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**Factors facilitating and hindering the implementation of the European Society of Cardiology Syncope Guidelines at the Emergency Department: a nationwide qualitative study**

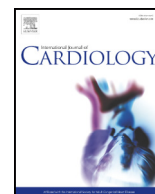
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## Factors facilitating and hindering the implementation of the European Society of Cardiology Syncope Guidelines at the Emergency Department: A nationwide qualitative study



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### ABSTRACT

**Aims:** Syncope care is often fragmented and inefficient. Structuring syncope care through implementation of guidelines and Syncope Units has been shown to improve diagnostic yield, reduce costs and improve quality of life. We implemented the European Society of Cardiology (ESC) 2018 syncope guidelines at the Emergency Departments (ED) and established Syncope Units in five Dutch hospitals. We evaluated the implementation process by identifying factors that hinder ('barriers') and facilitate ('facilitators') the implementation.

**Methods and results:** We conducted, recorded and transcribed semi-structured interviews with 19 specialists and residents involved in syncope care from neurology, cardiology, internal medicine and emergency medicine. Two researchers independently classified the reported barriers and facilitators, according to the framework of qualitative research (Flottorp), which distinguished several separate fields ('levels'). Software package Atlas.ti was used for analysis.

We identified 31 barriers and 22 facilitators. Most barriers occurred on the level of the individual health care professional (e.g. inexperienced residents having to work with the guideline at the ED) and the organizational context (e.g. specialists not relinquishing preceding procedures). Participants reported most facilitators at the level of innovation (e.g. structured work-flow at the ED). The multidisciplinary Syncope Unit was welcomed as useful solution to a perceived need in clinical practice.

**Conclusion:** Implementing ESC syncope guidelines at the ED and establishing Syncope Units facilitated a structured multidisciplinary work-up for syncope patients. Most identified barriers related to the individual health care professional and the organizational context. Future implementation of the multidisciplinary guideline should be tailored to address these barriers.

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## 1. Introduction

Syncope is the form of transient loss of consciousness (TLOC) that is due to global cerebral hypoperfusion; it is characterized by a rapid onset, short duration and complete and spontaneous recovery [1].

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Syncope is a very common problem which accounts for ~1% of all visits to the Emergency department (ED) and is associated with high healthcare costs [1,2]. The differential diagnosis is broad, and the causes of syncope range from benign to life-threatening conditions. Recurrent syncope significantly impacts quality of life (QoL) [3] and can be improved through effective diagnosis and treatment [1].

There is a huge variation in the management of syncope [4]. The diagnosis of the underlying cause is often inaccurate, inefficient or delayed [5]. Vasovagal syncope (VVS) is the most common cause of

TLOC, but it is not claimed by any specialty and not taught in detail [1,5]. This results in specialists to restricting diagnostic procedures to those appropriate for disorders within their own specialty. For instance, neurologists will focus on epilepsy, while cardiologists target arrhythmias and structural heart conditions. The European Society of Cardiology Syncope Guidelines (ESC SG) provide guidance for the initial evaluation, risk stratification and structured follow-up of syncope; the latter includes the availability of a multidisciplinary Syncope Unit [6]. If diagnostic uncertainty remains after the initial diagnosis and risk evaluation, diagnostic tests may help to induce attacks (e.g. with tilt table testing) or to record spontaneous events (e.g. with an implantable loop recorder). Earlier versions of the ESC SG were found to increase diagnostic yield and reduce health care costs in several European countries, yet these guidelines are not widely adopted [7–13]. A recent survey among European Heart Rhythm Association (EHRA) members demonstrated huge variation in the ESC SG implementation [4]. Implementation research could provide guidance how to improve ESC SG uptake by capturing the ‘real world’ contextual factors that hamper or facilitate guideline implementation [14–16]. Such studies are, however, lacking in the field of syncope. The SYNERGY trial (‘Syncope algorithms in the Emergency Department with structured follow-up.’ *Trial NL 6129*), a Dutch nationwide ESC SG intervention study, provides a unique platform for such assessment. The SYNERGY trial combined the implementation of the ESC SG at the Emergency Department with quick referral routes to Syncope Units. We aimed to identify barriers and facilitators associated with the implementation of Syncope Guideline in the SYNERGY study which could be used to improve implementation and adherence to the ESC guidelines.

## 2. Methods

We conducted semi-structured interviews covering all specialties involved in syncope care at the ED. All results were reported according to the Consolidated criteria for REporting Qualitative research (COREQ) checklist [17].

### 2.1. Participating centres

The SYNERGY trial was initiated to assess the health care efficacy of the implementation ESC SG. The ESC SG was implemented consecutively at five Dutch hospitals, including four regional hospitals (Diakonessenhuis, Utrecht; Rijnstate Hospital, Arnhem; Gelre Hospital, Apeldoorn and Maastad Hospital, Rotterdam) and one tertiary university hospital (Leiden University Medical Centre, Leiden). The implementation included two interventions: [1] a structured approach for syncope at the ED for all specialties and [2] the establishment of a multidisciplinary Syncope Unit with quick referral routes for ED patients. In two hospitals (Rijnstate Hospital and LUMC) facilities for syncope patients already existed before the trial but these services lacked possibilities to refer patients from the ED and lacked a multidisciplinary approach. In these two hospitals referral pathways were defined upon trial initiation as well as regular multidisciplinary meetings. The organisation of emergency care for syncope differed between hospitals (Table 1): in three hospitals dedicated emergency physicians and cardiologists performed the initial evaluation while in one hospital this was

done by either internists specialised in acute medicine or cardiologists and in one other hospital the primary specialty for patients with syncope could include internal medicine, cardiology or neurology. During the implementation process teaching conferences explaining the ESC guidelines were organised for all specialists and residents who provide syncope care at the ED.

### 2.2. Selection of participants

We conducted semi-structured interviews with physicians providing syncope care at the EDs from June 2018 to July 2019. The same set of open questions were asked to all participants. We did not use questions with predetermined barriers and facilitators. All interviews were conducted between six to twelve months after ESC SG implementation. We applied ‘purposive sampling’ for the selection of participants: we selected participants from different age groups and levels of experience, estimated using the number of working years and the average number of annual syncope consultations. For each centre we selected at least one physician with an appointment to the Syncope Unit. If a physician declined to participate, we approached a colleague with the same background and similar degree of experience. We continued to invite participants until data saturation was reached and no new information was gathered during three consecutive interviews [18]. The interviews were conducted by one member of the research group (MG) at a location of choice of the participant in the hospital. The researcher (MG) was a female physician who at the time had been working for two years on the SYNERGY trial. Twelve of 19 participants were familiar with the researcher. All participants knew that the researcher was conducting research on syncope guideline implementation. Participants did not receive feedback on the findings.

### 2.3. Identification of barriers and facilitators

Interviews were audiotaped and transcribed in full. Direct content analysis was used to analyse the interviews. Content analysis in qualitative research is used to interpret meaning from the content of text data of the interviews. With a directed approach, content analysis starts with a theory or relevant previous research findings as guidance for initial codes. So, in our case we used predetermined initial codes to analyse the interviews. We used the framework of Flottorp for analysis [14]. This framework seeks to identify factors that hinder (‘barriers’) or facilitate (‘facilitators’) the introduction of a new procedure. The framework categorises barriers and facilitators into seven levels: guideline factors; individual health professional factors; patient factors; professional interactions; incentives and resources; capacity for organizational change; social, political and legal factors. The framework of Flottorp describes how barriers and facilitators can be identified, categorized, and used for the development of tailored-based intervention strategy in syncope care. We used the framework to ensure that we would identify all barriers and facilitators. New codes were created for text that could not be categorized within these predetermined barriers or facilitators. Two researchers (MG, LvBV) independently coded the interviews. Discrepancies were discussed until consensus was reached. Each barrier and facilitator was reported once, regardless of the number of times it was mentioned or the number of physicians that mentioned them. We

**Table 1**  
Specialty primary responsible for syncope care at the emergency departments in the participating centres.

Hospital	Specialty primary responsible for syncope care	Other specialists involved	Estimated number of ED patients annually (all patients)
Leiden University Medical Centre	Emergency medicine, cardiology	Neurology	30,000
Diakonessenhuis	Emergency medicine, cardiology	Neurology	25,000
Gelre Hospital	Neurology, cardiology, internal medicine	–	27,000
Rijnstate Hospital	Emergency medicine, cardiology	Neurology	38,000
Maastad Hospital	Internal medicine (acute medicine), cardiology	Neurology	45,000

explored whether responses contrasted between medical specialties and between residents and medical specialists. A qualitative software package was used for the direct content analysis (Atlas.ti v8, Scientific Software Development GmbH, Berlin, Germany).

#### 2.4. Background characteristics

Where applicable quantitative data were presented as mean  $\pm$  SD for continuous variables with a normal distribution and as medians with interquartile range for data that were not normally distributed.

#### 2.5. Ethical approval

This study was approved by the institutional review board of the Leiden University Medical Centre. All participants gave their informed consent.

### 3. Results

#### 3.1. Participants

We interviewed 19 physicians. One physician who was approached declined to participate due to time constraints. The participants spanned a wide range of age, experience, number of syncope patients treated annually (Table 2). The mean time from implementation to moment of interview was 9.6 months (SD  $\pm$  1.4). Mean age of the participants was 39.7 years (range 26–55) and 53% of them were male.

#### 3.2. Barriers and facilitators

We identified 31 barriers and 22 facilitators regarding the implementation of the ESC syncope guideline (Table 3). Most barriers ( $n = 11$ ) concerned the individual health professional level, while most facilitators ( $n = 9$ ) related to the level of the guideline. We will discuss specific barriers and facilitators for each level.

#### 3.3. Guideline factors

Three barriers and nine facilitators concerned the level of the guideline itself. Professionals perceived the structured approach for the initial evaluation at the ED as a facilitator. Physicians mentioned that the option to refer patients to a Syncope Unit filled a gap in daily practice.

Some emergency physicians and residents felt that the guideline was too comprehensive and therefore sometimes too complicated for use at the ED. This view contrasted with the opinion of neurologists and cardiologists, who perceived the guideline as complete.

#### 3.4. Individual health professional

Eleven barriers and four facilitators were mentioned on the level of the individual health professional. Medical specialists preferred to adhere to older established routines which were not in line with the ESC SG, which caused a barrier to adapt to the new guideline. For example, the habit to order laboratory tests when seeing syncope cases at the ED proved difficult to change. Another important theme concerned the expected benefit of some procedures. In particular, physicians did not carry out orthostatic blood pressure measurements systematically, as they did not expect a high diagnostic yield. This was in contrast to laboratory testing at the ED, which most physicians expected to have a high diagnostic yield.

#### 3.5. Patient factors

Six barriers and one facilitator were identified on this level. Patient factors are assumptions from professionals and not directly from patients. Physicians reported that patients responded positively to a referral to the Syncope Unit, because they were relieved that a comprehensive work-up to find the cause of TLOC would follow.

#### 3.6. Professional interactions

Three facilitators and one barrier were mentioned on the level of professional interactions. There was strong agreement among emergency physicians to recommend the use of the guideline (“I ask my colleagues whether they checked what the guideline says.”). This positive attitude towards the guideline was also noted by neurologists, cardiologists and internists.

Several senior medical specialists reported that due to the multidisciplinary aspects of syncope care patients are often examined by different specialties in the hospital. This carries the risk that the medical history is copied verbatim instead of taken anew.

**Table 2**  
Characteristics of participating physicians.

Number	Discipline	Work experience, years	Working at Syncope Unit	Estimated no. of pts with TLOC per year (ED and outpatient clinic)
1	Emergency physician	10	–	200
2	Emergency physician	10	–	100
3	Emergency physician	4	–	900
4	Resident Emergency physician	2.5	–	375
5	Neurologist	14	–	10
6	Neurologist	10	+	160
7	Neurologist	6	+	100
8	Neurologist	12	+	150
9	Resident Neurology	5	–	50
10	Cardiologist	18	+	250
11	Cardiologist	16	+	200
12	Cardiologist	2	+	100
13	Cardiologist	8	+	150
14	Cardiologist	10	+	130
15	Resident Cardiology	5	–	30
16	Resident Cardiology	3	–	100
17	Resident Cardiology	1.5	–	100
18	Internist	8	–	100
19	Resident Internal Medicine	1	–	200
Total		7.7 $\pm$ 5.0 (mean, $\pm$ SD)	42%	130 (100–200) (median, IQR)

Abbreviations: pt. = patients.

**Table 3**

Barriers and facilitators influencing the implementation of the ESC guideline in syncope care as reported by 19 specialists and residents involved in syncope care from neurology, cardiology, internal medicine and emergency medicine. The barriers and facilitators are subdivided on levels and sublevels in accordance to the framework of Flottorp [14]. All barriers and facilitators are noted once regardless of the number of times mentioned or how many physicians mentioned them.

Level	Sublevel	Theme	Barrier/ Facilitator
<b>Guidelines factors</b>	Feasibility/ accessibility/ effort	Guideline is too comprehensive	Barrier
		Guideline is complete	Facilitator
		Getting to know guideline is not time consuming	Facilitator
	Strength of the recommendation	ECG abnormalities too easily classified as red flag for cardiac syncope	Barrier
		Guideline does not cover unexplained falls enough	Barrier
	Clarity	Structured work-flow	Facilitator
		ESC SG gives reassurance to medical specialists	Facilitator
		ESC SG gives clarity to patients	Facilitator
	Consistency with other guidelines / compatibility	Consistent with daily practice	Facilitator
		Syncope Unit fills a gap in daily clinical practice	Facilitator
	Cultural appropriateness	Multidisciplinary care for syncope patients	Facilitator
		Prevention of low value care	Facilitator
<b>Individual health professional factors</b>	Familiarity with the recommendation	Adherence to old way of working	Barrier
		Used to laboratory testing at the ED	Barrier
	Physician character	Fear of unnecessary hospital admissions	Facilitator
		Fear of missing something	Barrier
	Expected outcome	Expected outcome of orthostatic BP measurements is low	Barrier
		Expected outcome of laboratory testing is high	Barrier
		Expected diagnostic yield is low for laboratory testing	Facilitator
	Emotions	Guideline may conflict with clinical intuition	Barrier
	Domain knowledge	Adherence to guideline does not require substantial new knowledge	Facilitator
		Super specialists in fields outside of syncope need to be educated	Barrier
		Low urgency among medical specialists to attend educational activities	Barrier
		Unexperienced residents due to high turn-over at the ED	Barrier
		Nurses are not enough involved in the implementation process	Barrier
		Administrative staff are not aware of the need for timely referral to Syncope Unit	Barrier
	Attitude towards the guideline	Positive attitude among medical professionals	Facilitator
<b>Patient factors</b>	Preferences	Orthostatic blood pressure measurements not comfortable	Barrier
		Not all high-risk patients want to be admitted	Barrier
	Needs	Frail patients not covered enough in ESC SG	Barrier
		Traumatic injuries not covered enough in ESC SG	Barrier
		History taking and examination is time-consuming	Barrier
		No need for orthostatic BP measurement in those with a clear non-orthostatic cause	Barrier
	Behaviour/ motivation	Positive attitude towards referral to Syncope Unit	Facilitator
<b>Professional interactions</b>	Communication and influence	Agreement with guideline among emergency physicians	Facilitator
		Agreement with guideline among all other specialties involved in syncope care.	Facilitator
		Interdisciplinary referrals at the ED may result in copy-and-pasting of previous consultations	Barrier
	Team processes	Physicians remind each other to follow the guideline	Facilitator
<b>Incentives and resources</b>	Financial	Waiting with laboratory testing could delay the ED stay	Barrier
		Risk that financial gains are not equally divided among specialties	Barrier
		Financial gains due to the multidisciplinary Syncope Unit	Facilitator
<b>Capacity for organizational change</b>	Regulations, rules, policies	Consistent with usual organization of care	Facilitator
		Lack of time to adhere completely to the guideline (e.g. orthostatic BP measurements)	Barrier
		Enough time to adhere completely to the guideline (e.g. orthostatic BP measurements)	Facilitator
		Lack of personnel during shifts	Barrier
		Lack of personnel overall	Barrier
		Complete recording of history taking helps with adherence to guideline	Facilitator
		Convenient to refer to Syncope Unit	Facilitator
		Inconvenient to refer to Syncope Unit	Barrier
	Difficulties during set up of Syncope Unit (e.g. local hygiene policies; paper work)	Barrier	
	Relative strength of supporters and opponents/ priority to necessary change	Short stay facilitations at the ED lower the threshold for admission	Barrier
Standardized laboratory testing at the ED		Barrier	
<b>Social, political and legal factors</b>		Efficiency at the ED is prioritized above complete work-up	Barrier
		None mentioned	

Barriers are shown in red, facilitators are shown in green. Abbreviations: ECG = electrocardiogram; ED = Emergency Department; BP = blood pressure; ESC SG = European Society of Cardiology Syncope Guideline.

### 3.7. Incentives and resources

Participants mentioned on this level two potential barriers. All participants stated that financial incentives or disincentives did not play a role in the use of the guidelines for now. One physician, however, mentioned that if earnings from the multidisciplinary Syncope Unit would not be shared equally between specialties, some specialties would be discouraged to participate.

### 3.8. Capacity for organizational change

Eight barriers and four facilitators were perceived on this level. In general, the guideline fitted well in the current organisation of care in The Netherlands. No major changes were needed at the ED before introduction of the ESC SG.

Physicians reported barriers related to crowding, lack of time and personnel, especially during shifts, resulting in insufficient time to take a thorough history. In such cases physicians may prefer to follow a perceived safe route and admit the patient. Another recurring theme was standardized laboratory testing in patients with syncope. Respondents felt that it was more efficient to withdraw blood directly upon arrival at the ED than to await the opinion of the attending physician, as it may take one to two hours for laboratory results to come in. Some medical specialists reported that it was difficult and time-consuming to set up the Syncope Unit at their hospital (“It took us two year to get the continuous blood pressure measurement devices financed”).

### 3.9. Social, political and legal factors

Physicians did not mention any barriers or facilitators in the context of social, political or legal factors.

## 4. Discussion

We systematically evaluated the factors influencing the implementation of the ESC SG at the ED and Syncope Units and identified various barriers and facilitators providing several new insights. The multidisciplinary setting, with each discipline approaching the patient from its own perspective in different consultations at the ED makes ESC SG implementation complex thus underscoring the need for tailored-based intervention strategies to address barriers.

### 4.1. Strengths & limitations

We conducted semi-structured interviews with open questions to establish a complete overview of the barriers and facilitators that are perceived in daily practice. This qualitative approach may yield information that questionnaires do not, because knowledge and attitudes cannot be entirely encapsulated in predefined responses to direct questions. This type of data collection can provide rich and in-depth information about cognitions, motivations and experiences of participants, rather than quantitative studies, which seek to enumerate phenomena. Qualitative studies are concerned with answering questions such as “What is X and how does X vary in different circumstances, and why?” rather than “How many Xs are there?” [15].

A qualitative approach is therefore regarded as the gold standard for evaluating an implementation of a new process [15,16]. While various studies including a recent EHRA survey established huge variation regarding syncope management [4,7,11,19], qualitative studies on the implementation process are still lacking. Our study is a first effort to unveil barriers and facilitators between professionals and may hereby help to formulate a tailored strategy to improve ESC SG implementation. Another strength of our study was the use of purposive sampling by selecting physicians from all engaged specialties and from different hospitals. This approach enabled us to capture a broad range of perspectives, reflecting a diversity of views. There is no reason to assume that

the basic knowledge regarding the guidelines differed between the participants and the non-participants as all physicians involved in the syncope care at the ED attended the educational session. However, as for this study the participants were from various backgrounds, their knowledge about the guideline differs. Physicians who also worked at the Syncope Unit have a more in-depth knowledge of the guideline, which also comprises knowledge on tilt-table testing, implantable loop recorders etc. We selected at least one physician per participating centre with an appointment at the Syncope Unit. We continued interviewing new doctors until data saturation was reached which means that we probably identified the most relevant facilitators and barriers during the interviews [18]. The participating professionals covered a wide range with respect to age, experience, type of hospital, and number of patients treated annually, so we expect that most barriers and facilitators will have been identified though analysis of the interviews. The relatively low number of participants might be a limitation, but the fact that data saturation was reached argues against underreporting of barriers or facilitators. Our participants did not express barriers or facilitators in the social, political and legal context, but our study was confined to the Dutch health care setting which might affect the generalizability of this finding.

### 4.2. Existing literature

Guideline implementation is a complex process that is influenced by different factors. Change may be more likely if implementation strategies are specifically chosen to address these determinants [20]. Several studies investigated why physicians may have difficulty following guidelines. A general and major barrier relates to doctors' subjectivity, i.e. doctors' existing knowledge, attitudes and behaviour all strongly influence whether they will adhere to the guideline [21–24]. While we did not identify papers that addressed the implementation process, we did identify studies that evaluated the outcome of ECG SG related interventions. In a single centre study in Ireland, ESC SG implementation was carried out by introducing a local Integrated Care Plan [11]. The involved physicians were instructed several times prior to implementation and during four weeks afterwards, this resulted in increased referral rates to the Syncope Unit, but admission rates for syncope remained high and a large number of patients requiring early outpatient assessment were not referred to the Syncope Unit. The plan did not reduce costs and consultations, underscoring the need to develop additional interventions to guide syncope management at the ED. In a study from Brest, France, education was used as sole intervention to implement ESC SG. This resulted in some trends towards better syncope management but did not improve cost-effectiveness (i.e. unnecessary neurological investigations) [25]. Supervised management using ESC SG [4] or the use of a software decision tool based on the ESC SG [19] was found to increase diagnostic yield, decrease hospital admissions, and to decrease overall costs [8]. Similar findings were reported using an algorithm based on the ESC and US SG [26,27] or specific, simplified diagnostic algorithm [7]. In a study involving several European countries it appeared that applying a structured Lean Six Sigma based methodology in syncope management resulted in shorter time to diagnosis and increased diagnostic yield [28].

### 4.3. Discussion of identified facilitators & barriers and their implications for clinical practice

We showed that facilitators in the implementation process were frequently related to the level of innovation (guideline level). The majority of medical practitioners had a positive attitude towards the guideline and recognized that the guideline filled a gap in daily clinical practice and offered a structured approach. Another important facilitator includes the establishment of the Syncope Unit: both patients and professionals perceived the Syncope Unit as filling a need to deliver appropriate syncope care. The Syncope Unit is ideally suited for the

short term follow-up of those with an intermediate risk following the initial evaluation, those who classified as high risk patients with a negative screening and low-risk cases with recurring and/or incapacitating events [5,9]. To maximise the uptake of ESC SG we suggest that referrals to the Syncope Unit should be convenient, not time consuming and well embedded in the electronic filing system (Information box). It is also important to ensure that the physicians at the ED are aware of the existence of the Syncope Unit in their hospital and are encouraged to refer e.g. by providing feedback on the final diagnosis. Hurdles for the implementation were related to domain knowledge of the individual professional. We believe that education is key to address this issue. In view of the reported high turn-over of residents at the ED, quality would greatly improve if residents and nursing staff would have to complete a form of syncope education (e.g. e-learning or other web-based educational courses) before starting to work at the ED and if syncope is scheduled as a recurring topic on the educational agenda of residents, medical specialists and nurses as syncope is one of the most frequent reasons to visit the ED. Mobile applications could complement these teaching sessions and help to guide physicians through the initial evaluation [9,19]. Leadership is also crucial to disseminate guidelines among professionals: while mandatory e-learning may prove effective to safeguard the basic level of competence of the residents, the reported knowledge gap of senior colleagues is likely a more challenging implementation barrier as they may be less aware of the need to educate and less flexible to attend [29]. Leading clinicians are thus needed to convince their peers. Which specialty should take this role will critically depend on the local ED infrastructure (e.g. specialties involved, case mix). Physician leaders should meet the qualifications required for a syncope specialist and ensure that they engage all involved specialties [5]. As syncope features in the differential diagnosis of disorders pertaining to many specialties, no specialty involved with TLOC can afford not to know syncope. Another major barrier on the individual professional level included a lack of outcome expectancy, as a number of physicians and nurses did not see the added value of the orthostatic blood pressure measurements. This may be explained by perceived time constraints and more importantly by the lack of ownership. Time consuming tasks (e.g. long term registrations) are mostly reluctantly accepted if the imposed tasks indisputably fall in the domain of the specialty. Syncope is, however, not claimed by any specialty and could be viewed as an 'orphan symptom'. Improved team communication and interprofessional collaboration with clearly defined tasks among all professionals involved is thus an important facilitator. These predefined tasks could improve the quality of the consultations and thus overcome the reported barrier of "copy-paste" behaviour in case of multiple consultations.

One of the biggest obstacles mentioned in our study on the organizational level included time pressure at the ED. ED crowding is a major and well recognized public health problem [30]. The majority (60%) of studies that reported on the potential solutions focussed on expediting patient's throughput within the ED. As the reporting of laboratory tests is time-consuming, blood is drawn in all patients with urgent complaints directly upon arrival at the ED. This leads to unnecessary testing in syncope patients who turn out to have had a low-risk event. To solve this problem, triage nurses could be educated to recognize low-risk patients. Another option is to shorten turnaround-time for laboratory testing, so the physician could decide during the examination whether laboratory tests are needed or not. Crowding may also discourage physicians to perform orthostatic blood pressure measurements and could be solved when these assessments are performed by emergency nurses immediately following triage.

## 5. Conclusion

We explored barriers and facilitators in a multidisciplinary setting in hospital care as perceived by physicians of different levels of seniority, which is also generalizable for other health problems with multiple

disciplines involved. Most facilitators were reported at the level of innovation (e.g. structured work-flow at the ED and the option to refer to Syncope Unit aids to guideline adherence). Most barriers were identified at the individual health care professional (e.g. insufficient knowledge hinders implementation) and the organizational context (e.g. time pressure at the ED is perceived as an obstacle). Future implementation of the multidisciplinary ESC guideline should be tailored to address these barriers.

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## Data availability statement

Anonymized data can be made available to qualified investigators on reasonable request.

## Declaration of Competing Interest

MG, LvBV, FJdL, ECAK, BdG and MB report no disclosures relevant to the manuscript. SYGP received lecture fees from Spaarne Gasthuis hospital and Medtronic. MEWH received speakers fees from Biotronik and Medtronic. JGvD has received lecture fees from Medtronic. RDT has received fees for lectures from Medtronic, UCB, and Novartis. RDT has received consultancy fees from Theravaran and Arvelle. RDT receives research support from the Dutch National Epilepsy Fund, The Netherlands Organisation for Health Research and Development (ZonMW), NUTS Ohra Fund, Medtronic, Christelijke Vereniging voor de Verpleging van Lijders aan Epilepsie, The Netherlands.

## Appendix A

### Information Box

Suggestions to address the perceived barriers at the level of the individual health care professional and the organizational context during ESC syncope guidelines implementation.

#### Individual health care professional

- Guidance through the initial evaluation e.g. with mobile applications.
- Continued education on syncope by e.g. e-learning or other web-based educational courses and by making syncope a recurring topic on the educational agenda of all involved professionals including residents, medical specialists and nurses.
- To appoint physician leader for syncope care to divide tasks among specialties and professions at the ED, to convince peers to adhere to the guidelines particularly those elements that are more time consuming (e.g. orthostatic vital measurements), and to raise awareness among ED physicians of the existence of the Syncope Unit.

#### Organizational context

- Measures to avoid ED crowding, e.g. educating of triage nurses to recognize low-risk patients.
- To define syncope care pathways to ensure systematic ECG assessments and orthostatic measurements and to halt standardised laboratory testing in all syncope patients.
- Convenient, rapid referrals routes to the Syncope Unit that are well embedded in the electronic filing system.

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