Journal of Public Health and Development
Vol.18 No.2 May-August 2020

REVIEW ARTICLE

A Systematic Integrative Review of the Interventions Aimed at Improving Knowledge, Attitudes, and Beliefs Among Patients with Acute Coronary Syndrome

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Received: 6 April 2020
Revised: 15 June 2020
Accepted: 16 June 2020
Available online: July 2020

ABSTRACT

This Systematic Integrative Review is aimed to identify in the scientific literature on educational interventions used by health care providers or other professionals to increase knowledge, attitudes or beliefs about Acute Coronary Syndrome (ACS) among patients with ACS. The review performed in the CINAHL, MEDLINE, PubMed, Scopus, Cochrane and EMBASE databases between 2004 and 2019 of articles published in the English language. This review followed a systematic integrative review methodology.

The review results indicated that six randomised controlled trials, one pilot randomised controlled trials, two pre-test/ post-test studies , and one single group quasi- experimental study met the eligibility criteria. Thus ten studies total were included in the review. The results of this review suggested that attitudes and beliefs may be harder to improve than knowledge. Among the studies that measured ACS knowledge, nine studies reported statistically significant positive effects of the study interventions on ACS knowledge. This review contributes to a deeper understanding of how to improve ACS knowledge by examining the types and effectiveness of the interventions in the selected studies on three domains of outcomes measures including knowledge, attitudes, and beliefs. This review also investigated the intervention delivery modes that were used to improve knowledge, attitudes, and beliefs in ACS patients.

This review explored the evidence on interventions for improving knowledge, attitudes, and beliefs about ACS management. This review examined evidence to inform further development of educational interventions, as well as the interventions' outcome assessments. Based on this review, beyond formal ACS management, ongoing support is essential for the maintenance of knowledge among people with ACS. There is much variation in interventions across the selected studies. We also found a lack of integrated innovative technology in ACS patients' education, particularly how patient education can be incorporated into current models of care delivery to improve clinical effectiveness.

Keywords: systematic, integrative review, knowledge, attitudes, beliefs, acute coronary syndrome, intervention

INTRODUCTION

People with documented Coronary Heart Disease (CHD) are five to seven times more likely to have a Myocardial Infraction (MI) or die compared to people without a history of CHD.[1] Despite a higher risk of Acute Coronary Syndrome (ACS), the literature consistently reports that this population has a low level of knowledge on ACS symptoms. Patients with ACS did not have good knowledge of heart attack symptoms. Many individuals failed to recognise the typical signs and symptoms of heart attack, such as neck pain and sweating. [2] Delay in seeking medical assistance when faced with ACS symptoms has been associated with this knowledge deficiency.[3] A qualitative study conducted in Western Australia using open- ended questions directed at 255 participants showed that 23% of the participants did not promptly recognise the symptoms of ACS. They described their experience of having ACS as being dissimilar to anything they had ever experienced before, and that it felt, "not quite right" or that they were "not feeling well" While 10% of the participants recognised the symptoms, they waited a couple of days before seeking medical assistance.[4] This is concerning. Groups of people, especially the elderly, should be taught to understand and recognise these atypical symptoms to decrease the barriers to seeking help for ACS early.[5-6]

Recognising symptoms of ACS is challenging, as different people experience different symptoms. For example, people older than 65 years of age are less likely to experience cardiac chest pain. This age group is more likely to experience atypical symptoms signifying the need for specific education in this area. Moreover, people with a history of ACS had no greater knowledge of ACS than those with no prior history of a MI.[5.]

A qualitative study from Canada conducted by Cytryn and colleauges[7] explored the relationship between ACS knowledge and response actions to the symptoms. The study used a semi-structured interview with three scenarios that were developed based on factors known to induce delays in seeking medical help. In total, 30 participants were recruited from an academic hospital. The results showed that 80% of the participants identified chest pain (93%) and dyspnoea (53%) as symptoms. All participants (n = 30) identified rapid action in calling an emergency number and getting to an ED as an appropriate response to ACS symptoms. Therefore, there should be a focus on teaching about clusters of ACS symptoms to increase accuracy in decision- making to seek medical help.[2,8]

In 2010, the study conducted a street survey of 192 participants in Thailand. [9] The results showed that 22% did not identify chest discomfort as a symptom of ACS. More than 50% of the participants identified more or all ACS symptoms from a list of correct and incorrect symptoms. The most commonly recognised symptoms were fatigue (79. 7%), chest discomfort (78%), dizziness (76%) and shortness of breath (71%). Conversely, 66. 7% of participants mistakenly believed that chest discomfort due to ACS would be severe, sharp and stabbing. This misconception also suggests the need for education. This is similar to other studies that reported that half of their participants had selected incorrect symptoms as being related to ACS.[10]

The largest study examining the public's knowledge of ACS symptoms was conducted in 2012 in the USA.[10] A sample of about 103 million adults aged 18 years and over were identified using a random digit dialing telephone survey. Participants were asked to identify which symptoms they would associate with ACS from a predetermined list of symptoms (five correct and one incorrect symptom) on the Behavioral Risk Factor Surveillance

Survey. Swanoski and colleagues reported on data from three surveys carried out in 2005, 2007, and 2009 in 25 states in the USA. They used a composite score from all three surveys to report the results.[10] The results showed that varying percentages of respondents recognized typical ACS symptoms: chest pain or discomfort (93%); arm or shoulder pain (87%); shortness of breath (85%); pain in the jaw, neck or back (54%); and feeling weak, light- headed, and faint (63 %). When the participants were asked to identify the first thing they should do if they thought someone was having a heart attack, 87 % indicated that they would call the emergency telephone number (911).[10] In 2016, a cross-sectional population- based study using a survey questionnaire was conducted in five Elderly Health Centres in Hong Kong among 1,804 individuals. The study revealed the following percentages of participants identified diferent symptoms as heart attack symptoms: chest pain (80.2%); palpitations (75.8%); and fainting (71.9%). Sizable percentages of participants were unsure about whether atypical symptoms of ACS including sweating (49.4%), headaches (44.9%), and neck pain (40.6%) were actually symptoms of ACS.[5] Future health education should seek to increase knowledge and symptom recognition among varied groups of patients and in the general population .[5,11]

Compounding the problem of ACS knowledge and symptom recognition is the need to choose the best method of seeking medical care. The main reason why patients do not dial an emergency number for help is their misunderstanding of ACS symptoms.[3] Educational efforts need to focus on improving knowledge about symptom recognition and on how to access prompt, effective treatment for acute MI.[12.]

OBJECTIVES

This review of interventions in the coronary heart disease (CHD) population has been undertaken to determine the effects of these interventions in improving the knowledge, attitudes, and beliefs of patients with CHD and ACS. What differentiates this review from others is its focus on whether and how individualised educational interventions are effective. This review brings out the differences between the educational interventions, the variability of the instruments, the effects of the interventions and potential explanations. This is an attempt to explore the evidence to inform further development of educational interventions to increase ACS knowledge, attitudes, and beliefs among patients with ACS.

METHODS

An integrative review was used to examine the effectiveness of educational interventions to improve ACS patients' knowledge, attitudes and beliefs. The methodology for an integrative review, as recommended by Whittemore and Knafl,[13] was used to apply rigour to review the studies reported in this study. Specifically, we prepared the guiding question, searched and sampled the literature, collected data, conducted critical analysis of the included studies, discussed the results, and presented results of the integrative review and analysis of the data.

Criteria for Selecting Studies

Type of Studies : Any educational intervention study that consisted of a measure of knowledge, attitudes, or beliefs of ACS patients was included. This included randomised controlled trials (RCTs), controlled clinical trials, and quasi-experimental, and pre-test/post-test studies that consisted of either a parallel group or

cross- over design in which the follow- up was one month or more after the start of the intervention.

Type of Participants : Individuals aged 18 years and over with coronary heart disease (CHD) or ACS due to any aetiology were included.

Type of Interventions: Included were interventions that targeted improvements in ACS knowledge, attitudes, beliefs, or heart attack response actions.

Type of Outcomes: Studies were selected that reported on outcomes related to knowledge, attitudes, beliefs, or response actions to ACS symptoms.

Selection of Studies

A review was conducted of research undertaken between 2004 and 2019. The databases searched were MEDLINE, Psych INFO, Cochrane and CINAHL. A search of the literature was independently conducted by the first reviewer, and then a medical librarian using electronic database search engines. The titles of the articles identified in the search were initially considered, and any that were obviously irrelevant were excluded. The specific search keywords used were ' acute coronary syndrome' , 'heart attack', 'knowledge, attitude, belief' and 'intervention OR clinical trial OR pilot study OR outcomes OR randomised controlled trial' . There was also an additional manual search of references identified in the selected studies. The final search results were de- duplicated within EndNote. Articles were initially screened by reviewing titles and keywords. Two independent reviewers then screened the retrieved articles independently using predetermined inclusion criteria. Full versions of the studies considered potentially relevant were agreed on by consensus. Disagreements on inclusion were also resolved by consensus with a third reviewer. A summary of the selected articles is provided in Table 1.

Table 1. Summary of the Reviewed Studies

Study/Methods/ Sample	Intervention/ Reinforcement/ Follow-up/	Data measurement/ Instruments	Results
Goff et al. [14] USA RCT Pre-intervention n = 1,294 Post-intervention n = 1,204	18-month Intervention strategies included community organization, public education, professional education, and patient education. 20 communities Symptom recognition and the need to act fast by calling 911 Follow-up at 5-8 months, 12-15 months and 18 months No reinforcement	Knowledge of ACS symptoms Open-ended questions Random digit survey via telephone	Significant increase in knowledge of symptoms in intervention communities ($p < .001$) No significant differences in attitudes and beliefs between groups over time
Meischke et al.[15] USA RCT Age over 65 years old n = 323 Intervention = 176 Control = 147	Individualised education with information package about ACS symptom knowledge and importance of calling emergency telephone number Three- and 12-month follow-ups No reinforcement	Knowledge of ACS symptoms Response action intentions to ACS symptoms Telephone survey with open- ended questionnaire	No significant differences in knowledge of ACS symptoms or intention to call emergency telephone number between groups

Table 1. Summary of the Reviewed Studies (cont.)

Study/Methods/ Sample	Intervention/ Reinforcement/ Follow-up/	Data measurement/ Instruments	Results
Buckley et al. [16] Australia RCT Reinforced one month later History of CHD n = 200 Intervention = 105 Control = 95	Individualised education and counselling intervention (40 minutes) No reinforcement Three- and 12-month follow-ups	Knowledge, attitudes and beliefs The ACS Response Index	Significantly improved knowledge of ACS over time (p = .02) No significant differences in attitudes and beliefs between groups over time
Tullmann et al.[17] USA RCT Over 65 years old with history of CHD n = 115 Intervention = 58 Control = 57	Individualised education and counselling intervention (40-60 minutes) Reinforced at one and two months Three-month follow-up	Knowledge, attitudes, beliefs, perceived control and anxiety The Acute Myocardial Infraction (AMI) Response Questionnaire	Significant increase in knowledge (p < .001) and beliefs (p = .002) in the intervention group (IG) compared to the control group at three months No significant differences in attitudes between groups at three months
Bell et al.[18] USA Pre-test/post-test Mean age = 75 years n = 693 84% female (from 40 senior centres)	Group educational intervention (45-60 minutes) Post-test at 1-2 months No reinforcement	Knowledge of ACS symptoms Response actions The Behavioural Risk Factor Surveillance System	Significant improvement in knowledge of symptoms (p < .001) Significant improvement in knowledge of response actions to symptoms (p < .001)
McKinley et al.[19] USA, Australia and New Zealand RCT History of CHD n = 3,522 Intervention = 1,777 Control = 1,745	Individualised education and counselling (40 minutes) Reinforced at one month Three- and 12-month follow-ups	Knowledge, attitudes, and beliefs about ACS The ACS Response Index	Significant increase in knowledge (p = .0005), attitude (p = .0005) and belief (p = .0005) scores in the IG over time compared to the control group
DeVon et al. [20] USA Pilot RCT Diagnosis CHD with elective PCI n = 64 Intervention = 32 Control = 32	Slide presentation on computer (5-15 minutes) Viewed three times pre-discharge Repeated at two and four months post-discharge Four-month follow-up	ACS knowledge ACS symptoms Help-seeking behaviour questionnaire 20-item identified symptoms	Knowledge of ACS symptoms and help-seeking behaviour increased significantly in the IG compared to the control group (p < .001)

Table 1. Summary of the Reviewed Studies (cont.)

Study/Methods/ Sample	Intervention/ Reinforcement/ Follow-up/	Data measurement/ Instruments	Results
Gallagher et al. [21] Australia Pre-test/post-test History of CHD n = 137	Individualised education intervention (15−25 minutes) No reinforcement Two-month follow-up	Knowledge of ACS and response actions The ACS Response Index	Significant increase in knowledge of symptoms ($p < .0001$) Significant improvement in response action knowledge ($p < .001$)
O'Brien et al. [22] Ireland RCT ACS diagnosis n = 1,136 Intervention = 585 Control = 551	Individualised education (40 minutes) Three- and 12-month follow-ups Reinforced at one and six months	Knowledge, attitudes and beliefs The ACS Response Index	Significant increase in knowledge ($p < .001$), attitude ($p = .003$) and belief ($p < .001$) scores in the IG over time compared to the control group
Darsin Singh et al.[23] Malaysia Single group quasi-experimental CHD n = 60	Nurse education program Group education on ACS symptoms, rapid response to ED and lifestyle modification with flipchart No reinforcement One-month follow-up	Knowledge, attitudes and beliefs The ACS Response Index	Significant improvement in knowledge ($p < .001$), attitude ($p < .001$) and belief scores ($p = .015$) after intervention

Note: ACS = acute coronary syndrome; AMI = acute myocardial infarction; CHD = coronary heart disease; ED = emergency department; IG = intervention group; RCT = randomised controlled trial

Methodological Quality Assessment

A total of 10 studies were included for appraisal of methodological quality. All 10 studies were determined to be of adequate quality after assessment using one of two measures. The first tool was the Critical Appraisal Skills Programme (CASP)[24] checklist that measured RCTs. The second measure was the Joanna Briggs Institute (JBI) critical appraisal checklist [25] that assessed non- randomised experimental studies that achieved 'yes' on at least 50 % of the applicable questions. The quality appraisal scores for the RCT studies were 81.8-90.9 % and 66.7-100 % of the applicable questions for the non- randomised experimental studies.

RESULTS

Search Outcomes

The initial search identified a total of 2,890 articles, while a manual search of other sources (i.e., Google search and the grey literature) identified a further 92 articles. After the removal of duplicates, 2,225 articles remained for screening, of which 2,207 articles were excluded after review of title and abstract. Full-text articles were obtained for the remaining 18 articles. Based on a full-text review, a further eight articles were excluded. After review against the inclusion criteria, six RCTs,[14-17,19,22] one pilot RCT,[20] two pre-test post-test studies,[18,21] and one single group quasi- experimental study[23] were identified (see Table 1).

Figure 1 presents a preferred reporting items for systematic reviews and meta- analysis (PRISMA) flow diagram describing the overall process.

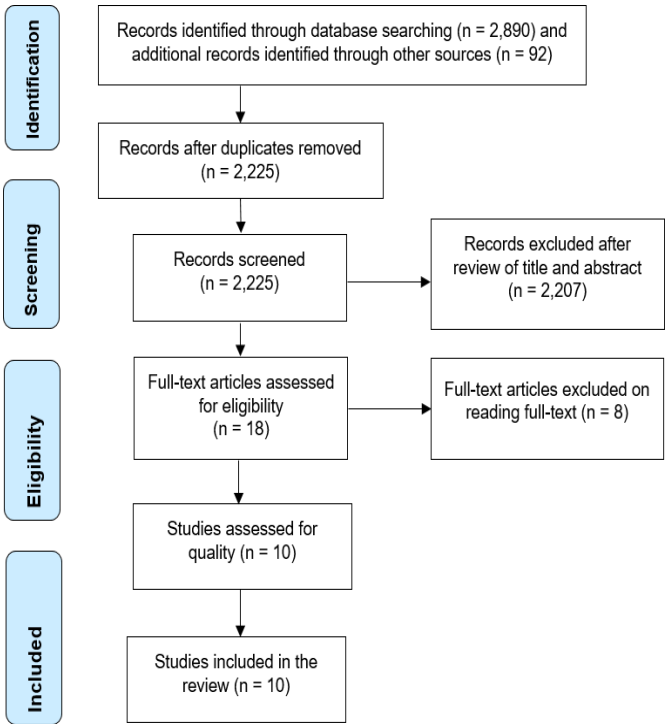

Figure 1: PRISMA Flowchart Showing Identification of Studies

Study Characteristics: The 10 studies included in this review represent a total of 7,454 participants with a mean age of 68.4 years. The sample size of the studies ranged from 60 to 3,522 participants. Gender was reported in all studies with a slight weighting towards men (57%). In six of the 10 studies, participants were recruited from CHD patients. [16- 17,19- 21,23] One study recruited high- risk groups of older adults with mean age of 75 years from 40 senior centers.[18] One study recruited patients who had a diagnosis of ACS.[22] The majority of interventions were conducted in the United States of America (USA). One study covered the USA, Australia, and New Zealand. There was also one study conducted in each of the following countries: Ireland, Australia and Malaysia. The characteristics of the included studies are presented in Table 1.

Methodological Attributes: The purpose of all the interventions was to improve ACS and CHD knowledge, as well as response actions to ACS symptoms. [16,23] Some interventions also incorporated the variables of attitudes and beliefs.[16-17,19,22-23] In relation to the intervention delivery method, five of the studies exclusively evaluated individualised education,[16-17,19,21-22] while two used a combination of both methods. [14- 15] Goff and colleagues[14] delivered a multi- component intervention, including mass media and interpersonal methods such as one- to- one interaction with high- risk CHD individuals who attended cardiac clinics. Two studies used group education to deliver the interventions. [20,23] DeVon and colleagues[20] conducted a pilot RCT and delivered content through a slide presentation via a computer prior to the patients'

discharge. Singh and colleagues[23] conducted a quasi-experimental study and delivered information on ACS symptoms, rapid response, and lifestyle modification via nurse-led group education.[23] Meischke and colleagues[15] delivered an ACS information package to participants' homes. Six individualised education interventions reported successful outcomes[14,16,21] Two group education interventions revealed positive effects on outcomes in the intervention group (IG).[20,23.]

Sample sizes varied across the 10 reviewed studies, ranging from 60[23] to 3,522 participants.[19] The pilot study by DeVon and collagues[20] and the single group quasi- experimental study by Singh and colleagues[23] had 64 and 60 participants, respectively, representing small sample sizes. Only two studies reported a power analysis to calculate the estimated sample size.[21-22] This is important because power analysis calculations are useful for verifying the validity of the statistical conclusions.[26] A number of studies had no reference to a power analysis of sample size.[16- 18,20] Three studies calculated the sample size based on the primary outcomes of seeking to reduce pre-hospital delay time (n = 1,294, n = 3,522 and n = 1947, respectively).[14,19,22] Finally, one study used different samples at each data collection time point, indicating that baseline and post-intervention data were not recorded for the same participants.[14]Consequently, this point should be of concern in developing future interventions.

Measurement of Knowledge, Attitudes and Beliefs: Five studies used the ACS Response Index,[27] which has been evaluated for both validity and reliability[16,19] to assess knowledge, attitudes and beliefs of ACS.[26,31,29,32-33] Two studies used checklist questionnaires (Yes = related or No = not related to a heart attack) of identified symptoms to assess knowledge of ACS.[17-18] Goff and colleagues[14] combined the ACS Response Index[27] and open-ended questions to measure CVD risk and prevention. Only two studies reported on the validity and reliability of the questionnaire.[20,22] These findings demonstrate that there are inconsistencies in measuring patient knowledge, attitudes and beliefs about ACS through the ACS Response Index.[27]

*Effectiveness in Improving Knowledge, Attitudes or Beliefs:*The results of this review suggest that attitudes and beliefs may be less easily improved than knowledge. Among the studies that measured ACS knowledge, nine studies reported statistically significant positive effects of the study interventions on ACS knowledge.[14,16-23] Only the study by Meischke and colleagues[15] did not demonstrate a positive effect of their education intervention. Three studies reported a statistically significant positive effect on participants' attitudes.[19,22-23] Four studies reported statistically significant effects of their interventions on beliefs.[17,19,22-23]

DISCUSSION

This review contributes to a deeper understanding of how to improve ACS knowledge by examining the types and effectiveness of the interventions in the selected studies on three domains of outcomes measures, as well as the intervention delivery modes that were used to improve knowledge, attitudes and beliefs in ACS patients. The findings from this review demonstrate increases in knowledge, attitude and belief scores among the IGs.[14,16,23] This finding supports the effectiveness of augmented ACS patient education. Another point of concern is the duration of the interventions. In this review, four RCT studies used individual education interventions with durations ranging from 40 minutes to one hour [16,17,19,32] that were then reinforced one month later by

telephone. Moreover, these studies measured the effects of the intervention at a three- month follow- up, and three studies[16,19,22] also measured and sustained their intervention effects at 12 months. All the studies reported significant improvements in knowledge, attitudes or beliefs in the intervention groups (IGs). The RCT conducted by Meischke and colleagues[15] did not demonstrate any significant effects of the intervention on outcome measures. This intervention was delivered by leaving the ACS information package at participants' homes, so it is unknown whether the participants actually read the ACS information package. The researcher did not disclose the duration between the delivery of the intervention and the measurement of outcome data measures. Thus, the results of this study cannot determine whether knowledge of ACS symptoms would differ from one time point to another.

The literature suggests that for educational interventions to be effective, there must be evidence that a knowledge gap exists in the target group.[28] RCTs are considered to be the most reliable of all designs to measure the effect of intervention studies.[26] Accordingly, a RCT was selected as the method of preference for this current study due to the recognition that nursing practice should be underpinned by the highest forms of evidence.[26,29] The literature also pointed out that a practical system of care should endeavour to normalise education interventions so that they can be delivered and reinforced by the entire health care professional team as part of routine care.[30] For example, at the time of a patient' s education in a cardiac rehabilitation program and at hospital discharge, they are required to take instructions from the health care professional team about knowledge of CHD and lifestyle modifications to increase their awareness of CHD.[31.] The field of patient education needs more disruptive innovation strategies to influence individual behaviour to change inactivity in patient responsiveness. [32]

As anticipated, treatment- seeking behaviour is closely related to the mortality and long- term morbidity of people with ACS. The educational intervention to be used in selected studies will allow for regular observational learning with educational intervention strategies included community organization, public education, professional education, and patient education. The development and evaluation of the interventions are based on the concept of observational learning[33- 34] and self- efficacy[35-36] as presented in Bandura' s Social Cognitive Theory.[37] The educational interventions targets factors that influence individuals' treatment-seeking behaviour and considers self-regulation theory, which is also part of SCT.[33-36] Self- regulation includes self-observation, self- judgement and self-reaction.[33-36] For this review, the interventions have focused on cognitive behaviour and improved response actions of patients with ACS,[14,15-23] with knowledge, attitudes, and beliefs being the intermediate steps to implementing appropriate response actions.

Based on our review, we concluded that knowledge, attitudes, beliefs and the associated patient- related factors were improved by augmenting education for ACS patients.[22-23] In addition, the literature reveals that appropriate response actions to ACS symptoms are dependent on sufficient knowledge, but also on attitudes and beliefs.[38] However, ACS symptoms can be difficult to interpret because a definitive diagnosis is not straightforward.[39] Inadequate knowledge of symptoms, misattribution and inappropriate response actions can lead to delays in seeking medical care and the use of ambulance services.[41] ACS symptoms are noticeable in

a variety of ways. Health care professionals should be aware of the range and variability of ACS symptoms, and the actions that should be taken when patients have these symptoms. [40] This point should be of concern to health care providers and the general public.[22,42]

The literature has revealed that education is most beneficial when it is tailored to the individual.[17-19,22-23]A variety of learning strategies for individuals should be considered, such as using interactive technologies and utilizing sound and visual effects that can encourage them to take more interest in the critical information and health messages being delivered.[43-44]

CONCLUSION AND RECOMMENDATIONS

This review explored the evidence on interventions for improving knowledge, attitudes and beliefs in ACS management. The results and evidence from this review can inform further development of educational interventions, as well as the intervention's outcome assessments. Based on this review, beyond formal ACS management, ongoing support is essential for the maintenance of knowledge among people with ACS. We found wide variation in interventions across the selected studies and the lack of integrated innovative technology in ACS patients' education. Our findings suggest that health care professionals and educators should explore technology-based interventions, particularly how they can be incorporated into current models of care delivery to improve clinical effectiveness. Studies of interventions for improving knowledge, attitudes, beliefs and appropriate response to ACS symptoms are warranted.

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