

BMJ Open Quality **No waiting lying in a corridor: a quality improvement initiative in an emergency department**

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ABSTRACT

Background Overcrowding in the emergency department (ED) is a global problem and a source of morbidity and mortality and exhaustion for the teams. Despite multiple strategies proposed to overcome overcrowding, the accumulation of patients lying in bed awaiting treatment or hospitalisation is often inevitable and a major obstacle to quality of care. We initiated a quality improvement project with the objective of zero patients lying in bed awaiting care/referral outside a care area.

Methods Several plan–do–study–act (PDSA) cycles were tested and implemented to achieve and especially maintain the goal of having zero patients waiting for care outside the ED care area. The project team introduced and adapted five rules during these cycles: (1) no patients lying down outside of a care unit; (2) forward movement; (3) examination room always available; (4) team huddle and (5) an organisation overcrowding plan.

Results Adaptation of ED organisation in the form of PDSA cycles allowed to obtain a collective team dimension to patient flow management. Since December 2021, despite an increase in activity, no patient is placed in a lying-in waiting area outside a care zone, irrespective of their care level. Vital distress and fragile patients who need to be kept in a supine position are treated immediately. In 2022, waiting time before medical contact was <2 hours for 90% of all patients combined.

Conclusions The PDSA strategy based on these five measures allowed to remove in-house obstacles to the internal flow of patients and to fight against their installation outside the care area. These measures are easily replicable by other management teams. Quality indicators of EDs are often heterogeneous, but we propose that the absence of patients lying on a stretcher outside a care area could be part of these indicators, and thus contribute to the improvement and safety of care provided to all patients.

PROBLEM

Our emergency department (ED), which treated 30 000 adult patients in 2020, treated 42 000 in 2022. This increase in activity is linked to the restructuring of the hospital (centralisation and grouping of the technical facilities on a single site), ageing of the population, an increase of activity following the COVID-19 pandemic and a reduced availability of primary care medicine which is also

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Emergency department (ED) overcrowding is a global issue and a source of morbidity, mortality and staff burnout. This problem generally leads to the accumulation of patients lying in a bed in a corridor waiting for treatment, complementary examinations or hospitalisation, thereby amplifying the problem.

WHAT THIS STUDY ADDS

⇒ A quality improvement initiative implementing several rules such as (1) no patients lying down outside of a care unit (no 'stretcher patients'), (2) forward movement, (3) examination room always available, (4) team huddle and (5) an organisation overcrowding plan, significantly decreases both the numbers of patients lying outside the care area and the time from admission to the first medical contact.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ This study suggests that the absence of patients lying on a stretcher outside a care area could be considered as a quality indicator for EDs.

overstretched (rate of general practitioners of 6.7 per 10 000 inhabitants, one of the lowest in Switzerland).¹

Despite actions targeted at the input and output aspects of the ED and an adaptation of resources, it proved difficult to cope with such an increase in patient numbers. The saturation of the ED remained constant, with an accumulation of patients lying on stretchers outside the care zone, mainly in the department's corridors, waiting to be taken care of or hospitalised due to the lack of a dedicated area. This phenomenon was accentuated by renovation work carried out over several years to modernise the premises. It has led to the exhaustion for the team, which had previously been spared. The accumulation of patients lying in the corridors was identified by the team and management as the major obstacle to the smooth running of the service, the flow of all users, their good care and the comfort and safety of everyone's work.



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Table 1 Summary of the three plan–do–study–act (PDSA) cycles

PDSA 1	PDSA 2	PDSA 3
Four rules: <ul style="list-style-type: none"> ▶ No 'stretcher patients' ▶ Examination room always available ▶ Forward movement ▶ Huddle 	Adaptation of four rules: <ul style="list-style-type: none"> ▶ Definition of sitting and lying waiting areas after care ▶ The lead of the huddles is given to the nurses ▶ Standardisation of huddle 	<ul style="list-style-type: none"> ▶ Definition and levels of overcrowding ▶ System overcrowding, directives and actions plan

In 2021, after the renovation work, we launched a project to improve the quality of care of patients lying outside the care area. It focused on the lifting of internal blocks to the flow of these patients, with particular attention paid to those generated by the teams or staff.² Several C (plan–do–study–act (PDSA)) cycles were set up to achieve the objective of zero patients lying in bed waiting outside a treatment room, irrespective of their level of care. One cycle allowed to reach the objective and the two other cycles allowed to maintain it over time (table 1).

BACKGROUND

Overcrowding in EDs is recognised as a source of morbidity and mortality.³ However, this is a new phenomenon in Switzerland, compared with other European countries. It has a direct impact on team performance and is a source of exhaustion for carers.^{3–11} The constant increase in the number of patients arriving at the ED means that management strategies must be constantly adapted, while preserving the safety of care and the quality of life at work for the teams. Today, flow management is one of the central points in the organisation of an ED. It can be based on three levels: input by shunting or limiting access to the ED (public health strategy); output by smoothing the path of patients who need to be hospitalised (hospital strategy); and the ED itself (throughput, internal organisation of the department).¹²

When the number of patients arriving exceeds the reception capacity, that is, saturation, the increase in the number of patients waiting who are sitting or lying on stretchers becomes inevitable. Some strategies have been proposed in an attempt to reduce the time to medical contact based on the internal organisation of the ED, such as, a reception and orientation doctor; creation of fast-track (FT) areas for less serious or able-bodied patients independent of the areas where lying patients are taken care of; an ED case manager; adaptation of the architecture; segmentation of flows according to seriousness; an increase in the number of beds in the ED; an increase in resources.³ Few of these measures have proven to be truly effective.^{3,4}

When those measures are found to be outdated or ineffective, some teams are trying to increase their capacity to deal with recumbent patients by creating virtual care areas in the corridors to treat new arrivals in bed or to move those awaiting hospitalisation (boarding). While this measure has a proven effect on limiting overcrowding,

the care or waiting of patients lying in the corridors is not without danger: lack of verbal and physical privacy; incomplete physical examinations; lack of surveillance; increased aggressiveness of patients; risk of psychiatric patients running away; lack of follow-up of care and delays in care; fragmentation of nursing care and inadequate staffing; decrease in user satisfaction; and exhaustion of care teams.^{13–15} The capacity to receive these patients is quickly limited due to a lack of resources, space or available stretchers. To limit overcrowding, some teams decide to combat the phenomenon by trying to speed up the care of patients who are lying down, but also to sit up as many patients as possible, if the pathology allows.^{16–18}

MEASUREMENT

The primary outcome was the absolute number of patients lying in bed outside a dedicated care area.

DESIGN

The project management team was supported and listened to by the hospital management, the department's management and by IT analysts who ensured the collection and adaptation of work tools and the monitoring of indicators. The communication of information to team members was done in an agile mode using team huddles for the dissemination of information.¹⁹ The opinions and proposals of field staff were collected to adapt and improve the processes.

From an architectural point of view, the department has 18 identical monitored examination rooms distributed in a circle around 2 resuscitation rooms (figure 1). Five of these rooms are identified as observation areas as the department does not have a short-stay hospital unit. The active care area of the ED was subdivided into two seven-bed areas (A, B) arranged in a circle around the two resuscitation rooms. Each zone is under the responsibility of a medical and nursing team (a senior emergency doctor, two to four interns and two to three nurses). This team subdivision was carried out according to a 'framework scrum' and 'scrum of scrums' strategy²⁰ to improve coordination, communication and performance in the management of arrivals. Each A or B medical officer is also responsible for a resuscitation bed. Triage was carried out according to the Swiss Emergency Triage Scale.²¹

The first PDSA cycle consisted in the suppression of a corridor waiting room and the formal prohibition of

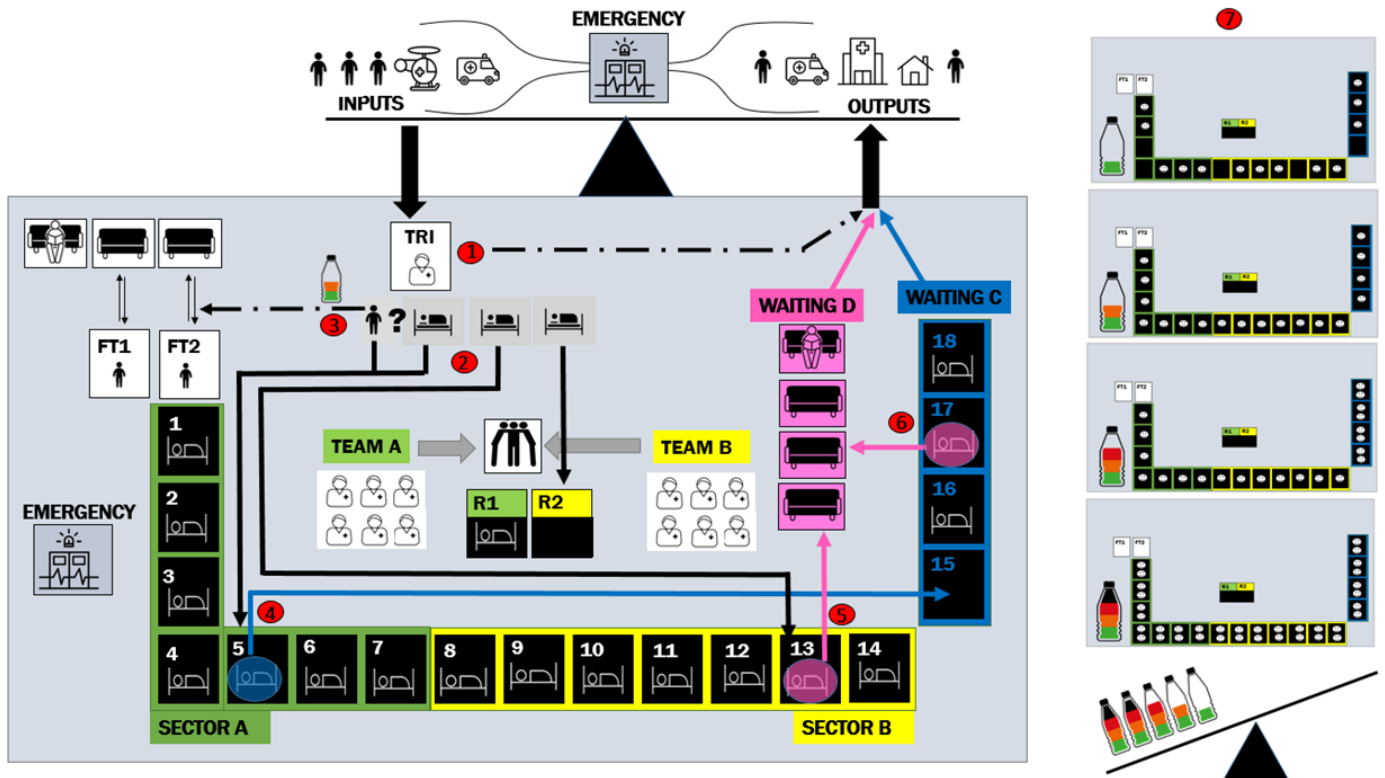


Figure 1 Plan–do–study–act cycles 2 and 3 (forward motion): (1) All arriving patients are triaged, non-serious patients are referred to other partners. (2) Able-bodied patients outside of life-threatening emergencies are managed in zones A and B if space is available or managed in fast-track (FT). (3) All recumbent patients are set up by moving a computer tagged blue or pink patient. (4) A blue tagged patient is moved to recumbent waiting zone C. (5) A pink tagged patient is moved to a seated waiting zone. (6) A recumbent patient is moved to a seated waiting zone after reassessment. (7) Levels of overcrowding.

the installation of patients lying outside a care area, irrespective of their level of care. The quality improvement project was adapted in stages over several PDSA cycles to maintain the objective of zero patients lying outside a care area. Although the goal was to improve the performance of the teams and the quality of patient care, particular attention was given to improving the quality of working life. This secondary objective was openly communicated.

STRATEGY PDSA cycle 1

Plan

A patient lying down in a corridor area was identified as a source of dysfunction in the department. This placement is decided by the teams in an arbitrary manner in the absence of a free care area to accommodate the patient (department overload). This lack of an available care area is linked to a dysfunction downstream of the ED (absence of an inpatient bed) or an internal dysfunction of the department (access block within ED). The objective of this first cycle is to stop waiting in a corridor, regardless of the level of care.

Do

The corridor lying waiting room (real area and computer cockpit area) has been abolished. It is forbidden from this first cycle to leave a patient lying down in a corridor

regardless of the stage of care (rule 1=no ‘stretcher patients’). Any patient arriving by ambulance or having to lie down must be installed after triage in the care area. Able-bodied patients who can walk are cared for in two fast-track rooms and then returned into the waiting room after care, pending results if their degree of triage permits.

To limit the access block to the emergency room, each A or B team is required to always free up an examination room (rule 2=examination room always available) to accommodate a new arrival in bed by limiting complementary exams and/or anticipating and accelerating hospitalisations. In the absence of an available hospital bed (downstream problem), patients must be moved to the observation area (rule 3=forward movement), where it is also proposed to double-up patients by examination room in zone C, if necessary. Before moving a patient, the teams are asked to consider the need to keep him/her lying down and/or monitored. Patients moved directly to the resuscitation zone follow the same process: they are transferred to zone A or B once stabilised if they still require care, or to the observation zone if they no longer require close monitoring.

The application of these rules is monitored during 5 min huddles involving a flow doctor (leader), a flow nurse, the two doctors responsible for sectors A and B, and the management team, which are held every 4 hours (rule 4=huddle).

Study

The objective is achieved from this first cycle; rule number 2 allows the reception and orientation nurse to always have the possibility to instal any newcomer lying down. As the teams do not fully adhere to the rules, compliance requires the intervention and reminders of the management at each huddle. Teams A and B point out the impossibility of always leaving an examination room available, justifying that their patients still require care. Area C is always saturated with patients at peak times. The patients moved are all moved lying down and monitored. The holding of huddles remains operator dependent. The management of FT patients is trivialised because the patients are considered not serious, with significant delays before medical contact.

Act

Rules 3 and 4 were adapted and a fifth rule was introduced to limit monitoring and keeping patients in bed. The waiting time for FT patients should be limited.

PDSA cycle 2

Plan

The first four rules should be maintained and adapted. To limit the overload of area C, not all patients moved should be monitored and/or lying down. FT patients should be moved to the emergency room when space is available.

Do

The name of the observation area was changed and renamed the 'supine waiting area C'. It is forbidden to move a patient there if he/she needs to be monitored. A seated waiting area D is created. Teams must identify movable patients in the form of a computer tag, pink if they can be moved while waiting in a sitting position, blue if they are waiting in a lying position (adaptation of rules 2 and 3). The lead of the huddles (rule 4) is given to the nurses. They gather the whole team around the flow nurse every 4–6 hours. A reminder beep sounds on all the phones on the ward and the huddle times correspond to the shift rotation times (7, 11, 15, 19, 23 hours). The team can decide at any time to carry out another huddle if it deems it necessary, including at night. Huddle flow is standardised (review of sectors, reminder of the importance of tagging patients and moving to welcome new arrivals). The forward motion of the ward is standardised (rule 3). Teams are asked to move FT patients to the emergency room when space is available (figure 1).

Study

The results are encouraging. The introduction of the computer tag allows early identification of patients to be moved. The teams do not report any difficulties in setting up these tags. Patients admitted to zone C are no longer monitored. The overload of zone C is limited by the installation of patients in zone D. Huddles are always carried out even in the absence of management. The management only intervenes when necessary. Despite

these measures, the pace of this forward movement remains operator dependent or team dependent on busy days. The treatment of FT patients is slowed down as soon as the ED becomes overloaded. There are no actions in place to combat overload.

Act

The points for improvement are the introduction of an overload plan and the adaptation of the management of FT patients.

PDSA cycle 3

Plan

The objective of this third cycle is to limit the overload of the service through an action plan.

Do

The level of service overload is communicated at the huddles (rule 4 adaptation) (table 1). Rather than using validated indicators of overcrowding (National ED Overcrowding Study Index),²² a simple indicator is chosen based on the occupancy rate of the ward by recumbent patients. The overload is thus estimated on four levels (figure 1). The green level corresponds to a level where examination rooms remain available. The orange level is declared when zone C is saturated (1 patient per cubicle) (18 bed patients taken in), the red level when zone C is doubled (22 bed patients taken in) and the black level when zones A, B and C are doubled (no more capacity, 36 bed patients taken in). Temporary understaffing of the care teams is not trivialised and can lead to the closure of care areas according to the decision of flow leaders.

When the level of overcrowding increases, proposals should be developed as a team based on a pre-established plan (rule 5=system overcrowding, directives and actions (SODA) plan) (table 2).

If these measures are not effective, patients should be doubled-up in the care areas (C then A and B). After each huddle, a 20 min discussion is held between the A/B senior doctors, the triage doctor and the flow nurse. A rapid review of all the files is carried out according to the Introduction, Situation, Background, Assessment, Recommendation framework, with cross-checking²³ of complex cases to help with the decision. For each patient, the usefulness of additional examinations is discussed ('less is more') and the possibility of being transferred to waiting area C or D. The FT is closed at the green level.

Study

Flow management has taken on a collective dimension and teams are developing action plans. The application of the plan has reduced the waiting time to less than 2 hours before medical care for more than 90% of patients.

Act

The SODA plan must be integrated into a facility plan. The black level must activate a crisis cell.

Table 2 Huddle

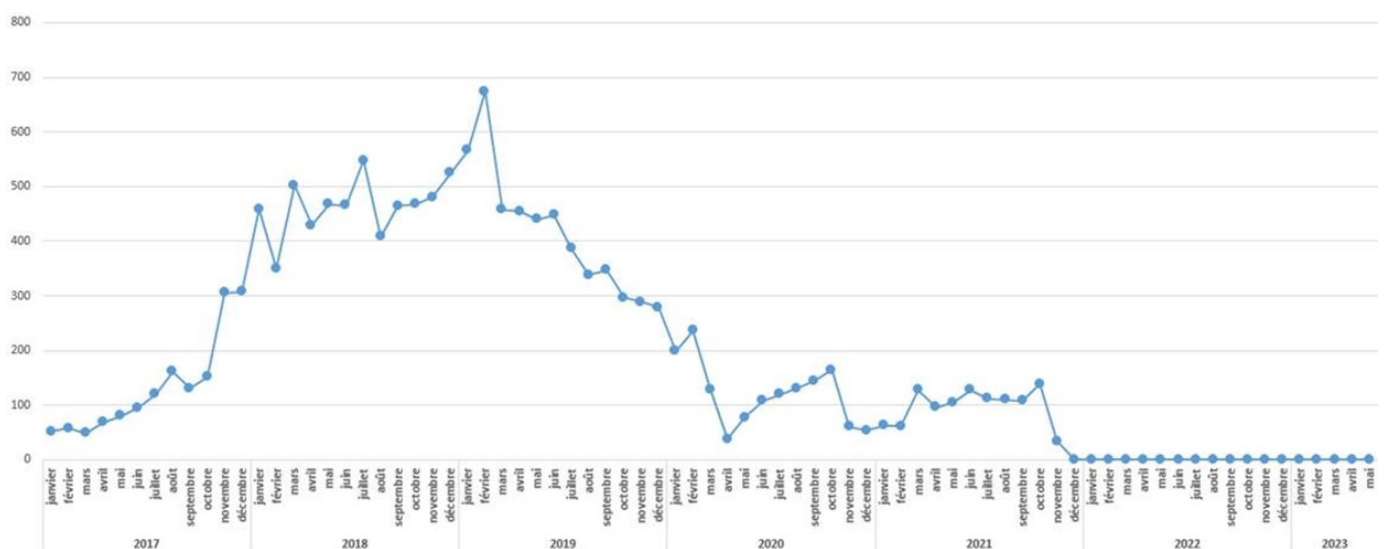
Standardisation of huddles	
	Leader: flow nurse. Public: the entire team on site. Communication of the overload level: green to black. Review of professionals and staff: secretariat, admission, security, nurses, doctor interns, executive doctors. Verbalisation of problem: input and/or emergencies (throughput) and/or output. Implementation measures, re-evaluation: within 1 hour.
Measures to fight against overcrowding	
Input problem	Strengthen the triage team? Intensify referral of patients to other partners to avoid oversorting? Reconvene the next day? Redirection of ambulances? Hospitalise from the moment of reception by bypassing the emergency room?
Throughput problem	Informing users. Recall the five rules of good operation. Tag to move; if possible, use the pink tag. Rediscuss the sitting position of patients lying in waiting area C. Limit unnecessary or non-urgent complementary examinations by cross-checking complex cases. Put pressure on the upstream and speed up hospitalisations. Understaffing of medical and nursing staff deemed unsafe by the flow nurse–triage doctor team may lead to the closure of a room in sector C to speed up the care process by increasing the level of overload, or in sectors A or B in order to balance the workload of the sectors/staff.
Output problem	Check bed availability by contacting the bed management unit. If no inpatient bed, activate corridor bed procedure in an inpatient unit.

RESULTS

In 2022, 42 000 adult patients were treated in the ED, an average of 115 patients/day, representing a major increase in activity of 40% in 2 years. Overall, almost 20% of all patients were over 70 years; 17% of patients were admitted by ambulance. The hospitalisation rate was 22%. The number of patients redirected to other care structures after triage was 2980 in 2022 (on average, 10 patients per day). Almost 60% of patients were triaged U3 (semiurgent conditions, requiring medical evaluation

within 2 hours). Around 6% of patients corresponded to U1 (life-threatening emergency requiring immediate care) after triage.

At the end of the first PDSA cycle, and despite the increase in ED activity, the objective was reached: zero patients waiting outside an examination area, regardless of their level of care (figure 2). This objective has been maintained since December 2021. In addition, no episodes exceeding the predefined system, or level ‘black’ (PDSA cycle 3, rule 5) has been observed since


Figure 2 Number of patients located in a corridor area.



this date, knowing that a maximum of 160 patients per day have consulted the ED. Vital distress and fragile patients requiring the maintenance of the lying position were taken care of immediately. The next two cycles maintained the objective and the team's adherence to the forward motion project. The last cycle enabled an action plan to be drawn up in the event of ED overload and to involve the hospital medical directorate in the smooth running of the service.

Other quality indicators were analysed retrospectively over the period 2022. Median waiting time before nurse triage was 5 min (average 8 min). Vital U1 emergencies were dealt with immediately on admission to the resuscitation room. Overall, in 2022, 90% of patients waited less than 2 hours before medical contact and 78% less than 1 hour. Notably, these trends continue to improve in 2023.

LESSONS

Our experience shows that it is possible to implement an ED without a stretcher wait area, regardless of the level of patient care. The acceleration of the processes for the care of patients in bed speeds up the care of all patients. This dynamic makes it possible to maintain short delays before nursing triage and medical care for all types of patients. We have thus limited the waiting time for sitting patients to less than 2 hours, despite the increase in activity. Importantly, no deleterious effects on our patients have been observed after implementing this strategy.

The adaptation of the organisation of an ED in the form of PDSA cycles makes it possible to give a collective team dimension to flow management^{2 24-26} and to achieve the objective: zero stretcher patients. The combination and adaptation of the five key rules implemented (no corridor stretcher patients, forward movement, examination always available, room, huddle and the SODA plan) made it possible to obtain this result. They guarantee internal pathways and the maintenance of the objective by limiting the human factors slowing down the progress of the diagnostic process for patients and their discharge from the ED. Flow management and the concern about overload often remain at a managerial level before they impact on the quality of life at work of the staff. From an individual point of view, there is often a tendency to do more and more to feel reassured (eg, letting patients lie down when they could be sitting up, monitoring when it is not essential, carrying out non-essential complementary examinations, etc). The time wasted by overprocessing each patient is passed on to all those waiting. By integrating a team dimension into flow management, teams are forced to think about these care processes.

It should be acknowledged that the teams responsible for ensuring this organisation are under great pressure from the flow. This will have to be monitored over the long term and it will be necessary to analyse whether this is not wearing for the workforce. To obtain their adhesion and guarantee their performance, management has become more transversal, involving the natural leadership of

actors on the ground who relay the service strategy. Based on the 12 recommendations of the European Society of Emergency Medicine,²⁷ everything is done to improve the working conditions of the teams: management that listens; a career plan with access to senior doctor positions; access to training; development of skills (ultrasound, simulation, teaching, research and publication); involvement in the development of the service; and suitable premises. The clinical working time of senior doctors is limited to 8 hours in order to guarantee their performance. Breaks and mealtimes are possible during the day and night, regardless of the activity. This measure is even imposed on the youngest doctors at night. One examination room was sacrificed to set up a nap room. The absence of patients in the corridors guarantees a pleasant working atmosphere, regardless of the level of overload in the department. The active management of patients as soon as they arrive limits the overload at the end of the day and the beginning of the evening, the most difficult times for teams. In our opinion, the indicator 'number of stretcher patients' could be retained as one of the quality criteria in the management of the ED.

LIMITATIONS

The overcrowding of emergency services is a new phenomenon in Switzerland, and it does not reach the levels of our European neighbours. Therefore, a limitation of our study is possibly a lack of generalisability to all settings as such a strategy would be more difficult to implement without inpatient facilities and a saturated downstream. Nevertheless, this strategy can be easily implemented in any ED and defer the wait after medical care. In this way, the ED fulfils its role and the patients waiting after treatment become the problem of the hospital structure, which does not guarantee an efficient downstream emergency service.

The implementation of such an organisation relies on cross-functional management and a group of employees motivated by the leadership of the project leaders. This strategy is effective in combating department overload, and limits waiting times before all patients receive medical attention. Nevertheless, the constant pressure on staff and the need to move patients to free up examination rooms might delay or misjudge the pathology or severity of patients if the department's activity is still increasing further. However, in our opinion, no major errors occurred since the implementation of those measures, but the outcomes impact of those changes should be evaluated in further studies.

CONCLUSION

The goal of zero patient lying on a stretcher waiting in a corridor can be achieved. The strategy based on the five measures removes the internal, mainly human, obstacles to internal patient flow. These measures are easily reproducible by other management teams under the cover of well-communicated objectives. Quality indicators of EDs

are often heterogeneous. However, we propose that the absence of patients lying on a stretcher outside a care area could be part of the quality indicators of an ED, and thus contribute to the improvement and safety of care provided to all patients.

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