

WAITING TIME FOR ASSISTANCE USING THE MACHESTER TRIAGE SYSTEM IN AN EMERGENCY HOSPITAL

TEMPOS DE ESPERA PARA ATENDIMENTO USANDO SISTEMA DE TRIAGEM DE MANCHESTER EM UM HOSPITAL DE URGÊNCIA

TIEMPO DE ESPERA USANDO EL SISTEMA DE TRIAJE MANCHESTER EN EL SERVICIO DE URGENCIAS DE UN HOSPITAL PÚBLICO

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Submitted on: 2016/06/09

Approved on: 2017/03/01

ABSTRACT

The Manchester Triage System (MTS) is used by emergency health services to determine patients' clinical priority, optimizing the waiting time for medical care. Studies that measure waiting times for medical care are scarce. Objective: To evaluate patients' waiting times in a public emergency hospital. Method: this is a descriptive study performed on medical records of 68.215 patients in a Brazilian emergency hospital during 2014. Data was collected from the hospital's electronic database. Descriptive statistical analysis was performed using the software SPSS and R. Results: The waiting time between registration at reception and the beginning of triage had a mean of 12:23 minutes. The mean of the waiting time between the beginning of triage and its end was 2:06 minutes. Only 32.3% of patients classified as orange were seen by a doctor within ten minutes of being triaged. The majority (58.2%) of patients classified as yellow received medical care within 60 minutes of being triaged. In general, patients waited for 52:03 minutes on average between their arrival at the hospital and the first medical care they received. Conclusion: The nurses are triaging patients within the MTS recommended time. Most patients classified as orange and 41.8% of those classified as yellow had waiting times to receive medical care longer than the MTS' recommendations. This shows the need to establish assistance flows to reduce waiting times and comply with MTS recommendations.

Keywords: Nursing; Emergency Medical Services; Triage.

How to cite this article:

Chianca TCM, Costa RM, Vidigal MV, Silva LCR, Diniz GA, Araújo JHV, Souza CC. Waiting time for assistance using the manchester triage system in an emergency hospital. REME – Rev Min Enferm. 2016[cited _____];20:e988. Available from: _____
DOI: 10.5935/1415-2762.20160058

RESUMO

O Sistema de Triage de Manchester (STM) é utilizado em serviços de urgência para determinar prioridade clínica de pacientes, otimizando o tempo de espera para atendimento médico. Estudos que mensurem diferentes tempos de espera para atendimento são escassos. **Objetivo:** avaliar tempos de espera para atendimento de pacientes em hospital público de urgência. **Método:** estudo descritivo realizado em hospital público de urgência brasileiro com população de 68.215 prontuários de pacientes atendidos em 2014. Os dados foram coletados por consulta em prontuário na base de dados eletrônica do hospital. Estatística descritiva foi usada para análise nos programas SPSS 21.0 e software R 3.2.1. **Resultados:** o tempo médio de espera entre o registro na porta de entrada e a classificação de risco foi de 12:23 minutos. O tempo médio geral entre início e fim da triagem foi de 2:06 minutos. Apenas 32,3% dos pacientes classificados como laranja foram atendidos pelo médico em até 10 minutos após a classificação. A maioria (58,2%) dos pacientes classificados como amarelo foi atendida pelo médico em até 60 minutos após a classificação. No geral, os pacientes esperaram, em média, 52:03 minutos entre a chegada ao hospital e o atendimento médico. **Conclusão:** o enfermeiro está classificando o paciente no tempo recomendado pelo STM. A maioria dos pacientes classificados como laranja e 41,8% dos classificados como amarelo aguardaram por atendimento médico em tempo superior ao recomendado pelo STM, indicando a necessidade de estabelecer fluxos assistenciais para minimizar tempos de espera e adequá-los ao recomendado pelo STM.

Palavras-chave: Enfermagem; Serviços Médicos de Emergência; Triage.

RESUMEN

El Sistema de Triage Manchester (STM) se utiliza en los servicios de urgencias hospitalarias para determinar la prioridad clínica del paciente, optimizando el tiempo de espera para la atención médica. Son escasos los estudios que miden el tiempo de espera. **Objetivo:** Evaluar el tiempo de espera de los pacientes en el servicio de urgencias de un hospital público. **Método:** Estudio descriptivo realizado en un hospital público brasileño con una población de 68.215 expedientes de pacientes atendidos en 2014. Los datos se recogieron por consulta en expedientes en la base de datos electrónica del hospital. El análisis estadístico descriptivo se realizó en los programas SPSS 21.0 con el software R 3.2.1. **Resultados:** El tiempo de espera entre la recepción y el comienzo del triaje fue de 12:23 minutos en promedio. La media del tiempo de espera entre el comienzo de triaje y el final fue de 2:06 minutos. Sólo 32,3% de los pacientes clasificados como anaranjado fueron atendidos por un médico hasta diez minutos después del triaje. La mayoría (58,2%) de los pacientes clasificados como amarillo recibió atención médica hasta 60 minutos después del triaje. En general, los pacientes esperaban en media 52:03 minutos entre su llegada al hospital y la atención médica. **Conclusión:** los enfermeros seleccionaron pacientes dentro del tiempo recomendado por el STM. La mayoría de los pacientes clasificados como anaranjado y 41,8% de los amarillo esperaron más que el tiempo recomendado por el STM. Esto demuestra la necesidad de establecer flujos de asistencia para reducir los tiempos de espera y cumplir las recomendaciones del STM.

Palabras clave: Enfermería; Servicios Médicos de Urgencia; Triage.

INTRODUCTION

The greater care demand than the capacity of the services to absorb them has meant that emergency and urgency care in Brazil has become a frequent target of criticism in the media in recent years, leading to the need to rethink strategies for services to the population and boosting the development of patient triage systems.^{1,2}

Triage or risk classification emerged as a strategy to optimize care and minimize damage to patients due to overcrowding of emergency and urgency health services.³ Triage is a clinical risk management system used to safely organize patient flow when the clinical needs exceed the capacity of the service to absorb the demand for care.⁴

Triage allows the patient to be directed to the area of treatment and/or medical specialist most appropriate to their demand, especially in places where any number of people with different needs can be present at the same time. The argument of reducing access time to definitive medical care improves the patient's chances of recovery has been the justification for the development and implementation of triage methods in health services.⁵

In Brazil, the Ministry of Health (MS) has sought to insert the risk classification not only as a method of organizing the entry in health institutions but also as a strategy to human-

ize the services provided by the Unified Health System.⁶ The State Department of Health of Minas Gerais decided to implement the Manchester Triage System (MTS) at the entrance to its health services to meet recommendation of the MS.⁶⁻⁸

MTS is a risk classification system for patients seeking emergency and urgency care services widely used in the European Union and other continents.^{3,9} This system offers standardization of triage based on patient classification in five categories, based on the appropriate time between triage and first contact with the medical professional.⁴ It is worth mentioning that the MTS does not aim to establish a medical diagnosis during the evaluation of the screening, but rather, based on the main complaint presented by the patient, to assess the need and the time-target to assist him.⁴

The MTS is composed of 52 flowcharts representing the main complaints of patients assisted in the emergency services. Each flowchart has discriminators, which are the signs and symptoms that should be investigated to assess the complaint. The presence of a discriminator or the inability to deny it determines the patient's level of priority. The priority levels established by MTS and the target time for medical care are: Level 1 – Red (emerging) – immediate medical care; Level 2 – orange (very urgent) – medical care for up to 10 minutes; Level 3 – Yel-

low (urgent) – medical care in up to 60 minutes; Level 4 – green (not very urgent) – medical care in up to 120 minutes; Level 5 – Blue (non-urgent) – medical care in up to 240 minutes.⁴

Studies have shown that MTS has good reliability and validity for the triage of patients in emergency and urgency services, although there are still sub-triage or super-triage episodes.^{2,3} Research in Brazil has revealed MTS as a good predictor of clinical outcomes of patients admitted to emergency and urgency services since patients develop different levels of severity among classification groups.^{7,8} When compared with a Brazilian institutional protocol, a study showed that MTS increased the priority level of patients, and this system is considered more inclusive.¹⁰

However, even with satisfactory results in validity and reliability, MTS does not seem to be able to ensure quality and efficiency in the emergency and urgency service.¹¹ The literature found that waiting times were better distributed in the levels of urgency after the implementation of MTS but without reduction the care time.¹¹ Research demonstrating the performance of MTS in the waiting time for care is scarce, mainly addressing the reality of Brazilian health services.

In this sense, this study aimed at evaluating the waiting times for patients in an emergency public hospital, concerning MTS. This investigation is justified since the service in the time determined by the MTS according to the level of risk is a crucial factor for patient safety to avoid undesired events as worsening of the clinical evolution of the patient due to delays in care and preventable deaths.

METHOD

This is a descriptive study carried out in the emergency room of a large hospital, reference for the assistance of clinical and traumatic emergencies of the city of Belo Horizonte, Minas Gerais, Brazil. The patient's registration is done by reception professionals as soon as the patient arrives at the hospital to organize the service. Then, the patient is sent to the triage rooms, where the evaluation and classification of risk are done by nurses, using the MTS as the directing protocol. At the end of the classification, patients are referred to the waiting areas for medical care, according to the level of clinical priority.

The study population consisted of the medical records of all the patients assisted in the emergency room of the hospital under study in 2014 and registered in the computerized database of the hospital (n=68,215 visits). The study included the medical records of patients who were registered in the electronic system at the hospital, who were triaged by MTS and who had the necessary data to calculate the different waiting times, objects of analysis of this study. The medical records that did not have triage data (n=17318) were excluded. The records of patients classified as "white," not corresponding to patients with acute aggrava-

tions, but to patients who seek the hospital for a return to medical consultation, performing exams and procedures previously scheduled, among other procedures (n=2904). Moreover, the records whose data failures prevented the calculation of study target waiting times (n=309). After the exclusions (n=20531 medical records), the final sample was 47,684 medical records.

The data were collected in November 2015 in the electronic database of the hospital and available to the researchers. The variables related to service times were measured in minutes, being: time 1 – waiting time between the registration at the reception and the beginning of the triage; Time 2 – time of the evaluation and classification of risk performed by the nurse; Time 3 – time between the end of the triage and the first medical record in the electronic system; Time 4 – waiting time between the registration at the reception and the first medical record in the electronic system. It should be noted that the calculation of times 3 and 4 was performed only for patients classified in levels 2 and 3 of MTS priority. The medical records of patients classified as level 1 were excluded since these patients receive immediate medical care in the emergency room according to the clinical protocol of the hospital. Patients classified at levels 4 and 5 were excluded because, at the time, following the care protocol, these patients were evaluated, classified according to the risk and referenced for care in other health services, because they were little urgent or non-urgent cases. Currently, all patients are evaluated by a physician before being referred to other health services. Thus, the sample of patients for the calculation of times 3 and 4 was 29,788 medical records.

Also, it is clarified that the time of the first medical record in the electronic system was considered the time of the medical care because the hospital uses the electronic medical record as a tool for management and care management. Therefore, any examination, medication or procedure can only be started when there is a doctor's prescription or record in the system. Then, for this study, it was considered that the patient received only any medical intervention when it was recorded in the electronic medical record.

Data were tabulated and treated in an Excel spreadsheet, version 2010, and analyzed in software R, version 3.2.1, and SPSS, version 21.0 by descriptive statistics with frequency distribution calculations and central tendency measures (mean and Median). Patient waiting times were calculated in minutes.

This study is linked to the research project "Reliability analysis of the Manchester protocol to determine the priority of patients in emergency services," approved by the Research Ethics Committee of the Federal University of Minas Gerais (CAAE: 35387414.9.0000.5149) and by the Teaching and Research Center of the hospital under study. Since this was a retrospective study, which used information available in the information system of the hospital under study, whose patients were from dif-

ferent locations and had already been discharged from the hospital, it was waived to obtain the Informed Consent Form.

RESULTS

Regarding the demographic characteristics of the patients, it was observed that most the visits corresponded to male individuals (54.14%). The mean age of the patients was 34.69 years old (standard deviation: 22.07 years old). Most of the visits (65.03%) were performed in the daytime, while 34.97% of them occurred during the nighttime period, between 7:00 p.m. and 7:00 p.m.

Table 1 shows the distribution of the patients' classification of the medical records analyzed according to the risk level of MTS.

Table 1 - Classification of patients according to MTS risk levels. Belo Horizonte, 2015

| Classification | N | % |
|----------------|-------|-------|
| Red | 232 | 0.49 |
| Orange | 8424 | 17.67 |
| Yellow | 23299 | 48.86 |
| Green | 15132 | 31.73 |
| Blue | 597 | 1.25 |
| Total | 47684 | 100 |

Source: study data.

The analysis of Table 1 infers that the largest portion of patients was classified in level 3 of MTS priority, represented by the yellow color and that demands medical care in up to 60 minutes. Only 0.49% of the patients presented applications classified as emergent, requiring immediate medical assistance.

Regarding the complaint presented by the patient at the moment of risk classification, 52.66% of the patients were classified using the flowcharts "problem in the limbs" (28.12%), "adult malaise" (10,27 %), "Big trauma" (7.53%), and "abdominal pain" (6.74%). The other 47.34% were classified using the "wound", "falls", "chest pain", "lower back pain", "headache", "irritable child",

"worried parents", "diarrhea", "traumatic brain injury", "dyspnea", "aggression", "convulsions", "urinary problems", "unconsciousness", "nasal problems", "local infections and abscesses", "overdose or poisoning", "sore throat", "Strange behavior", "abdominal pain in the child", "diabetes", "neck pain", among others.

The different wait times for assistance were evaluated. Table 2 shows the mean and median overall and each level of risk with the different evaluated times, in minutes.

The waiting time for the care between the registry at the reception and the beginning of the triage by the nurse (time 1) was 12:23 minutes on average (median: 6:36 minutes). The lower the clinical priority of the patient, the mean and median values were higher for the waiting times between the registration at the reception and the beginning of the triage by the nurse.

Time 2 represents the time spent by the nurse in the evaluation and classification of patients' risk. It can be noticed that, in general, the mean and median were approximately 2:00 minutes, and the lower the clinical priority of the patient, the greater the median time spent by the nurse in the evaluation and risk classification of the patients. Thus, it is stated that, in general, nurses meet the MTS recommended on time to be spent on the evaluation and classification of risk, ideally not exceeding three minutes.⁴

Time 3 represents the time between the end of the classification and the medical care, calculated only for the patients classified as orange and yellow, for reasons already elucidated previously. There were 32.3% of patients classified as orange seen by the physician within 10 minutes after classification, according to the MTS recommendation. There were 50% of the patients assisted in up to 16:00 minutes and 75% of patients within 30:00 minutes. For patients classified as yellow, 58.2% of them were assisted within 60 minutes after the risk classification, as established by MTS, and 75% of patients were assisted within 90 minutes.

Time 4 refers to the time (in minutes) between the arrival of the patient to the hospital and the medical care, and, in general, it was 52:03 minutes on average (median: 28:31 minutes). This time represents the waiting time of the patient from the registry in the reception to the medical care.

Table 2 - Average and median waiting times for care, in minutes. Belo Horizonte, 2015

| Risk level | Time 1 | | Time 2 | | Time 3 | | Time 4 | |
|------------|---------|--------|---------|--------|---------|--------|---------|--------|
| | Average | Median | Average | Median | Average | Median | Average | Median |
| General | 12:23 | 7:33 | 2:06 | 2:01 | 43:05 | 18:36 | 52:03 | 28:31 |
| Red | 6:36 | 3:18 | 1:36 | 1:13 | NA | NA | 37:40 | 26:60 |
| Orange | 8:34 | 3:93 | 2:29 | 1:46 | 26:09 | 16:00 | 36:36 | 24:46 |
| Yellow | 13:03 | 7:23 | 2:05 | 2:01 | 70:59 | 49:13 | 84:26 | 64:38 |
| Green | 14:16 | 9:21 | 2:16 | 2:17 | NA | NA | NA | NA |
| Blue | 15:03 | 8:10 | 3:19 | 2:23 | NA | NA | NA | NA |

*Note: NA = Does not apply. Source: study data.

DISCUSSION

Most of the patients in this study (54.14%) were male, with a mean age of 34.69 (+ 22.07 years old). This finding corroborates studies that evaluated the profile of patients assisted at emergency care units and found that most of the patients were male and between 30 and 50 years old.^{7,8,12} These findings may be explained by the fact that the hospital under study is a reference for the care of patients who are victims of trauma, mostly affecting males and young people. In Brazil, the most recent data on the causes of mortality reveal that mortality from external causes is the third cause of death in males and the main cause of death among people aged 15-49 years old.¹³

Most of the visits (65.03%) were performed during the daytime, while 34.97% of the visits took place during the night, between 7:00 p.m. and 7:00 p.m. Although it was not the focus of this study, a recent study found an association between the time of care and the level of risk of the patient, and the later the time of care, the higher the level of risk and the greater the severity of their clinical condition.¹⁴ These findings are important because they can contribute to the planning of care, with adequate allocation of human nursing resources, according to the demand for care presented by the patient. Currently, it has been discussed the need for triage systems to be predictors of patients' evolution in emergency services, as well as contributing to the creation of care flows that can optimize the time elapsed between identifying the need for care and the response required for this demand. In this sense, a conducted study showed that the higher the level of risk, the greater the number of hours of nursing committed to the care of the patient, and the average number of hours spent for patient care classified as red was 97:93 minutes, while for the blue patient was 23:18 minutes.¹⁵ Thus, knowing the profile of patients according to the level of risk in each work shift can contribute to the dimensioning of nursing staff in emergency services, aiming at the improvement of the care given.

In this study, 67.02% of the patients were classified as 1, 2 and 3 MTS priority. The highest proportion (48.86%) belonged to level 3 (yellow color), indicating that the hospital under study, most of the time performing emergency and urgency care, according to its purpose. Nevertheless, studies performed in Brazil and Portugal showed that the highest percentage of patients were classified in level 4 of priority (green color), followed by those classified in level 3 (yellow color).^{12,16} In Brazil, these findings have been related to a poor primary health care, together with the lack of knowledge of the population as to what service would be more appropriate to their health condition, emphasizing the need for clarification of the population about the hierarchy and the attribution of each unit that makes up the health care network of the emergency and urgency situations.^{12,14}

The "problem in the limbs" flowchart was the most used in the classification of patients in this study. Studies in Brazil have emphasized the "adult malaise" flowchart as the most used to guide the nurse's evaluation in the classification of risk.^{12,14} These differences are justified because the hospital under study is a reference for patients in the orthopedic clinics and traumatology, where the main complaint presented by patients is related to problems in the limbs.

Optimizing waiting time for medical care is the primary objective of MTS.⁵ The median waiting time between arrival at the emergency room and beginning of the triage (time 1) was 06:36 minutes (IQ 3.08-15.32). It should be noted that this is a reality of the Brazilian emergency services. According to the MTS, the patient should be screened immediately upon arrival at the emergency department.⁴ The MTS is known to have English origin and is currently used in different countries of the world. However, in European and English countries, when the patient enters an emergency service, he is directly assisted by a nurse, so there is no waiting between the arrival at the service and the beginning of the classification of risk.

In Brazil, there is a great demand for care that goes beyond the absorption capacity of the services. Although there are not studies that evaluate the staff of nurses in the classification of risk in emergency services, in the clinical practice, the number of rooms of classification of risk factors performed by nurses is insufficient to respond immediately to the demand of patients entering services, generating this unwanted waiting time between the arrival at the hospital and the beginning of the care. However, it is worth mentioning that, in clinical practice, the patient classified as red is referred directly to the emergency room, which has materials, medicines and care staff readily available for urgent care. Thus, time 1 data for these patients are not related to the absence of evaluation and medical care before the registration of medical care in the hospital databases.

The analysis of the time 2 infers that the nurses in average took 2:06 minutes to carry out the classification of risk, as recommended by the MTS. The evaluation in the risk classification is not intended to make a presumptive diagnosis and should be quick and focused on the main complaint presented by the patient. According to the MTS, the ideal evaluation time should not exceed 03:00 minutes.⁴

The analysis of Table 2 shows that for patients classified as orange and yellow, there were cases of patients who waited longer than recommended by MTS between the establishment of the priority level and the medical care. For patients classified as orange, only 32.3% received medical care within 10 minutes after classification, as recommended by the MTS. Moreover, for patients classified as yellow, 58.2% were assisted by the physician within 60 minutes, as established by the MTS.

Brazilian and international studies that have evaluated the adequacy of the times for medical care as recommended by MTS are unknown. However, the time spent in emergency departments has been evaluated. In this sense, research has shown that advanced age, need to be seen by more than one specialist and the use of radiological tests are associated with an increase in the patient's stay in the emergency department for more than four hours. Unlike patients classified as red who are directly assisted in the emergency room by a group of specialists and have diagnostic and therapeutic features readily available at the bedside, patients classified as orange and yellow are not readily assisted by specialists. Also, patients classified at these priority levels are often older and with other comorbidities, which increases the demand for consultation with other specialists and the performance of radiological tests, increasing the probability of these patients exceeding the time in the emergency department.¹⁷

Similarly, elderly patients classified at lower priority levels present longer waiting times, with the time of arrival at the hospital as the most powerful waiting time predictor.¹⁸ Other factors that may affect the waiting time for the triage are time taken by the nurse to drive patients to the treatment site, which leads them to be absent from the triage room and the classification of patients who are referred for care in the medical specialty sectors.¹⁹ Study focusing on the waiting time and interaction with patients from an emergency department in an underdeveloped country using a triage system showed the need to improve the time for triage and care by the physician since the patients' waiting time was not adequate for the protocol used in the institution.²⁰

Although not described in the MTS and being a peculiarity of the Brazilian services, time 4 was also the target of this study. As previously mentioned, this time is directly influenced by the time demanded between the arrival of the patient to the emergency service and the achievement of the risk classification. The difficulties of personnel, the structuring of a properly organized and hierarchical network of services according to the different levels of care complexity and the great demand for care in the emergency services, making them the gateway to health care, are barriers that complicate the classification of risk at the time the patient arrives at the emergency service in Brazil. This finding indicates that a triage system does not ensure the effectiveness of an emergency service, requiring it to be structured and organized, with established care flows to allow fast patient turnover.

It can be said that the Brazilian emergency and urgency network is complex, considering the nature of care to the individual in emergency and urgency situations and the diversity of components that structure it. Thus, one of the greatest challenges for its implementation lies in its ability to make its components work in harmony so that the product is an integrat-

ed and convergent performance, measured in improvements in the care and management processes. Therefore, there is also a need to integrate the three SUS management spheres, as well as the establishment of a regulatory policy, integration between communication and information systems, qualification of work processes, different points of care and, above all, the political, ethical and technical commitment of the managers and professionals who work at the front line.²¹

Given the above, measures need to be taken to minimize the time 1, which directly influences the patient's total waiting time between arrival to the emergency department and medical care. Efforts have been made to ensure that the Brazilian emergency and urgency network is effectively implemented. Regional action plans have been agreed between the federal, state and municipal governments, based on technical, epidemiological, demographic criteria and according to the needs of the population assigned to each territory. Resources have been made available for investment and costing of hospital entrance doors, increased cost and better articulation between emergency and urgency care points in the country, qualification of care and organization of priority care lines, increased cost for critical patient beds and clinical beds, the creation of long-term care units, the strengthening of basic care and the organization of home care.²² These measures are expected to result in improved care delivery and reduced waiting times for emergency services.

CONCLUSION

The profile of the patients assisted in the emergency department of the hospital under study is mostly male and of young age. Most of the patients were classified in levels 1, 2 and 3 priority, which corresponds to urgent care, in consonance with the purpose of the care of the hospital under study.

In general, the mean waiting time between the registry at the entrance door and the risk classification was 12:23 minutes, and the lower the patient's clinical risk, the longer the waiting time between the registration of the door and risk classification. The overall mean time between the beginning and the end of the triage was 2:06 minutes, that is, the nurses are classifying the patient within the time recommended by the MTS. Only 32.3% of patients classified as orange were assisted by the physician within 10 minutes after classification. Most of the patients (58.2%) classified as yellow were assisted by the physician within 60 minutes after classification. Overall, the patients waited on average 52:03 minutes between hospital arrival and medical care, showing that there are cases of patients classified as orange and yellow who wait for medical care in a time superior to that recommended by the MTS.

A limitation of the study was the non-monitoring of waiting times between the classification of risk and medical care

and between registration at the reception and medical care for patients classified at levels 4 and 5 of MTS, since at the time of data collection, these patients were counter referred to medical care in other care points of less complexity of the care network. Therefore, it is recommended to carry out new studies that evaluate waiting times for these MTS priority levels and their suitability for MTS.

Finally, the findings of this study reinforce that the implementation of a triage system does not ensure care at the appropriate times, according to the MTS recommendation, and it is necessary to create care and management flows beyond the risk classification that provides access to services, appropriate professionals and at appropriate times according to the patient's level of risk.

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