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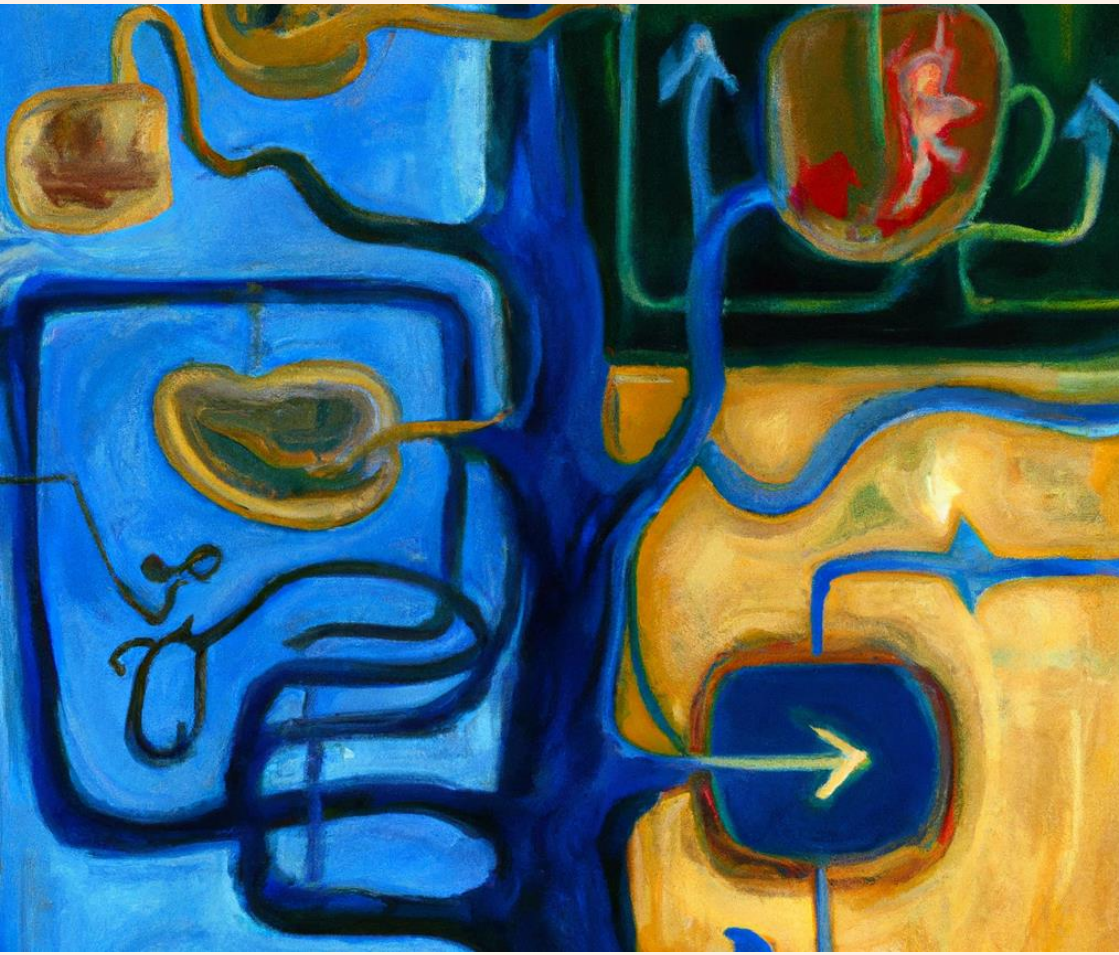

# Digital triage: a paradigm shift

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www.healthpolicy.se | info@healthpolicy.se

**Forum for Health Policy** (Forum) is a Swedish think tank. Forum serves as a neutral platform where policymakers, researchers and health care providers meet to discuss and analyze important issues concerning the Swedish health care system. With a strong international perspective and focus on the patient experience, the aim is to stimulate innovation, contribute to new ideas, and assist policymakers and politicians with knowledge and possible policy options.

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**Author:** Jonathan Ilicki is a medical doctor, fellow in clinical innovation at the KTH Royal Institute of Technology and head of innovation at the health technology company Platform24. The author is responsible for this report's content and conclusions.

**Illustrations:** All illustrations have been generated by OpenAI's generative image service DALL-E.

# Content

# Preface

Several studies show great opportunities for quality improvements and efficiency gains with the help of digitization and the use of health data. Digital solutions and tools, when used correctly, are a way to cope with today's and future challenges in healthcare. Forum for Health Policy has published a series of reports with policy recommendations for better conditions for digital transformation to support patients and staff.

Forum for Health Policy has asked Dr. Jonathan Ilicki to describe and reflect on digital triage as a way to improve patient safety and free up resources for care based on his experiences. Our hope is that the report creates debate and dialogue around digital triage. Please feel free to comment on the website or on social media. Many thanks to Jonathan.

Peter Graf
Chairman of the Forum for Health Policy
Stockholm, May 2023

# Introduction to triage

Triage is the process of assessing the urgency of a patient's problems based on limited information. It is the opposite of a complete medical assessment, where healthcare professionals thoroughly evaluate and assist the patient. The challenge lies in the fact that collecting more information during triage usually requires additional time and resources from the care provider. The purpose of triage, therefore, is to efficiently evaluate the patient's problems and prioritize those with the most critical needs for immediate help.

Triage is performed in various contexts, including primary care (when a patient contacts a medical hotline or health center), emergency care (when a patient arrives at an emergency department), or pre-hospital care (such as during a major accident). This seemingly straightforward task of correctly guiding patients has significant implications for the overall functioning of the healthcare system. Inefficient or inadequate triage often leads to redundant work and unnecessary visits. In Sweden, these unnecessary pathways through the healthcare system have been estimated to account for approximately 1.5 million primary care visits.[1]

In all these contexts, triage is carried out using different triage systems designed in various ways. At one end of the spectrum are the least accurate and resource-demanding systems, which involve quickly assessing the patient with limited decision support. Such decisions, made without thorough examination, can be useful in situations like major accidents when prompt decisions must be made and there is no time or opportunity for comprehensive patient evaluation. On the other end of the spectrum are triage systems that instruct healthcare staff to ask questions and conduct a more thorough examination, such as in an emergency department.

# Examples of different types of triage systems

**Primary care triage**
- RGS (*Rådgivningsstödet*)
- NTS (*Nederlandse Triage Standaard*)

**Emergency medicine triage**
- RETTS (*Rapid Emergency Triage and Treatment System*)
- SATS (*South African Triage Scale*)
- MTS (*Manchester Triage Scale*)

**Disaster medicine triage**
- START (*Simple Triage and Rapid Treatment*)
- MPTT (*Modified Physiological Triage Tool*)

At first glance, triage may appear unimportant, but it is actually one of the most fascinating processes in healthcare. It is complex, timeless, and crucial for a healthcare system to function effectively.

The triage process is important because it requires striking a balance between patient safety and resource utilization. Healthcare resources will always be limited in comparison to what is medically feasible. Therefore, it becomes necessary to prioritize resources, as certain conditions are more urgent than others. For instance, a patient experiencing a heart attack must receive immediate guidance and treatment, even if it means placing less time-critical patients at a lower priority. This trade-off is improved as research identifies more efficient ways of assessing the risk associated with dangerous conditions. Nevertheless, the trade-off still remains.

Triage also possesses inherent complexity due to the wide variation in how diseases manifest themselves. Serious diseases can present in atypical ways, making it challenging to always rule out dangerous conditions completely. Simultaneously, it is deceptively simple to create a completely safe triage system - just refer every patient to the emergency department. However, such a system would be catastrophic, as emergency departments would become

overcrowded with patients not in need of immediate care. The difficulty lies in developing and refining a system that ensures all patients receive the most effective level of care without employing an excessively extensive or costly process for gathering information and assessing patients, while also minimizing the likelihood of missing serious conditions.

Triage will remain a fundamental aspect of a properly functioning healthcare system. Patients will always encounter symptoms that they are unable to evaluate on their own, and healthcare resources will always be limited. As long as this remains the case, the need for triage and patient prioritization will persist.

# The future of triage

There are many reasons as to why triage will become even more important in the future. To understand the increasingly central role of triage in healthcare, it can be useful to look at how triage has developed historically and how healthcare is developing today.

There are three major trends that help us understand how triage will be used in the future:

1. **Successive formalization of triage**: Before the 1990s, emergency triage in hospitals often relied on subjective assessments or simpler local systems with, for example, three levels.[2] However, during the 1990s, structured emergency healthcare triage systems began to emerge and get implemented worldwide.[3] These systems aim for greater standardization, ensuring that a triage algorithm yields consistent assessments for patients, regardless of the healthcare staff involved.

2. **Expanded use in healthcare**: Structured triage began in acute care and later spread to primary care, and has since become increasingly common around the world. One contributing factor to this is that triage is needed when healthcare resources cannot meet patients' demand for care, leading to queues and the need to prioritize patients based on medical urgency. The mre limited the accessibility (resulting in a greater difference between demand and supply), the more important it becomes to ensure that the right patients are cared for at the right time. While some countries, like Sweden, introduced a structured triage for assessing patients in primary care early on, other

countries, such as the Netherlands and France, adopted it later.[4] With a global aging population and increasing healthcare demands, the need for triage is expected to grow in the future.

3. **Healthcare specialization:** Over time, we accumulate an increasing amount of medical knowledge. This means that we discover new treatments and therapies, which increases the value of specialization. A more specialized healthcare system allows for the application of detailed knowledge and yields better medical outcomes. Moreover, as the healthcare system evolves, it tends to consist of more specialized units with narrower tasks. The greater number of units, the more often a patient will be handed over from one unit to another. At each such handover, an assessment will be made regarding the urgency of the patient's problem - and thus triage will play an increasingly important role.

Taken together, these trends indicate that triage will remain a central process in healthcare and will most likely become even more important in the future.

# Digital triage: a paradigm shift

In recent years, digital triage has undergone rapid development and been implemented worldwide. This represents a significant paradigm shift for several reasons. Firstly, digital triage allows for the continuous improvement of triage systems. Secondly, it has the potential to enhance patient safety by promoting adherence to triage guidelines. Thirdly, it offers tangible efficiency gains for the healthcare system.

## A revolution in continuous improvement

Swedish primary care triages millions of patients every year.[5] The phones in our medical hotline (called 1177) and the health centers ring constantly. But there is no easy way to perform a structured follow-up and evaluation of manual triage. How many telephone triages in Sweden adhere to best practice guidelines? Which questions unnecessarily direct certain patients to emergency departments? How often does triage result in appropriate levels of care? Unfortunately, these questions remain unanswered due to the manual nature of telephone triage. It is impossible to systematically review the precise responses provided by patients in relation to the advice they received. In other words, despite the millions of patients triaged via telephone each year, opportunities for learning and systematic improvement within the triage system are severely limited. Gathering data from the manual triage process is far from straightforward. The only aspect that can be assessed in retrospect is the healthcare staff's medical notes, which are interpretations and summaries of the patient's statements during the triage process.

When triage is digitized, however, both the questions from the provider and answers from the patient are collected in a structured manner. This allows an analysis of the triage logic with high frequency and automation, based on the patient's answers to triage questions. This type of learning is a veritable revolution as it enables a significantly more accurate and comprehensive understanding of how triage occurs and works.

**Opportunity to systematically improve patient safety**
It can be argued that occasional adverse medical events are bound to happen in connection with triage. This is partly due to the sheer volume of patients being triaged, which inherently involves incomplete information, and partly because creating a perfect triage system is very difficult. What should be avoided, however, is that the same known mistakes happen again and again.

Caregivers in Sweden have a legal obligation to report events that have caused or could have caused a serious adverse event, commonly known as Lex Maria, to a government agency. Reviewing historical Lex Maria cases related to manual triage reveals the recurrence of certain misjudgments. One example is the repeated failure to triage patients with typical symptoms of diabetes (such as increased thirst, frequent urination, fatigue, or weight loss) according to established guidelines. An examination of 146 Lex Maria cases from 2010 to 2021 identified similar instances of misjudgments in the years 2015, 2018, 2019, and 2020, where patients with symptoms suggestive of diabetes weren't triaged according to guidelines.

It is understandable that triage errors occur. Training new staff on triaging requires time and resources. Additionally, as triage often involves referring patients to other healthcare facilities, obtaining feedback on the appropriateness of triage outcomes can be challenging. These factors may help explain the recurrence of specific triage errors. Digital triage systems have an advantage in this regard, as they only need to learn a certain triage logic once. Consequently, a digital triage system can serve as a safety net, ensuring that patients with serious conditions are not overlooked.

## Better compliance and more equal care

Multiple studies have shown that healthcare professionals interpret manual triage systems in different ways, even when evaluating the same patient.[6-8] Patients can therefore receive varying assessments depending on who happens to answer the phone. Some studies show that patients receive different assessments based on their ethnicity[9, 10], socioeconomic status[11, 12] or even on the gender of the triaging nurse.[13] It is human to have cognitive biases and prejudices, but this large unwarranted variation is unlikely to benefit patients or their care.

**Digital triage has better adherence to guidelines**

Digital triage systems have no biases. Instead, they always follow the triage protocols they were programmed with, avoiding the arbitrary variation that many triage studies have shown in humans. Digital systems will not discriminate against a patient because they are tired or have prejudices against that particular patient.

There may be interpersonal factors which warrant that patients are assessed differently. Patient A tends to exaggerate and describe their pain as unbearable, even when it is relatively mild, whereas Patient B rarely complains. The nurse may recognize that an expression of

pain from Patient B could indicate a more severe condition. Here, too, digitization can make it easier for both healthcare staff and patients. Caregivers can, for example, set different limits for different patients in digital questionnaires, thus accounting for interpersonal variation. Above all, triage does not always have to replace healthcare personnel, but a digital triage system's recommendation can be assessed by a nurse who knows patients A and B. In this way, both quality of assessments and adherence to guidelines can be improved, while at the same time drawing upon healthcare staff's expertise and knowledge of the patient.

## More time for the patient instead of standardized questions

Digital triage involves a patient stating their symptoms to a digital system, or an app, which asks a series of questions. Based on the patients responses the system can then recommend the most appropriate level of care. This can save time for healthcare in several different ways.

**Reduce the time healthcare professionals spend asking standardized triage questions over the phone**
In manual triage, patients contact medical hotlines or health centers, where healthcare staff ask questions to assess

the urgency of care. By automating the triage process, fewer nurses are required to man the phones, freeing up their time to directly attend to patients. This can lead to significant positive outcomes. In Sweden, around 1 000 nurses are employed to handle patient inquiries over the telephone to the medical hotline (1177).[14, 15, i] Moreover, an estimated 2 000 – 3 000 nurses regularly triage patients via telephone at healthcare centers.[16, ii] In comparison, there were approximately 17 000 nurses working in Swedish primary care in 2019. [17] This illustrates the significant time savings could be realized if only e.g. 15% of incoming phone calls could be managed automatically.

**Automatic self-care advice that does not take time from healthcare professionals**

Many patients who are triaged will require in-person assessments at their health center. However, many patients that contact healthcare do not need extensive investigations or assessments. Instead, these cases can be directed to self-care advice solely based on the information provided by the patient. By fully automating such triage processes, patients can promptly receive the appropriate advice without consuming any time from healthcare personnel, neither during the triage nor the subsequent healthcare consultations.

**Reclaiming time during the clinical meeting**
In manual triage, the patient verbally explains their symptoms to a nurse who takes brief notes. When the patient later meets a doctor or nurse in person, they are often required to repeat their symptoms once again. However, with digital systems, the patient's medical history can be carried forward and accessed during the final appointment, resulting in significant time savings. This reclaimed time can instead be spent on other, more person-centric aspects of the consultation.

**Help patients quicker reach the correct level of care**
Digital triage facilitates collaboration between different components of the healthcare system in ways that are not feasible with manual telephone triage. Let's consider a scenario where a patient presents alarming symptoms that require prompt investigation for cancer. With digital systems, specific processes can be automated, such as notifying the general practitioner about the situation or generating automatic referrals for necessary blood tests or chest x-rays. Moreover, digital triage systems have the capability to automatically direct patients to the appropriate healthcare professional based on their symptoms. For instance, if a patient's symptoms indicate a need for assessment by a physiotherapist or psychologist, they can be directly referred to the respective specialist

without the need to first contact other healthcare staff. This seamless coordination provided by digital triage enhances efficiency and ensures that patients receive timely and targeted care.

This highlights an additional advantage of digital triage - it seamlessly integrates the triage process into the overall healthcare experience for patients. In the case of manual telephone triage at a medical hotline, patients are asked questions that lead to an assessment and referral. However, after this interaction, the patient often needs to independently contact another healthcare facility. This introduces a potential gap where important information can be lost. In contrast, with digital triage, patients can seek care in one part of the healthcare system (such as a medical hotline or their health center) and seamlessly continue their care journey from the triage process. This can involve contact with their general practitioner, receiving self-care advice, or directly connecting with a specialist if necessary - all without even realizing that a triage has taken place.

## Digital triage has several limitations

Digital triage, like any technology, has several different limitations. Some patients cannot use digital systems. Patients may also have unique complaints that a general algorithm has difficulty dealing with. Digital triage also requires that both patients and healthcare professionals understand the reasoning behind the triage system, otherwise it can generate uncertainty and extra work rather than trust and time savings. Similarly, it is important that triage is integrated into the subsequent care process and that the triage is consistent between care units and care providers, to avoid duplicate work or that patients get referred back and forth.

Early studies on digital triage systems have raised concerns about their tendency to be overly cautious and refer too many patients to a higher level of urgency than needed.[18] The criticism is reasonable, but this caution is to be expected. If digital systems were not more careful and safer than manual assessments by healthcare professionals, the systems could not be introduced as they per definition would be unsafe. In addition, it is reasonable to have a certain margin of safety when introducing new processes. However, the most significant advantage of digital triage systems is the ability to continuously update and refine the

triage logic. This allows healthcare providers to actively control and adjust the level of caution, ensuring that it aligns with their reasonable standards. By regularly evaluating and improving the triage logic, healthcare providers can strike the right balance between caution and efficiency in digital triage systems.

Most medical innovations (ranging from new drugs to new surgical procedures) are not initially applicable to all patients and this is also true for digital triage. But if a digital triage system can improve quality, efficiency and patient safety for a majority of patients, it can free up time for those patients who can't use digital systems, thereby benefitting them as well.

# Summary

Digital triage represents a new paradigm in healthcare as it can enable continuous improvements in how patients are referred between different parts of the healthcare system. It can also relieve healthcare staff, enabling them to dedicate more time to patients. The collection of structured data is a new paradigm in being able to understand and improve triage systems, with automated referrals enabling better coordination in increasingly complex healthcare systems. Triage is highly contextual and will work differently in different settings, which is why it is important to research and evaluate multiple aspects of triage. Here too, digital triage opens up new possibilities, as much of the relevant data is easier to collect digitally than manually.

However, everything should not be digitized for everyone. Some patients will continue to call or physically visit their care facility to discuss their care needs – and must be given the opportunity to do so. Digitizing triage is a way for us to improve patient safety while freeing up more time for our most fragile patients, who need more time than we can often offer them today.

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[i] Estimation is based on that approximately 250 nurses working at the 1177 medical hotline in Stockholm (Pramsten) and that 1177 is estimated to need approximately 1200 nurses (Olsson)

[ii] Estimation is based on that there are approximately 1 200 health centers in Sweden (SKR) and that each health center has 1.5 - 2.5 nurses on average who triages by telephone.