), "What is a clinical pathway? Refinement of an operational definition to identify clinical pathway studies for a Cochrane systematic review", *BMC Medicine*, Vol. 14 No. 1, p. 35.

Longmore, M. (2014), *Oxford Handbook of Clinical Medicine (Oxford Medical Handbooks)*, 9th ed., Oxford University Press.

Mater, W. and Ibrahim, R. (2014), "Delivering Quality Healthcare Services using Clinical Pathways", *International Journal of Computer Applications*, Vol. 95 No. 1, pp. 5–8.

Rehman, S., Li, X., Wang, C., Ikram, M., Rehman, E. and Liu, M. (2019), "Quality of Care for Patients with Acute Myocardial Infarction (AMI) in Pakistan: A Retrospective Study", *International Journal of Environmental Research and Public Health* , available at:https://doi.org/10.3390/ijerph16203890.

Rosalina, I.S., Mansur, M., Syamsul Hidayat, M.K. and Widyaningrum, K. (2018), "Evaluating Clinical Pathway Typhoid Fever Monitoring at ABC Hospital Malang", *Jurnal Medicoeticolegal Dan Manajemen Rumah Sakit*, Vol. 7 No. 1, pp. 43–51.

Rotter, T., de Jong, R.B., Lacko, S.E., Ronellenfitsch, U. and Kinsman, L. (2019), "Clinical pathways as a quality strategy", *Improving Healthcare Quality in Europe: Characteristics, Effectiveness and Implementation of Different Strategies*, European Observatory on Health Systems and Policies, Copenhagen.

Rotter, T., Kinsman, L., James, E., Machotta, A., Willis, J., Snow, P. and Kugler, J. (2011), "The Effects of Clinical Pathways on Professional Practice, Patient Outcomes, Length of Stay, and Hospital Costs: Cochrane Systematic Review and Meta-Analysis", *Evaluation & the Health Professions*, SAGE Publications Inc, Vol. 35 No. 1, pp. 3–27.

Schmidt, I., Thor, J., Davidson, T., Nilsson, F. and Carlsson, C. (2018), "The national program on standardized cancer care pathways in Sweden: Observations and findings half way through", *Health Policy*, Vol. 122 No. 9, pp. 945–948.

Scholz, K.H., Maier, S.K.G., Maier, L.S., Lengenfelder, B., Jacobshagen, C., Jung, J., Fleischmann, C., et al. (2018), "Impact of treatment delay on mortality in ST-segment elevation myocardial infarction (STEMI) patients presenting with and without haemodynamic instability: results from the German prospective, multicentre FITT-STEMI trial", *European Heart Journal*, Vol. 39 No. 13, pp. 1065–1074.

Trimarchi, L., Caruso, R., Magon, G., Odone, A. and Arrigoni, C. (2021), "Clinical pathways and patient-related outcomes in hospital-based settings: a systematic review and meta-analysis of randomized controlled trials", *Acta Bio-Medica : Atenei Parmensis*, Mattioli 1885, Vol. 92 No. 1, pp. e2021093–e2021093.

Urizar, E., Nuño, R., Alvarez, C., Concepción, F., Blay, C. and Quiroga, A. (2018), "Barriers and facilitators for the implementation of Integrated Care Pathways ICPs: a systemic perspective", *International Journal of Integrated Care*, Vol. 18 No. s2, p. 131.

Vernon, S.T., Coffey, S., D′Souza, M., Chow, C.K., Kilian, J., Hyun, K., Shaw, J.A., et al. (2019), "ST-Segment–Elevation Myocardial Infarction (STEMI) Patients Without Standard Modifiable Cardiovascular Risk Factors–How Common Are They, and What Are Their Outcomes?", *Journal of the American Heart Association*, American Heart Association, Vol. 8 No. 21, p. e013296.

Whittle, C., Dunn, L., McDonald, P. and Luc, K. de. (2008), "Assessing the content and quality of pathways", *Changing Clinical Care*, 1st ed., CRC Press, p. 13.

Zègre-Hemsey, J.K., Asafu-Adjei, J., Fernandez, A. and Brice, J. (2019), "Characteristics of Prehospital Electrocardiogram Use in North Carolina Using a Novel Linkage of Emergency Medical Services and Emergency Department Data", *Prehospital Emergency Care*, Taylor & Francis, Vol. 23 No. 6, pp. 772–779.