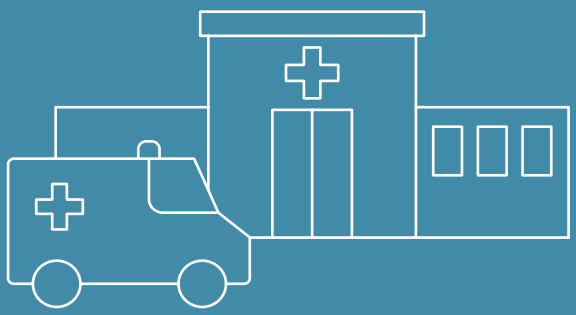
ECONOMIST IMPACT



Time to care: innovating to improve timely decision-making in emergency departments

Key takeaways

- Emergency department (ED) crowding is a global health problem with adverse effects for healthcare staff and patients. Fast access to treatment can make the difference between life and death.
- Many factors contribute to crowding including population growth and aging, increasing patient complexity, difficulties in accessing care, ED staff shortages, delays in receiving test results and challenges in discharge planning.
- In countries with developed healthcare systems across Asia-Pacific, Europe and the Americas, rising tides of ED presentations have been managed in various ways. Solutions to help manage patient flow are implemented in three stages:
  - **Input**—addressing large patient volumes presenting at the ED
  - **Throughput**—managing delays in triage, assessment, diagnosis and treatment
  - **Output**—improving patient flow out of the ED
- Technologies such as telemedicine and artificial intelligence (AI) can help to reduce input by improving access to primary care and directing low-risk patients to ED alternatives. AI could help to predict high patient volumes, allowing hospitals to plan staffing more effectively.
- Telemedicine allows ED or other specialist physicians to assess patients remotely, contributing to patient throughput. It also allows some patients to be cared for in virtual wards within their homes, supported by remote monitoring, reducing pressure on inpatient beds.
- Point-of-care testing (POCT) helps facilitate timely clinical decision-making in the ED by making tests available around the clock and delivering rapid test results. It can also inform pre-ED triage by paramedics, to better identify which patients need to be taken to the ED.
- Alternative staffing approaches, such as upskilling nurses and allied health professionals to perform advanced practice roles, can help to ease the strain on overburdened doctors by absorbing some clinical tasks and contributing to increased patient flow.
- To effectively address ED crowding, these approaches must be integrated into hospital processes and supported by adequate infrastructure and resourcing. Patients, healthcare professionals, technical experts and key decision-makers need to be involved in the planning, implementation and evaluation of such measures.

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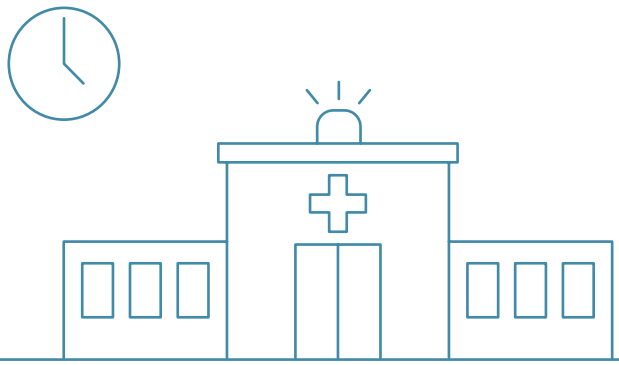
Background

The clock is ticking when a new patient arrives at the emergency department (ED). Timely assessment and rapid decision-making can smooth their access to life-saving care. Delays cost lives. Yet emergency departments are creaking. Long waits in the ED are becoming more common. It is not just the patient waiting for care who suffers. Behind them are others. Ambulances cannot tend to new emergencies. Staff are tired, stressed and prone to errors. What can be done?

In 2019 the World Health Assembly highlighted the importance of strengthening the provision of emergency care and stressed that the timeliness of this care is essential.[1] Emergency practitioners need relevant information quickly to make decisions, be it before the patient reaches the ED, while they are being assessed or during discharge planning.

This report addresses new technologies and approaches to improve timely decision-making in EDs with the aim of producing better patient outcomes and cost-effectiveness for hospitals. We explore topics including:

- **The use of pre-triage systems to make decisions about appropriate care.**
- **How digital healthcare in the ED and the patient's home can make better use of resources, speed-up discharge and reduce unplanned emergency attendance.**
- **The role of POCT in enabling faster test turnaround, reducing time to treatment and facilitating more effective decision-making.**
- **The role of primary care professionals and upskilling non-medic multi-disciplinary ED professionals in improving patient flow.**



Current challenges facing emergency departments

When we have new patients and we don't have a room to put them in, we evaluate them in the hallway. How good of an initial evaluation can you give a patient in a hallway?

Kori Zachrison, associate professor of emergency medicine, co-director of the Center for Neurological Emergencies at Massachusetts General Hospital & Harvard Medical School

Emergency rooms at the frontline

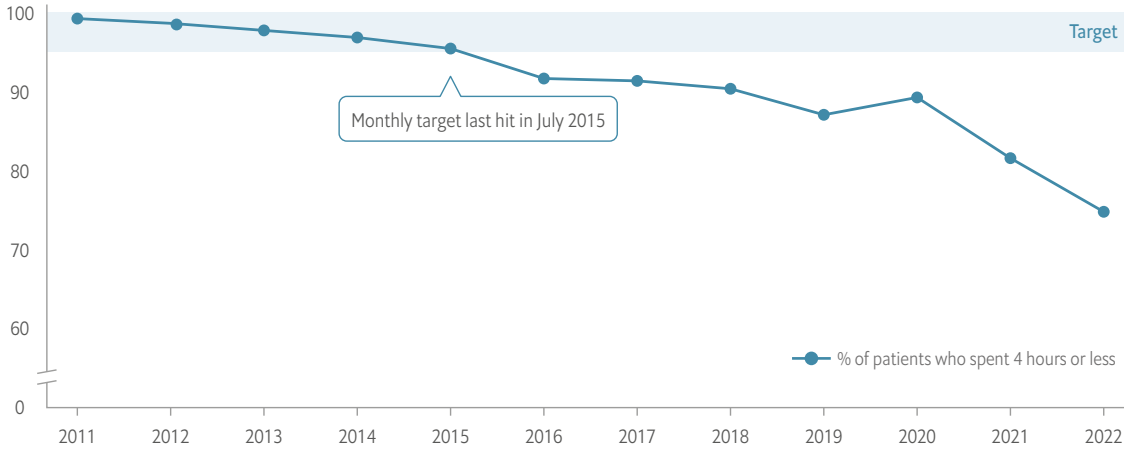
Emergency rooms are the frontline of urgent care. They are fast-paced environments where decisions must be taken quickly, with life-or-death consequences. ED crowding is a longstanding problem in this already pressured environment.[2] Its impact on patient care is highlighted by Kori Zachrison, an associate professor of emergency medicine at Harvard Medical School and co-director of the Center for Neurological Emergencies at Massachusetts General Hospital and Harvard Medical School. Dr Zachrison reports having to evaluate new patients in the hallway when no other room is available due to overcrowding. "How good of an initial evaluation can you give a patient in a hallway?" she asks.

ED pressures are a worldwide phenomenon. Population growth and ageing have created a global situation where more people require healthcare, against a backdrop of constrained budgets.[3,4] In the US, ED visits rose by over 60% between 1997 and 2019.[5,6] Increasing demand is often not matched by increased provision. In South Korea, the number of patients treated in EDs increased by 1.8% from 2017 to 2018, but the number of ED beds decreased by 1.7%.[7]

And in the UK, ED waiting time performance has been worsening. One key monthly target in England is that 95% of patients attending EDs should be admitted, discharged or transferred within four hours. This target has not been hit since mid-2015 (see Figure 1).[8,9]

In Japan, finding a hospital that will accept an emergency patient can be challenging. Paramedics on board ambulances pre-triage emergency patients and identify an appropriate hospital for their treatment. They can only transport the patient once the receiving staff at the selected hospital have agreed. In 2013 in

Figure 1: Emergency department waiting time target performance in England
Percentage of ED attendees admitted, discharged or transferred within four hours*



Source: NHS England[9]
*Average of monthly figures for % of patients admitted, discharged or transferred out of the ED in 4 hours or less. 2022 data to August only.

Osaka, the third most populous city in Japan, calls had to be made to five or more hospitals before the patient was accepted in 12% of cases, and calls to over 15 hospitals were sometimes needed.[10] This could delay arrival at the ED and the initiation of essential treatment.

The knock-on effects of the covid-19 pandemic have exacerbated these issues. At the height of the pandemic, many countries experienced a temporary reduction in ED attendances.[11-14] People who delayed or could not access care are now coming forward and their condition may have deteriorated to the point where they need emergency care. As currently seen in the UK, long waits for elective care due to backlogs are also contributing to this.[15]

Human impact: critical gaps and missed opportunities

The pressures on EDs affect patients directly. They are not simply uncomfortable—they worsen clinical outcomes.[2]

Some patients faced with long waits simply leave before being seen.[16] Estimates of how many patients do so vary widely, with rates between 0.1% and 15% reported.[17] National figures for the US in 2019 suggested that the overall rate of patients recorded as leaving without being seen was under 0.7%.[18] The rate varies between hospitals, with one hospital in the Midwest reporting a rate of 5% in the same period for example.[19]

Although patients who leave may be less severely ill, some do need urgent care and will have worse outcomes as a result of this missed opportunity to deal with their condition.[16,20,21] In the US, about a quarter of people who leave without being seen return to the ED within seven days, and of those about 11% are admitted to hospital.[21]

Frequent users of the ED may be more susceptible to the adverse clinical outcomes associated with ED crowding. This is because they are often vulnerable, disadvantaged,

homeless or uninsured, with poor access to other forms of care, especially primary care.[22,23]

The number of patients aged 65 and over presenting at the ED increases with an aging population. Older people have increasingly complex needs and can be more adversely affected by lengthy waits to be seen or admitted.[2] A Canadian study of healthcare professionals found that 54% of respondents perceived increased patient complexity as a cause of ED crowding.[24] Dr Zachrison also highlights that insufficient capacity in specialist care services has led to rising numbers of patients with behavioral or mental health problems attending the ED for care.

Overcrowding not only impacts patients, but also ED staff. Stress levels increase and it becomes challenging to adhere to best practice.[2] For instance, physicians, nurses and other staff are subjected to aggression and violence, can become distracted and prone to making errors, and are more likely to burn out or quit their posts.[5] Timothy Rainer, professor of emergency medicine at the University of Hong Kong confirms that recruitment and retention is a significant challenge worldwide. He attributes this to the staff losing their enjoyment of the specialty when "one's under too much pressure then one can't function well, can't learn well and can't treat the patients well because there are too many patients." The loss of experienced staff in turn exacerbates the issues of ED crowding, creating a vicious cycle.

Causes and consequences of ED crowding

Why does overcrowding in the ED happen, and how does it affect the ability of staff to make good healthcare decisions?

According to the American College of Emergency Physicians, crowding occurs "when the identified need for the emergency services exceeds the available resources for patient care in the ED, hospital or both."[25]

Crowding can happen at three stages[26] (see Table 1):

Input—too many patients presenting at the ED

Throughput—delays in triage, assessment, diagnosis, and treatment

Output—too few patients leaving the ED

Excess demand is often the problem, but studies suggest that crowding does not arise from population size alone.[2] Some patients present at the ED for non-emergencies, which often reflects difficulties accessing more appropriate care.

Throughput delays may be caused by several factors such as poor access to diagnostic tests, slow test turnaround time, delays in consulting with a doctor or specialist, and staff shortages.[27]

Output causes of crowding often relate to broader organizational issues, such as delays in admission to wards or transfer to other hospitals because of bed shortages. The solution lies in looking at the ED within the broader context.[27]

ED crowding has a wide range of adverse effects, including delays in diagnosis, treatment and hospital admission, increased overall length of stay and, ultimately, increased morbidity and mortality.[2]

Table 1: Examples of delays at each stage of the ED journey[2,8,27]

INPUT	**Relates to demand for ED services. If more patients attend the ED than can be dealt with rapidly, this leads to long waiting times**
Caused by: • Patients presenting with more urgent and complex care needs • Patients not knowing where else to go for care • An increase in the number elderly patients presenting • A high volume of presentations, including many low-acuity presentations • Poor access to primary and outpatient care • Limited access to diagnostic services in the community	
THROUGHPUT	**Relates to patients' length of stay in the ED. If throughput is slowed by delays in patients being triaged, assessed, diagnosed and treated this can contribute to ED crowding**
Caused by: • More treatment occurring in the ED • Staffing pressures, such as staff shortages, high turnover, early retirement or reliance on temporary staff • Use of junior medical staff in ED and delays in seeing specialists • Delays in receiving test results • Delays in making decisions about patient disposition, for example due to delays in consultation with other specialties	
OUTPUT	**Relates to patients leaving the ED, either by being discharged or admitted to a ward**
Caused by: • Hospital bed shortages delaying the admission of the patient to a ward (access block) • Delays in the ability to transfer to other services e.g. another hospital, rehabilitation settings or social care	

The impact on decision-making is evident. Decisions are likely to be delayed or impaired when there is insufficient space to conduct an appropriate and private examination, insufficient access to diagnostic tests and their results, and inadequate access to specialist or senior expertise and input.

In the next section, we discuss tools and strategies that could assist at crucial decision-making points within the different stages of ED workflow.

Existing and emerging tools and strategies to support timely decision-making

Input: avoiding unnecessary ED attendance

To manage ED demand, healthcare systems must direct patients to the most appropriate services, ideally before they arrive at the ED. The most suitable service will often be primary and outpatient care.

Pre-ED triage: identifying the most appropriate care

Triaging patients before they reach the ED can help to direct them to the most appropriate site for care.

The UK's NHS uses a non-emergency telephone service to triage callers and direct them away from ED if the situation is not an emergency. The service assesses callers' health problems using a clinically validated triage system. It then sends an ambulance or recommends that the caller attend the ED, visit primary care or book an appointment with another healthcare service. A study that examined over 16 million of these non-emergency telephone calls found that 78% were advised to access care that was not the ED. For every 20 such calls, only one caller made an unadvised visit to the ED.[28]

Experts have predicted that AI has the potential for significant impact in supporting urgent decision-making outside of hospitals in the future.[29] AI has been assessed for uses such as forecasting demand for ambulances, screening patient emergency calls or data to identify people experiencing cardiac arrest, and linking patients' electronic medical records to ED records.[29] AI-based systems can also divert low-risk patients away from the ED setting.[30] In the US and Switzerland, home-based, patient-led e-triage systems using AI are already being used via smartphones or computers to suggest places of treatment outside the ED.[31,32]

For patients who do need to go to the ED, digital technology can also inform this process. In the Japanese city of Osaka a smartphone app has been introduced to facilitate hospital selection for emergency patients.[33] Paramedics input details of the incident and the patient's condition, and the app shows hospitals that can provide the necessary care and how busy they are. The paramedic then selects a hospital from the list, and the hospital is contacted automatically. Patient data can also be shared with the hospital via the app. Use of the app has significantly reduced the number of calls that paramedics have to make at the scene of an incident.

Reducing ED demand: improving access to high-quality primary care

Better access to primary care is crucial for reducing ED demand. Contrasting his work in the UK and Hong Kong, Professor Rainer notes that while the challenges facing EDs are similar, "Hong Kong has an even less well-developed primary care system. So, even more patients come to the emergency department." He says that attending the ED is also cost-effective

for patients—as charges for attending the ED are low, and they can have quick and low-cost access to expensive, high-level investigations.

Good access to primary care allows people's conditions to be managed in the community before they reach crisis point, reducing ED use and avoidable hospitalizations.[2,34,35] Access to primary care can be improved through measures such as extending opening hours and offering more appointment slots.

Another approach is to offer enhanced primary care services alongside EDs (sometimes called the co-location model).[36] Patients attending the ED are triaged and those deemed low risk are directed to a primary care practitioner. This approach has been used in European countries such as Austria, Finland and the UK.[36-38] Data from a Swiss hospital support its potential benefits: after implementation of a co-located GP unit, time to patient discharge reduced, as did costs for managing ED patients.[39] ED staff satisfaction also increased. However, Professor Rainer cautions that although co-located primary care sometimes relieves pressure, it can increase the workload, as people realize they can access both GPs and emergency care in the same place.

Co-located primary care centers can also target specific vulnerable groups. For example, a pilot at an urban ED in Los Angeles offered a co-located primary care clinic tailored for homeless patients.[23] Homeless ED attendees with less acute medical conditions were offered usual ED care or care from a primary care physician supported by a mental health clinical nurse specialist, ED nurses and social workers. Some 65% chose primary care.

Primary care teams can also help to reduce ED attendances through the delivery of patient-centered comprehensive care, sometimes referred to as the "medical home" in the US and Canada.[40-42] In this model the primary care provider takes responsibility for all of the person's healthcare needs, coordinating with other professionals as needed. The model has been associated with benefits including better chronic disease management, improved quality of care and greater use of preventative care.[42] Keeping patients healthier should reduce their need to attend the ED.[33]

Not everyone needs to see a physician face-to-face. Telemedicine means that people can consult a primary care doctor via video or through other digital platforms, increasing access and helping to reduce ED demand. Almost all of the patients (99%) taking part in a large Canadian pilot of virtual primary care visits using video, audio or secure messaging reported that the quality of care was at least as good as they would expect from an in-person visit, and that they would use the service again.[43] Although most said they would have used an in-person primary care visit if the service was not available, 10% said that they would have gone to an ED or walk-in clinic. Patients who used the service tended to be younger adults, and any adoption of these services needs to consider that older and other vulnerable populations may face barriers to accessing virtual primary care.[3]

Throughput: making decisions about patient care

The potential of point-of-care testing

Waiting for test results is a common cause of delays in the ED. In the US 75% of ED visits in 2019 involved at least one diagnostic or screening test, with around half having imaging or a blood test (51% and 48% respectively).[18] Doctors are unable to decide how patients should be treated and whether they need to be admitted until they have these test results. Rapid access to tests and test results may not be possible if testing services are staffed only during office hours or need to be sent to a central laboratory.

One potential solution is point-of-care testing (POCT), which can be used for on-demand testing at the patient's bedside or nearby. POCT devices are usually designed for use by appropriately trained non-laboratory staff, theoretically enabling 24-hour access.[44] Some POCT is less invasive than traditional alternatives, making them preferable for children and the frail elderly.[45] The smaller samples needed are also an advantage for these groups, notes Ian Smith, manager of the screening laboratory and POCT at Oxford University Hospitals NHS Foundation Trust in the UK.

POCT may be particularly valuable in remote or rural settings that lack access to a 24/7 laboratory service. Australia's New South Wales Health Pathology service has one of the world's most extensive managed POCT services, operating across remote EDs.[46] Staff at the EDs report greater test access and faster test turnaround, facilitating more efficient decision-making.[46]

POCT can also play a role before a patient reaches the ED. Katy Heaney, Consultant Clinical Scientist and a POCT specialist at Frimley Health NHS Foundation Trust in the UK, explains that her organization was an early adopter of the use of POCT among first responders. A trial of ambulance paramedics carrying a range of POCT equipment followed, finding that the combination of these tests and clinical assessment reduced the number of patients brought into the hospital by 20%.[47] POCT also identified 10% of patients as needing hospital care who would not have been identified based on clinical assessment alone. On-site POCT can be a particularly useful assessment tool for complex patients who present with challenging needs resulting from frailty, dementia or other mental health impairments. In Ms Heaney's experience, POCT "enhances the clinical assessment, enabling better decision-making for that patient."

POCT in the ED can include blood gases, glucose and other blood chemistry, cardiac-related tests, tests for inflammation and viral respiratory infections, such as influenza and covid-19, and urine tests for pregnancy or detecting drugs of abuse.[48,49] Studies confirm a faster test turnaround with POCT. However, it is less clear whether POCT reduces length of stay in the ED. Some (but not all) studies report reduced

time to disposition decision or admission, clinical decision-making time, the likelihood of hospitalization, or hospital length of stay.[48]

The ED setting is complex, with multiple factors influencing patient flow.[50] POCT may not lead to a reduction in length of stay or an improvement in other outcomes if its implementation is not well planned. Services need to select POCT options that address the ED staff's needs when providing patient care and will operationally fit into the department. Implementation planning should consider and address the impact of POCT on existing workflows, workloads, and resources. Ms Heaney highlights the importance of making implementation a collaborative process and providing technical support for those performing the tests. Appropriate training and quality control are essential to ensure that POCT performs well and gains the confidence of the clinical staff.[51] Mr Smith recommends developing protocols to guide POCT use to mitigate the risk of over-testing due to convenience rather than clinical need.

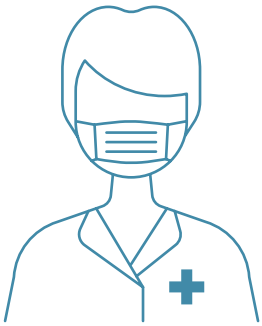
The results of POCT also need to be embedded into decision-making processes, laboratory information systems and, ideally, electronic patient records.[45,46,50-54] For example, systems to alert clinical decision-makers to the results of tests as soon as they are available are needed.[51,52] Yet Mr Smith explains that modern IT infrastructures that could facilitate these needs are often missing from hospitals, making it impossible to reap the full benefits of POCT.

According to Mr Smith, most EDs in the UK have adopted some form of POCT. This varies from site to site, influenced partly by the availability and proximity of laboratory services. The cost of POCT also impacts its adoption, say both Mr Smith and Ms Heaney, as it is often higher than laboratory tests. A siloed view of hospital budgeting can make it hard to make a business case for investing in POCT machines, as the potential savings fall under different departments' budgets and can be hard to quantify. "For five out of 10 patients, there isn't a saving, there's a cost," says Ms Heaney. "For two out of ten patients, there's a saving in bed occupancy; for the other three, there's a saving because complications are minimized." She recommends that hospitals and health systems take this system-wide perspective to help realize the cost benefits of POCT.

Alternative staffing approaches

Staff shortages contribute to ED crowding and delays. Nursing staff shortages are reported to be one of the primary reasons for ED crowding.[55,56] In addition, EDs are often largely staffed by junior doctors rather than experienced clinicians, which can contribute to delays.[57]

Healthcare departments and higher education institutions are working to tackle shortages by introducing advanced practitioner roles. Nurses, pharmacists and allied health professionals such as occupational therapists can train to an advanced practice level, enabling them to perform some of the tasks usually done by a physician.[58] The hope is that advanced practitioners can lead patient care, reduce physician caseloads, and mitigate physician shortages. Professor Rainer flags that legislation impacts their scope of practice and how teams can be organized, but he is seeing progress. "We are now seeing some excellent advanced nurse practitioners and emergency nurse practitioners working in the emergency department in the UK and in Hong Kong," he enthuses.



Dr Zachrison explains that nurse practitioners and physician assistants are crucial to the ED at Massachusetts General Hospital (MGH), particularly when demand is high: "If we have more than 20 patients in the waiting room, we activate a protocol where we put a physician assistant or a nurse practitioner that has a good amount of experience out front in triage, and they will take an initial quick history and physical and put some [test] orders in to get everything rolling, so that by the time that patient is ready to be seen by their physician-led team, many of their results are in." Evidence suggests that upskilling and diversifying staff roles to advanced practice levels can reduce ED length of stay, provide good quality of care and lead to high levels of patient satisfaction.[59-61]

Effective triage is crucial in the ED, and advanced practice roles need to be complemented by ED physicians. One review found that patient throughput increases when ED physicians can see patients at the earliest possible point, ideally during triage.[62] Another found that triage led by a senior doctor may reduce waiting times and shorten stays in the ED.[63] Hospitals must develop processes that combine appropriate skill mixes and experience to deliver optimal patient care.

Digital solutions to support patient care

Telemedicine and AI solutions are helping hospitals to manage triage and patient flow through the ED. A 2016 survey of all EDs in the US found that 52% of responding EDs used telemedicine services to manage their patients.[64] Use of telemedicine was more common in busier EDs. Telemedicine could alleviate staff shortages and support alternative staffing models by allowing a remote ED physician to provide oversight to advanced practice practitioners, as well as facilitating consultations with specialists that are not available in the hospital. These services could be particularly useful for smaller hospitals or EDs in more remote areas.[64-66]

For example, an ED in Connecticut piloted a telemedicine rapid assessment system for adults.[67] This system allowed an ED physician based at home to take the patient history via video conference, then order tests as appropriate. The patient was followed up for further evaluation and care continuation by a physician in the ED. Initial findings suggested that both patients and physicians were satisfied with the service. Such a system could provide flexibility in attendance surges in the ED.

Dr Zachrison highlights telestroke care as a success story in terms of patient outcomes. It enables rapid delivery of safe and effective acute care, and improves clinical outcomes for patients in rural settings.[68,69] It also keeps patients closer to home and their support networks. For example, the MGH telehealth consult service allows hospitals on Martha's Vineyard and Nantucket islands to provide treatment on site and avoid transferring patients to the mainland. The ability to address rural disparities in access to high-quality specialized healthcare "is a big potential win for telehealth," says Dr Zachrison.

Some of the barriers to wider adoption of telemedicine in the US include the different credentialling and licensing requirements across different states, concerns from smaller centers about losing patients to the centers where the telehealth specialists are based, and challenges with reimbursement. Since the covid-19 pandemic, there has been some progress in streamlining the regulatory requirements and expanding coverage for telehealth.[70,71]

AI and machine learning have excited great interest across many fields, and the ED is no exception. AI's capability to analyze patterns in large datasets from EDs could help to predict patient flows, outcomes or diagnosis. Evidence in the field is still emerging, and although various approaches and uses have been tested, much of it remains at the proof-of-concept stage.[29] Results from studies directly comparing AI with human performance have been mixed. Some have found AI-based approaches to be superior or to help physician judgement, but others have not.[29]

Using AI to predict ED admissions could help hospitals to plan staffing models for crises, such as pandemics. Other potential applications include triage, risk stratification and rapid analysis of medical images. Professor Rainer believes that AI could in future also help to prevent ED admissions by alerting doctors to a diagnosis for patients with specific combinations of symptoms entered into their electronic medical records. This could avoid a scenario where the diagnosis and consequential treatment may not have been discovered until the patient requires emergency care at the ED.

Output: making patient disposition decisions

Virtual wards

A major cause of ED crowding and increased length of stay is delay to discharge or transfer. This depends on decision-making about discharge. Patients who need to be admitted cannot leave the ED until a bed is found, while others can leave the ED only if adequate support at home is available. During covid-19, telemedicine expanded to fill these gaps, supporting earlier discharge from the ED or preventing admissions.[72]

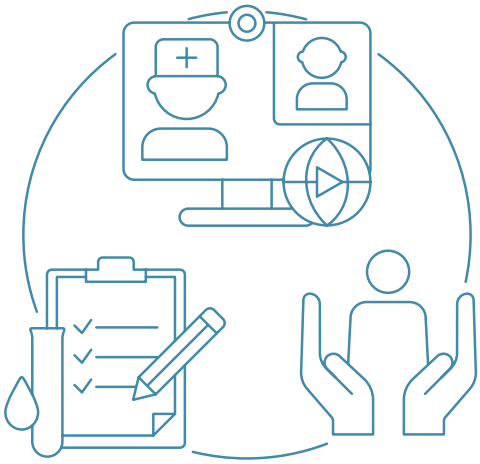
Remote monitoring during covid-19 led to the "virtual ward" being more widely used, in countries including the US, Canada, China, Australia, the Netherlands, Ireland and the UK.[73] In this system patients who would otherwise have been treated in hospital are treated at home with digital remote monitoring, supported by a multi-disciplinary team of healthcare professionals.

Virtual wards relieve some of the pressure on inpatient beds by flowing patients out of the hospital. They can also help to prevent ED attendance and emergency hospital admissions by targeting patients in the community who have become unwell.[74-77] In the UK during covid-19 the provision of virtual wards targeted people with pre-existing conditions that might be exacerbated and require ED attendance.[74]

Digital tools to support discharge

Interactive digital tools could also support timely and seamless discharge from the ED and prevent future ED visits. One pilot of such a tool allowed hospitalized patients to complete a digital checklist of items 24-48 hours before their expected discharge.[78] It aimed to ensure that they understood their medications, self-care instructions and follow-up arrangements. The results were integrated with patient records, allowing staff to see and address any areas of patient concern. The tool also facilitated secure messaging between the clinician and patient up to a week after discharge. Initial results suggest that most patients felt that the tool supported self-management and communication with their care team.[78] Such an approach may prevent avoidable ED visits by allowing staff to check-in with patients to ensure that they follow guidance for self-care.[72]

Looking ahead



"The future is always going to be challenging because the demand is outstripping the response," says Professor Rainer. As the population ages and health conditions become more complex and challenging to manage, pressure on the ED and health systems will increase, posing risks to the wellbeing of patients and staff. The interdependencies involved in managing flow through the ED mean that no single silver-bullet solution exists. Despite this, some strategies—discussed below—are more commonplace than others, allowing for trial and error and adaptation to the ED.

Digitization of the health system

Telehealth, virtual wards and online consultations have great potential to help manage patients in the ED and help flow patients back into the community. However, following a surge of digitization during the covid-19 pandemic, many applications have been discontinued or used less frequently. Barriers to longer-term adoption include technical difficulties (such as unreliable equipment or internet connections), lack of resources to facilitate telehealth deployment, and limited time to evaluate and select the best digital platforms.[79] For digital solutions to stick, they need to be interoperable with existing systems and digital diagnostics such as POCT. Additional IT support is required initially, and healthcare workers must be trained to use new programs and equipment. ED workforce planning must also incorporate telehealth approaches to help embed them into hospital infrastructures.[79]

Moving care outside of the ED using innovative solutions

More and more care will be provided outside of the traditional hospital-based ED setting. Telehealth, virtual wards and POCT solutions will enable this move. Dr Zachrison envisions a scenario where a primary care physician is concerned that an elderly patient with mobility issues is experiencing a heart failure exacerbation. In the future, instead of having to send the patient to the ED the physician could have a virtual consultation with specialists who could send a paramedic to the patient's home. The paramedic would facilitate a video consultation with an emergency physician, perform tests using POCT and share the results digitally in real-time, and either administer treatment or bring the patient to hospital if indicated.

Improving ED staff productivity

Improving the productivity of ED staff involves finding effective ways to manage large surges of patients, as opposed to making staff work harder. Diversifying the skill mix of professionals across the ED team, and relieving pressure on physicians, is a staffing model that is growing in popularity. Using advanced practitioners to take initial patient history and order tests can support triage in the ED department and help to prevent patient backlogs. Yet training advanced practitioners takes time, especially in the competencies required for ED settings, which are littered with diagnostic uncertainty and complex decision-making. Broadening access to advanced practice training programs that include specific ED skills such as triage and digital tools to support diagnosis and patient flow is needed.[80]

Increasing availability of social care

Difficulties moving patients out of the hospital, or "bed block", is one of the most significant output challenges faced by hospitals. Bed block has a massive knock-on effect on the ED, forcing patients who require inpatient care to wait in the ED department, causing crowding. Social care packages are more commonly required by older and vulnerable patients, who comprise a large proportion of those in the ED. Social care availability is experiencing a global crisis, leading to hospitals having to play the role of de facto care homes for some patients until appropriate care can be found.[81]

Some countries have adopted solutions to bolster social care capacity. These include changes to the organization and procurement of care and integrating health and social care systems. In Japan, for example, where 28.4% of people are aged 65 or older, every Japanese citizen starts paying contributions towards long-term care when they are 40.[82] Individuals can choose which service provider they use, but the central government sets a national fee schedule to control what providers can charge.[81] The government also subsidizes moving patients from acute care hospitals to rehabilitation or temporary respite beds to improve hospital output.[33]

Digital solutions are also improving social care. These include using geolocation data to map distances travelled for care in the community and assigning social care staff to patients who live in the same neighborhoods. This enables social care providers to improve efficiency, productivity and care for more patients.[83] Care workers are also being trained to help patients to manage long-term conditions by monitoring their vital signs using digitally enabled instruments and POCT.[84] Results are sent from testing devices to a tablet or smartphone and shared with health professionals to allow them to spot deterioration early on and make changes to medication as needed.

Conclusions

The challenges facing EDs are acute and unlikely to ease. Demand continues to rise and post-pandemic pressures have exacerbated already-challenged systems. Rising demand has led to improper care in inappropriate environments, sometimes referred to as corridor care. Investment and innovation are urgently needed to mitigate a system that causes distress to patients and healthcare professionals. Mitigation must change the way that the ED is perceived and accessed by patients, and ultimately how services are provided.

Increased investment in improved access to primary care, inpatient beds, staff numbers, upskilling staff and diversifying staff skill mix, better direction of patients to alternative services, and improved financial incentives may all help address the root causes of ED crowding and waits. Yet the ED will always be competing for finances, staff supply and inpatient beds owing to the increasing demand for healthcare. Therefore, taking advantage of better tools and technologies such as telemedicine, AI and POCT are needed to help ensure fast access to information to enable the ED to function as effectively as possible when staff and bed numbers are constrained. For any of these strategies to succeed, they must also be integrated into broader hospital processes and supported by adequate infrastructure. This includes improving existing IT systems to enable effective use of these tools, as well as working collaboratively with clinical and technical staff, patients, and tool providers to plan their implementation and integration into existing workflows. Programs to improve ED service provision, particularly those using innovative approaches, should be evaluated and publicized to allow other EDs to learn from them.

Ensuring that people attending ED get timely care and are signposted to services outside of the ED that can help them manage their health better can transform ED attendance from being perceived as a failure of the healthcare system into an opportunity. Professor Rainer sees a role for trailblazers with vision to drive forward innovative models of care within the ED and catalyze change: "I'm excited about emergency medicine in the future."

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