



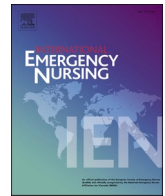
## **Actions taken affecting lead time in the care pathway for low-priority patients with a suspected stroke: A critical incident study**

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# Actions taken affecting lead time in the care pathway for low-priority patients with a suspected stroke: A critical incident study

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## ABSTRACT

**Background:** The time delay from alerted ambulance to arrival at the stroke unit is crucial for patients suffering a suspected stroke. This is a recognized problem why additional explorative knowledge regarding actions taken are needed.

**Aim:** To explore actions taken by nurses that affect lead times in the care pathway from the alerted ambulance to the stroke unit, for low-priority patients suffering a suspected stroke.

**Method:** The design of the study was explorative and descriptive and used a qualitative approach based on Critical Incident Technique (CIT). Twenty-two nurses involved in the stroke care pathway at an university hospital in western Sweden were interviewed about their actions that affected the lead time.

**Results:** Actions undertaken affected lead time in the stroke care pathway for low-priority patients related to “promoting the care chain process” and “taking control of the situation”.

**Conclusions:** The staff within all parts of the care pathway affected the lead time, individually as well as via interaction between departments. This calls for the need of further collaboration and consensus concerning how to facilitate a smooth care pathway.

## 1. Introduction background

The early acute care pathway varies in terms of length as does the steadily increasing demand for emergency care [1], which leads to queues, crowding in the emergency department (ED) with the risk of long waiting times, reduced patient safety and increased morbidity and mortality [1–3]. In emergency medical services (EMS), several critical factors cause delays in the early care pathway, such as misunderstandings between the dispatchers and the nurses at the EMS about patients' issues [4], which entail time-consuming reassessments [5]. Another critical factor causing time delays is failure when diagnosing patients with unclear symptoms [6]. The situation entails the risk of treatment delay for the patients and critical situations for the staff managing the patients' length of stay (LOS) and safeguarding patient safety. It has also been found that uncertainty caused by organisational,

interpersonal and cultural issues within a clinic/hospital has an impact on physicians' ability to make decisions [7].

Several trials have been conducted to shorten the time in the acute care pathway. One approach is offering emergency patients safer care through a prehospital care pathway with direct admission to units at the hospital (Fast Track [FT]), e.g. for patients with acute heart disease [8–9]. Even for some low-priority patients—those patients whose condition does not need urgent care—it is already obvious in the ambulance or upon arrival at the ED that admission or transport to, e.g. the X-ray department, is the next step in the care pathway. For these low-priority patients, the time to hospitalisation is extended as transport to the ED takes place, which also contributes to crowding at the ED and to a way of working that requires more staff in the care pathway. These are reasons why FT has also been implemented for low-priority patient groups.

The FT approach has been successful, e.g. for patients with hip

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fractures and frail older patients [10–11]. In the case of patients with a suspected stroke, early treatment is a crucial factor regardless of severity [12–13]. As most patients suffering a stroke are older with high risks due to their complex needs and increased vulnerability [14], the need to shorten their stroke care pathway is especially critical. The traditional care pathway for low-priority stroke patients mostly starts with EMS transport to the ED, followed by admission to the stroke unit. The lead time—the time between initiation and completion of this process—is often long because of the care pathway via the ED and is therefore a critical factor that affects stroke patients' survival rates. An FT directly from EMS to the stroke unit for low-priority patients with a suspected stroke has existed in Sweden since 2008. Internal guidelines and exclusion criteria based on the Medical Emergency Triage and Treatment System [15] result in a significant shortening of lead time to the stroke unit and high diagnostic accuracy in terms of stroke-related diagnoses [16]. Despite the positive outcomes of this FT, annual internal follow-up data show a declining trend regarding the number of FT in the care pathway from EMS to the stroke unit, bypassing the ED [17]. The reason for this is not yet fully understood, but in a previous study in which critical incidents (CIs) in the stroke care pathway for low-priority patients were explored, time delays were identified. The study showed factors affecting lead time related to human interactions and health care structures, and CIs in the early stages of the care pathway affect the lead time in the overall process [18].

To our knowledge, the human actions taken that affect lead times in the care pathway from the alerted ambulance to the stroke unit remain unexplored. Insights into what approaches affect LOS in the care pathway for patients with low-priority stroke can contribute data for care improvement and help save lives. The aim of this study, therefore, was to explore the actions taken by nurses that affect lead times in the care pathway from the alerted ambulance to the stroke unit for low-priority patients suffering a suspected stroke.

## 2. Method

### 2.1. Design and setting

We applied an explorative descriptive design based on the qualitative approach of Flanagan's critical incident technique (CIT) [19]. CIT generally aims to create descriptions of actions that have affected a phenomenon—in this context, the length of time based on CIs that have generated actions, i.e. behaviours that, because of their retrospective perspective, can only be considered critical in hindsight. The impact of the actions, either individually or in a series, is crucial and has a significant outcome, which is either positive or negative [20]. Technology facilitates the understanding of, in this context, the measures taken by nurses in the stroke care pathway, affecting the time factor through the management of different procedural problems [21]. The study was conducted at a university hospital involving three hospitals at different geographical locations within a large city in western Sweden. Each hospital had an ED and a stroke unit. The interviews were conducted across all three EDs, two stroke units and within the EMS, which was located outside the hospital and transported patients to all three hospitals.

### 2.2. Ethical aspects

We conducted the study in line with the Declaration of Helsinki [22] and according to the General Data Protection Regulation 2016 [23]. The Regional Ethical Review Board in Gothenburg, Sweden, approved the study (Diary number; 374–18). The participants were given both written and verbal information about the study, they expressed that their participation was voluntary, and they were informed that they could withdraw from the study at any time. All of them gave their written informed consent to participate. Interview data were handled in strict confidence, with no possibility of identifying individual participants.

The results were presented on a group level and were visualised using quotes.

### 2.3. Participants and data collection

CIT was considered a suitable and effective method for identifying and following up on individual behaviour in terms of narratives and actions [20]. The participants were selected based on the context being studied, and nurses who worked at the department's EMS, ED and stroke unit were invited to participate. To identify eligible nurses, the first author approached the managers in the different settings and informed them about the study. These managers in turn notified the nurses about the opportunity to participate, after which the interested nurses were informed about the study orally and in writing by the first author. The sample covered different characteristics of the respondents, such as their age, sex, educational level and work experience. The first author conducted the interviews with 22 nurses who were distributed across the different departments of the stroke care pathway (Table 1).

The participants chose the venue for the interview, which was normally near their work. For the design of the interview guide, the research team benefitted from its broad spectrum of experience in methodology and in the field. Additionally, the interviews were prepared by approaching the ambulance and ED staff informally in discussions about the context and normal procedures in managing patients suffering from stroke before the data collection started. The purpose was to increase the quality of the study and provide the research team with an improved understanding of how to accomplish the best circumstances for the participants to share their experiences. To explore the actions taken by the nurses, the interview began with an open-ended question asking about real incidents affecting the lead time in the care pathway, either negatively or positively, and the actions taken in connection with such incidents. The interviews lasted up to 59 min (mean: 26 min).

### 2.4. Data analysis

As the interviews revealed a large number of CIs and actions taken, the results and the analysis are presented in two separate papers. Part I explores CIs in the stroke care pathway for low-priority patients suffering a suspected stroke [18], and the present study, part II, explores the actions taken that affected lead times in the care pathway from the alerted ambulance to the stroke unit for low-priority patients suffering a suspected stroke.

The first author started by reading all the transcripts of the

**Table 1**

Professional and socio-demographic characteristics of the nurses in the stroke care pathway (n = 22) and percentage female.

Female/Male n (% female)	
<b>Total</b>	<b>15/7 (68)</b>
EMS	1/5 (17)
ED	9/2 (82)
Stroke unit	5/0 (100)
<b>Age range (Mean/Median)</b>	
<b>Total</b>	<b>26–60 (41/42.5)</b>
EMS	34–47 (41/40)
ED	26–60 (39/34)
Stroke unit	41–52 (46/44)
<b>Work experience years, range, (Mean/Median)</b>	
<b>Total</b>	
EMS	3–32 (14/14)
ED	6–20 (12/10.5)
Stroke unit	3–32 (13/5)
	12–21 (17/16)
<b>Specialist nursing education %</b>	
<b>Total</b>	<b>55</b>
EMS	83
ED	36
Stroke unit	60

EMS – Emergency medical services ED – Emergency department

**Table 2**

Number of interviews and actions taken per department in the stroke care pathway.

Care pathway departments, total n = 3	Interviews, total n = 22 (%)	Actions taken, total n = 3 (%)
EMS	6 (27)	133 (39)
ED	11 (50)	113 (33)
Stroke unit	5 (23)	98 (28)

EMS – Emergency medical service ED – Emergency department.

interviews several times to gain an overview of the participants' experiences and actions. Any measures that had been taken were underlined in the text, resulting in a total of 344 actions (Table 2).

Based on the nurses' described behaviours, 344 actions were identified. These were compared in terms of similarities and differences and thereafter divided into 15 subcategories. Following the same structural and systematic analysis procedure, the subcategories were abstracted into five categories, which ultimately resulted in two main areas. Throughout the analysis procedure, the research team reflected on and discussed the outcomes of abstraction levels until a consensus was reached [24] (Table 3).

To ensure adherence to the complete and transparent reporting and use of the study design, analysis and findings, the research team worked in line with the Consolidated Criteria for Reporting Qualitative Research [25].

**Table 3**

Actions taken by nurses (n = 22) affecting the lead-time in the stroke care pathway of low-priority patients with suspected stroke.

Main areas (n = actions)	Categories (n = actions)	Subcategories (n = actions)
Promoting the care pathway progress (n = 195) care	Improving clarity (n = 75)	Gaining an overview (n = 29) Building trust with patients and relatives (n = 23) Consulting medical expertise (n = 13) Conferring with colleagues (n = 10)
	Contributing towards precautionary measures (n = 64)	Safeguarding the patient (n = 50) Notifying others (n = 14)
	Enabling agility (n = 56)	Influencing physicians' work prioritisation (n = 23) Paving the way in the care pathway (n = 18) Working in a solution-focused manner (n = 15)
Taking control of the situation (n = 149)	Dealing with different opinions (n = 118)	Keeping thoughts to yourself (n = 60) Convincing others (n = 31) Building consensus (n = 18) Tackling different approaches (n = 9)
	Letting off steam (n = 31)	Debriefing after critical work-processes (n = 21) Checking patient outcomes following work processes (n = 10)

**Table 4**

Distribution of actions taken presented as subcategories, %: Total and for each department.

Subcategories (n = actions)	Total (n = 344)	EMS (n = 133)	ED (n = 113)	Stroke unit (n = 98)
Keeping thoughts to yourself (n = 60)	17%	16%	17%	21%
Safeguarding the patient (n = 50)	15%	2%	26%	18%
Convincing others (n = 31)	9%	8%	7%	12%
Gaining an overview (n = 29)	8%	11%	10%	2%
Building trust with patients and relatives (n = 23)	7%	11%	4%	4%
Influencing physicians' work prioritisation (n = 23)	7%	1%	11%	9%
Debriefing after critical work-processes (n = 21)	6%	5%	6%	8%
Building consensus (n = 18)	5%	9%	3%	3%
Paving the way in the care pathway (n = 18)	5%	9%	4%	2%
Working in a solution-focused manner (n = 15)	4%	4%	4%	6%
Notifying others (n = 14)	4%	2%	4%	6%
Consulting medical expertise (n = 13)	4%	9%	1%	0%
Conferring with colleagues (n = 10)	3%	7%	1%	0%
Checking patient outcomes following work processes (n = 10)	3%	6%	2%	0%
Tackling different approaches (n = 9)	3%	0%	0%	9%

### 3. Results

In total, 22 nurses, 12 of whom were specialists, responded to the invitation and joined the study; 15 of them were females. Their nursing experience ranged from 3 to 32 years (mean: 14). (Table 1). The actions taken (n = 344) related to CIs affecting lead times in the care pathway of low-priority patients with a suspected stroke are presented in the following section, visualised using quotes presented in Table 5.

**Promoting progress in the care pathway** was related to procedures aimed at **improving clarity**, **contributing to precautionary measures** and **enabling agility**. The nurses focused on actions such as observing the status information of the patient, handling situations with their mindset on promoting patient safety and shortening the length of time by working in a smooth manner overviewing the care pathway process.

**Taking control of the situation** was associated with actions **dealing with different opinions** and frustrations, i.e. maintaining a balance between arguing, confronting others and choosing to keep one's ideas and disappointments inside. **Letting off steam** meant reflecting on the complex care processes together with colleagues, either in an organised way or during coffee breaks. This also included following up on patients' status or pathway after the CI (Table 4).

#### 3.1. Promoting progress in the care pathway

Actions taken to **improve clarity** were the most common, especially concerning *gaining an overview*, which particularly affected the lead time

**Table 5**  
Citations.

Nurse at department/identity number (ID) of the interview	Citation
EMS/ID 39	"I told the relative that you must mention the word stroke.... since the patient was not really communicating, ... you have to stress that when you arrive at the ED"
Stroke unit/ID 54	"... I actually took the report from the nurse who had cared the patient at ED, she was in the end of her shift and me too ... so I let the night staff decide when the patient would be allowed to arrive to stroke unit from the ED ... The staff changes between different schedule shifts are somewhat critical ..."
Stroke unit/ID 52	"I called the boss on Monday when he was back in duty although it was my day off after the weekend... we had been forced to take in a patient although our stroke unit were already overcrowded with 6 patients. The patient was being transported by ambulance ... from another hospital ... the patient was already on his way in the ambulance when they called us"
ED/ID 36	"I actually called the neurologist to come to the ED ... otherwise the old lady would have been left in "the queue for getting medical treatment at ED" and would have had to wait for her turn"
EMS/ID 42	"I reported to the stroke unit that I had already identified and prepared important phone numbers for contacting the home care ... I have a background in hospital care ... and I know that such things take so much time."
EMS/ID 41	"Well, because then I must argue why I am leaving the patient at this ED ... not according to the routine ... well, well since I knew the staff a bit ... I approached friendly ... and then they become like ... of course we will help you in this situation."
EMS/ID 37	"... Why should we be dealing with this Fast Track ... when it's still problem with the number of care places ... we dedicate a lot of time ..."
ED/ID 50	"I have been thinking about what would have had happened if we hadn't checked on the patient ... how would it had ended... what would I have been blamed for ... she would have died there in the corridor"

EMS – Emergency medical service ED – Emergency department.

(Table 3). This was exemplified by EMS nurses asking the *right* questions and attempting to interact with patients and their relatives with an open mindset without preconceived notions. The nurses also mentioned thorough examinations and ways to cooperate with colleagues, which meant covering for one another to obtain a comprehensive picture of the patient's condition. The ED nurses attempted to *gain an overview* partly by listening to EMS nurses' reports, but they also described the need to carry out their own assessments. The ED nurses checked with the home health care service or nursing home staff who were normally responsible for the patient's care or asked the patient or their close relatives about the patient's normal status to gain a holistic picture. These combined actions helped the ED nurses create a picture of the course of events, the suspected diagnosis and the patient's special needs. The results also showed that *building trust with patients and their relatives* was more common within the EMS than within the ED and the stroke unit. The actions consisted of shared decision making concerning different choices throughout the care pathway, informing patients and relatives about their rights and entitlements or explaining the severity of the condition and the cause of delay (the often-overcrowded stroke unit). In addition, the EMS nurses urged the relatives to press the ED nurses regarding the importance of quick admission to the stroke unit, pointing out that this was the hospital's routine for patients suffering a suspected stroke. See Table 5 for citation visualisation.

In order to improve clarity, the nurses—especially those from the EMS—*consulted medical experts* by phone to obtain support and discuss ideas about any suspected diagnosis, especially when the patient's issues were unclear. At times, this was necessary, as there were cases which required a physician's decision regarding delivery destination. On the way to the patient, the EMS *colleagues conferred* with one another about strategies regarding the possible diagnosis based on the information they received from the alarm centre, as well as about the work schedule to use upon meeting the patient.

*Safeguarding the patient* was the second most commonly described action taken, mainly occurring within the ED and the stroke unit and aiming at **contributing towards precautionary measures**. ED nurses described safety actions related to patients who had been waiting a long time and had ended up at the ED despite applicable guidelines of immediate direct admission to the stroke unit, especially in situations involving vulnerable and older patients. The nurses positioned the patients such that they had a clear view of the patients to monitor them easily, conducted careful measures to check their medical status and made frequent attempts to communicate with the patients who were fragile and had impaired consciousness. Nurses at the ED considered their EMS colleagues to be wrong regarding the report content in that they added their own opinion, e.g. to legitimise transport to the ED

instead of FT to the stroke unit. The ED nurses described how they *safeguarded the patient* by listening to the EMS nurses' reports whilst also focusing on the patient and their symptoms to create a high level of patient safety.

Regarding the report, EMS nurses described maintaining a professional approach even if they were personal friends with the ED staff. *Safeguarding the patient* was also an important issue for the stroke unit nurses. To handle critical information transfer, stroke unit nurses ensured that they received the report from the nurse in charge at the ED before leaving their workplace for the day.

*Notifying others* relates to the nurses' choice of situation management, depending on where in the care pathway they worked. For example, EMS nurses put effort into documenting and clarifying statistics regarding the situation. In that way, they stressed that attempts had been made to admit patients according to FT guidelines, particularly when these attempts failed. Within the ED and the stroke unit, the nurses acted by documenting in the data systems or reporting directly to the manager. There were also occasions in which nurses were called back to the department on their day off to notify them about situations and actions taken during weekends when no leaders were in place.

Actions taken to **enable agility** proved effective, such as *influencing physicians' work prioritisation*, which primarily took place at the ED and the stroke unit. This entailed directing the physicians to immediately meet patients in the treatment room, calling the physicians to the ED as soon as the test results arrived and influencing them to treat vulnerable patients differently and more smoothly to avoid the risk of ending up with a long LOS.

At the stroke unit, the nurses call for the physicians and direct them to the unit in performing tasks related to shortening the length of care pathway processes. This concerns the issuance of X-ray referrals, quickly discharging finished patients from the ward and admitting patients to the stroke unit from the ED.

*Paving the way in the care pathway* was related to the EMS nurses' preparation of the process whilst driving out to the patient by checking guidelines and accelerating the process, i.e. contacting the stroke coordinator, thereby giving the hospital time to plan. In addition, EMS nurses collected important patient information, such as telephone number, names of close relatives and other relevant data, which was routinely done at the stroke unit, to make the job easier for colleagues later on in the care pathway and to ease an already strained work situation.

When EMS nurses had—incorrectly based on the guidelines—transported patients to an ED, they tried to *work in a solution-focused manner* by *flattering* and *charming* their ED colleagues so that patients were given a place of care immediately.

To facilitate a smooth transition for the patients, EMS nurses also



initiated FTs, especially when they did not concur with the physician's decision about refusing immediate admission.

### 3.2. Taking control of the situation

Actions associated with *keeping thoughts to yourself* were very commonly described throughout the care pathway and were linked to **dealing with different opinions**. The nurses did not communicate their thoughts and opinions when incidents occurred. This was triggered by their uneasiness, stress and inadequacy when physicians did not arrive in acute situations or when they needed to call physicians but chose not to for fear of disturbing them. The EMS nurses described fearing that the patient would end up at the ED at risk of a long waiting time. They were also upset when the patients with a suspected stroke chose not to be transported to the hospital by ambulance. The ED nurses felt sadness, powerlessness and resignation when there were disturbances in the care pathway or when patients ended up at the ED and were not transported to the next care level. The stroke unit nurses were uncomfortable when they looked their colleagues in the eye after accepting patients for admission to the stroke unit.

Rather than keeping their thoughts to themselves, the nurses described an unrestrained approach, which resulted in arguing and *convincing others*. This choice of handling the situation was seen in all involved departments. The EMS nurses convinced the hospital's on-call medical neurologist, the stroke coordinator or the receiving stroke unit to free up care places for the patients with a suspected stroke in various ways. They kindly asked for a care place by objectively explaining the patient's status or by raising their voices and being determined. They argued not only about what was best for the patient but also about human values. At the ED, the nurses *convinced others* by persuading physicians to force patients through the health care system and to avoid cumbersome loops, such as returning to the ED after an X-ray examination, instead of moving directly to the care unit. At the stroke unit, the nurses convinced others by arguing with colleagues in other departments in the care pathway and colleagues from other hospitals to find an empty bed in a ward other than the stroke unit when there was a risk of overcrowding. The arguments were related to patient safety and the fair distribution of patients between hospitals.

The EMS nurses were frustrated when patients repeatedly refused to get a bed availability at the stroke unit according to the FT routine. This resulted in their lack of compliance with FT routines by instead transporting the patients to the ED. To legitimise this practice of not following routines, they *built a consensus* on their arguments in order to legitimise their decision to their colleagues at the ED.

*Tackling different approaches* was an issue, especially within the stroke unit. The nurses experienced difficult situations and had to deal with other staff's arguing and way of behaving. They dealt with insults when patients had been accepted for admission or were forced to act by calling younger ED physicians and request help in enrolling patients

when senior physicians refused to adapt to current routines; the nurses also managed the capacity of care places when the decisions of others resulted in overcrowding.

Actions associated with **letting off steam** were important, especially for younger and inexperienced colleagues, in terms of *debriefing after critical work processes*. The nurses took actions, such as organising and spontaneous debriefing with colleagues within their own department. The actions were mostly directed towards colleagues and incidents in other areas rather than in their own. A disorganised debriefing, resulting in general frustration, took place via short meetings in the coffee room or in the ambulance and touched on areas such as the unfair distribution of patients, in which a hospital had to admit a higher proportion of patients despite its capacity being over-stretched. Furthermore, debriefing about the lack of fluency due to language confusion and deficient collaboration related to senior physicians who despite being responsible for care places questioned new routines in an unpleasant and condescending way. Nevertheless, the nurses also mentioned satisfaction with how smoothly the processes flowed. An organised debriefing was related to different circumstances fulfilling a different function, as they were led by managers and were carried out in a structured and orderly manner.

The nurses, especially those in the EMS and the ED, also *checked patient outcomes following work processes*. They needed to know the outcomes of the whole care pathway, as well as whether their own interventions had been successful.

## 4. Discussion

In this study, many actions taken that affected the lead time in the stroke care pathway for low-priority patients were identified, and these actions were taken individually or in series. The staff in the entire care pathway played an important role in affecting the time factor, either individually or in a group, as well within the department through interactions between the EMS, the ED and the stroke unit. When delays were created in one part of the care pathway, the process was often accelerated by correcting at a later stage. However, on occasion, the opposite occurred, i.e. early mistakes and crowding at the ED persisted throughout the whole care process and resulted in patient safety risks, which is in line with the findings of other studies [1–6].

The most interesting findings from this study are related to the similarities and differences in the actions taken by the staff within the different parts of the care pathway to manage the situation (Fig. 1). The EMS nurses pointed out the importance of quickly gaining an overview of the patients' issues to make reliable assessments and build trust with the patients and their relatives; this is especially critical in the early part of the care pathway to avoid prolonging the lead time in the entire process. In order to handle the situation, they involved the patient and next-of-kin who knew the patient's normal status to clarify and secure their assessment. This confirms the need for more support to facilitate

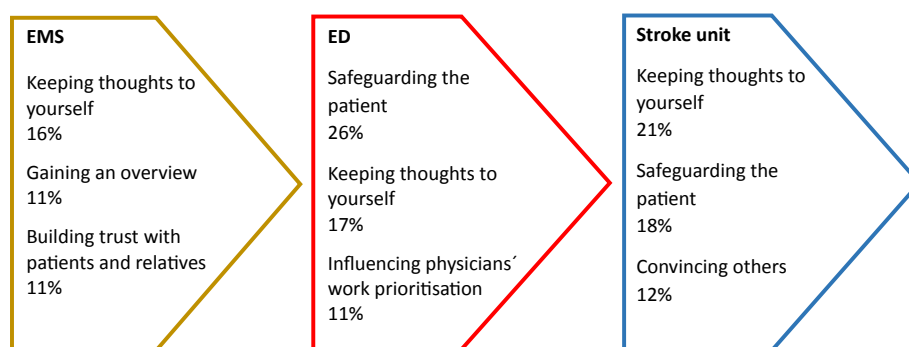


Fig. 1. The mostly described actions taken (%) affecting lead time within each department (EMS, ED, Stroke unit), in the care pathway for low-priority patients suffering a suspected low-priority stroke.

EMS nurses' assessments in terms of distinct guidelines and practical work tools [26]. The EMS nurses' actions to make the care pathway smooth by interacting directly with the patients and their families so that they can claim their right of rapid admission to the stroke ward when arriving at the ED is in contrast to the strong focus on interprofessional teamwork and communication amongst the ED staff [27,28].

Important actions taken within the ED were safeguarding the patient and influencing physicians' prioritisation (Fig. 1) in favour of the need for early, accurate assessment. Efficient triage models to secure patient priority and patient safety, counteract overcrowding and decrease lead times have been thoroughly evaluated and compared worldwide [29]. Regardless of which model is used, incorrect prioritisation affects the time factor in the entire care pathway. The ED nurses described how they reassessed patients' prioritisation if the EMS nurses' report was substandard or dubious to ensure patient safety and avoid the lead times being significantly affected as a result of the patient being sorted into an incorrect priority group. The ED nurses protected vulnerable and older patients, who are most prone to patient safety risks in the acute care pathway [14]. This is known to be achieved either through bypassing the ED [8–11,16] or implementing inter-professional teamwork at the ED [27]. In this study, the nurses at the ED were often specialists with long professional experience in contrast to the younger physicians, who were mostly temporary employees at the ED. This is probably the reason why the nurses acted by influencing the physicians' prioritisation and thus making the patients' way through the system smoother. Furthermore, the nurses at the stroke unit described actions taken to safeguard the patient and convince others (Fig. 1), mostly in relation to guidelines not being followed or accepted or being questioned by the physicians, as this resulted in added tasks or new routines. These reactions led to negative situations and further tasks for the nurses, which in turn resulted in increased lead times and patient risks, thus confirming earlier results [30]. Furthermore, handling parallel tasks, such as arguing about care bed availability and dangerous and unexpected patient transports between stroke units and assuring worried patients when the physicians were late and taking time, were hazardous for the lead time.

The most described action was 'keeping thoughts to yourself' (Table 4) because of the nurses' uncommunicated frustration, anger and sadness when, e.g. facing facts of overcrowding and lack of care places. This action is an expression that health care is complex and often organised in a line structure, rather than organised with a focus on processes, with deficient insights into one another's working methods. The initiating descriptive study showed that hindering and favourable factors affecting how fast and smooth the care pathway ran were related to human interactions and organisational structures [18]. Another study [2] stressed the lack of knowledge regarding how local and system-wide factors influence lead times in the care pathway and staff actions and interactions with others.

The trustworthiness of the study and the confirmability of the method was strengthened by its careful application of the CIT with regard to participant selection from the departments involved in the entire care pathway, the open interview technique and the research team's experiences and knowledge regarding the study context and the methodology used [19,20,21]. However, the authors' pre-understanding about the studied context also involved the risk of guiding the interviews, which was handled through the authors' regular discussions to consider the rigour of the described actions taken and to reach a consensus which ensured dependability [24].

## 5. Conclusions and implications

This study highlights differences and similarities in the actions taken to shorten the lead times by staff in the care pathway for low-priority patients suffering from a suspected stroke. The focus from the EMS perspective was on an accurate and holistic assessment of the patient's status by the nurses closely involved with the patients and their relatives. This contrasts with the ED unit, where interprofessional teamwork

was a prominent action taken to shorten the lead time. Finally, at the stroke unit, affecting the lead time for the patient was accomplished not only by convincing others of the necessity of a care bed despite overcrowding but also by denying a care bed because of overcrowding and patient safety.

In summary, staff at all stages in the care pathway prioritised safeguarding the patient, but they took different actions. The result has clinical implications for the improvement of protocols and routines, such as the use of digital support systems in electronic patient records and the need for structural teamwork between staff at the involved departments in the care pathway to support further collaboration and consensus on how to facilitate a smooth care pathway.

## CRedit authorship contribution statement

**Ingela Wennman:** Conceptualization, Methodology, Investigation, Writing – original draft. **Eric Carlström:** Conceptualization, Methodology, Investigation, Writing – review & editing, Supervision. **Bengt Fridlund:** Conceptualization, Methodology, Investigation, Writing – review & editing, Supervision. **Helle Wijk:** Conceptualization, Methodology, Investigation, Writing – review & editing, Supervision.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## Ethical statements

The study was conducted according to the Helsinki declaration on ethics and the General Data Protection Regulation 2016. The study was approved by the Regional Ethical Review Board in Gothenburg, Sweden (Diary number; 374-18).

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