

Clinical Decision-Making in Emergency Medicine

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This review of the bases for decision making in emergency medicine argues that the process involves more than a simple an action-reaction sequence. Instead, decisions are governed by cognitive processes that favor the development of strategies and complex skills that enable the physician to act appropriately. Influential factors include physician-related attributes as well as emergency service- and patient-related ones. Two models of clinical reasoning are defined. In the first system, reasoning is instinctive, driven by pattern recognition. The ability to make decisions with this system is acquired over time, through experience. In the second system, decision making is systematic and analytical. More reliable than the first system, this second one is less prone to error, although it takes longer to learn and is more costly. The most effective way to cope with most clinical situations is usually to combine these 2 cognitive approaches. This review describes key aspects of decision making processes that aim to minimize the risk of making mistakes in emergency medical practice. [Emergencias 2010;22:56-60]

Key words: Emergency health services. Decision making. Cognitive processes.

Introducción

Emergency physicians (EP's) may be perceived as being action-driven, making time critical interventions to save patients' lives, but behind an EP's actions lie complex decision-making skills and strategies. Emergency Medicine (EM) requires that EP's are expert thinkers who deal with a broad range of presentations under significant time and resource constraints. EP's are often unaware of the cognitive processes that drive their decision-making¹. It has been suggested, however, that by developing greater awareness of their clinical decision-making strategies, termed "metacognition", EP's can improve their clinical effectiveness, reduce the risks to patients from poor decision-making and become better teachers of the craft of Emergency Medicine¹. This review outlines recent work by Croskerry¹⁻⁵ and other authors in this field⁶, such that EP's may be inspired to learn more about their decision-making skills. Croskerry challenges us to "think about our thinking"¹.

Firstly, consider the components of clinical decision-making⁷. Practitioner-related factors include the practitioner's knowledge, their cognitive processes and their metacognitive processes. The

practitioner's knowledge includes their speciality knowledge, which is largely based on research evidence and their clinical skills. The practitioner's broader "non-medical" knowledge and their experience of the world also contribute to the knowledge foundation on which their decision-making is based. Cognitive abilities vary between people. At any point in time, cognitive processes may be influenced by numerous factors such as emotion⁸, physiological states such as hunger, sleep deprivation, illness or by the environment in which they work⁹. Metacognition involves awareness of one's knowledge and decision-making, along with one's motives and resources, resource constraints and the ability to plan strategically on that knowledge. It is characteristic of expert practice¹⁰.

Many factors in the ED conspire to make it a challenging environment in which to make decisions, but decision-making is at the core of EM. ED's are often overcrowded¹¹ and noisy¹² and adverse working conditions have been associated with increased risk of medical error⁹. Often EP's have limited datasets on which to base urgent decisions and life-saving action. The breadth of case-mix of illness and injury seen in most ED's re-

quires that EP's develop decision-making skills across a broader spectrum of conditions than is necessary for other medical specialists. EP's may find themselves trying to work with numerous interruptions¹³ and more senior EP's often have to switch to making non-clinical and organisational management decisions (e.g. solving rostering crises) while trying to supervise junior staff or provide direct patient care. Responsible resource stewardship¹⁴ places limits on the time or resources that can be devoted to individual cases, such that all patients receive a basic level of care and the clinical safety of the overall ED population is maximised. It precludes the over-investigation of patients, thereby sparing scarce resources.

Clinical decision-making is influenced by patients and their interactions with their carers. Patient expectation, societal factors and healthcare resource availability¹⁴ may influence an EP's decision-making and both patient and carer are influenced by the healthcare environment in which they co-exist⁷. Components of clinical decision-making may change over time. EP's may need to adapt their decision-making approaches as medical knowledge, technologies and patient expectations evolve over time.

A detailed analysis of cognitive processes in EM is beyond the scope of this paper. Croskerry describes two major models of clinical reasoning², from Sloman¹⁵. "System 1" is instinctive and recognition primed. It is acquired largely through experience. "System 2" thinking is systematic and analytical. It is more reliable and less prone to error, although more time consuming and expensive than system 1. A combination of both systems of thinking is usually most effective in clinical situations².

It has been suggested that the ideal model for clinical decision making would involve classical Bayesian reasoning, with formal determination of the pre-test probability of a particular diagnosis and expert evaluation of the clinical evidence, followed by careful analysis of each step of the decision making process¹⁶. In reality, the need for expediency in the ED leads us to use decision-making short-cuts to provide emergency treatment and determine an appropriate patient management plan. Croskerry describes a number of decision-making strategies employed in the ED and explains the common errors associated with each approach³.

Pattern recognition is the decision-making strategy most commonly used by experienced EP's. Mental short cuts or rules of thumb termed heuristics are also frequently employed by EP's.

Heuristics relate to short cuts in thinking that an individual learns through experience. An experienced EP will avoid working through a lengthy differential diagnosis, but will focus on confirming the most likely diagnosis. When appropriately applied, heuristics enable practitioners to work in a highly effective and economical way. Heuristics can, however, increase the risk of error².

Less experienced practitioners may not see patterns in data or may not have developed useful heuristics. They may therefore engage in exhaustive testing for a large number of diagnostic possibilities. Exhaustive strategies demand greater resources, but may be appropriate for all clinicians to use, where an obscure diagnosis is considered. On the negative side, fatigue may drive an EP towards exhaustive diagnostic reasoning if they do not have the mental energy to engage in more efficient decision-making strategies⁶. Hypothetico-deductive reasoning involves generating diagnostic hypotheses to limit the number of differential diagnoses to consider. This method reduces the number of tests needed to establish a working diagnosis. The quality of the diagnostic hypotheses generated may again relate to the experience of the clinician⁶.

In the algorithmic method, algorithms or flow charts are used to simplify the decision-making process into a series of steps. One example of this is the series of advanced life support algorithms. Although this method may be less intellectually challenging, it has the advantage of minimising delay when rapid life-saving decisions need to be made. However, it is important that EP's familiarise themselves with the scientific basis of these treatment protocols to ensure that they keep an open mind regarding possible alternative diagnoses or treatment options⁶.

Given the time constraints particular to EM, clinical investigations for hypothesis testing are only useful if the results are available in a realistic time frame. In practice, a trial of Naloxone administration and/or bedside urine testing are more useful to the EP in the initial management of a patient with symptoms of severe opiate intoxication, than laboratory-based tests for drugs of abuse would be. This type of EM decision-making, based on initial treatment followed by re-evaluation in the light of their response to this treatment is described as "event driven" decision-making⁶. It closely mirrors the ED environment.

For conditions where the risk of failure to diagnose carries severe consequences for the patient, EPs use a "rule out worst case scenario" strategy⁶. Ruling out subarachnoid haemorrhage in a patient

with headache is one such example. The importance of not missing these life-threatening conditions justifies the increased use of resources which this process requires. However adopting a rule-out worst case scenarios for all cases, irrespective of the true risks, could result in over-investigation of patients and reduce the efficiency and clinical effectiveness in the ED.

Human reasoning is error prone. Our cognitive abilities have evolved for life in the wider world and are based upon plausible rather than purely logical thinking. Working in EM requires us to adapt our imperfect cognitive processes to solve clinical problems. It is therefore understandable that we are prone to errors, which on retrospective analysis may seem obvious and avoidable. Our reasoning strategies are subject to biases or forces which may negatively or positively affecting our thinking. Hopefully, through developing metacognition in relation to some of these biases also, we may minimise our risks of succumbing to error. Fatigue, illness, substance abuse and emotional distress can all adversely affect performance¹⁷. EP's need to be aware that experiencing difficulty in decision making can be a key symptom of "burn-out" and to watch for this problem in themselves and their colleagues. We can all be influenced by personal factors when it comes to decision-making. Affective errors in decision-making can arise when emotional variables enter into a EP's judgement. They result from a complex interplay of emotions and cognition. The other side of all errors is the effect they have on the affective state of those who mediated them⁷.

Negative biases are endemic in EM. The EP's initial approach to a patient may be influenced by their triage category (perhaps relying unduly on the triage nurse's decision-making skills), a nurse's informal comments or the acuity level of the cubicle to which the patient is assigned. It may be easier for the EP to formulate a management plan for the patient who they instinctively like and who presents a textbook clinical history than for the patient with learning difficulties or psychiatric illness who cannot communicate their symptoms. Doctors must be aware that a patient's failure to provide a textbook standard history does not reduce the clinical likelihood of a particular disease!

Croskerry has listed numerous cognitive errors that occur in the clinical decision-making process³. The reader is encouraged to be pragmatic if reviewing his entire list and to remember that errors occur in the minority of cases man-

aged in the ED. Among the common errors we can make in our diagnostic thinking is premature closure. This refers to making a diagnosis without considering appropriate alternatives, for example deciding that chest pain is due to acute coronary syndrome and failing to adequately exclude the possibility of aortic dissection. Search satisfying, similarly, refers to failing search for a second diagnosis, when we have found a first, e.g. failing to see a second fracture on an X-ray. "Sutton's slip" refers to the error of only considering the obvious. Confirmation bias involves paying excessive attention to data which confirms our preferred diagnosis while ignoring data which refutes it. Diagnosis momentum may occur when an unverified diagnosis is passed from person to person or even from clinician to clinician. Inexperienced clinicians may fall victim to base rate neglect, which involves not adequately considering the prevalence of a particular disease. Availability bias refers to diagnosing what most commonly comes to mind. "Zebra retreat" describes a scenario where one fails to make an unusual diagnosis. The analogy describes seeing a zebra but believing it is a horse, because horses are more common. Reasons why this may happen include physician fatigue, fear of seeming unrealistic or wasting resources or having little confidence in one's own clinical judgement.

As EM educators we need to create an environment which supports EP's in clinical decision-making, maximises positive biases and minimises the risk of error. We should advocate for optimal working conditions with minimisation of avoidable distractions. The use of algorithms, evidenced based care pathways and clinical guidelines may reduce bias at a departmental level. Such materials can protect against error by reducing reliance on memory, directing the appropriate use of clinical investigation and reducing inter-operator variability in patient management¹⁸. Care pathways should be designed for the ED to accommodate the undifferentiated nature of initial EM presentations. They should also reflect the availability of diagnostic resources in the hospital. Handover sessions at change of shift allow group discussions of clinical decision making in sentinel cases¹⁹. It would be impractical to engage in reflective practice continuously across one's entire ED shift, but consciously reviewing one's decision-making processes in challenging clinical cases is likely to bring benefits to the patient and practitioner. Obtaining and providing feedback on our decision-making is key to developing and maintaining compe-

tence in this field⁵. It allows one to calibrate one's risk assessment and strengthen confidence by reinforcing good practice.

Problem based learning and new techniques in medical education, such as simulation, offer increased opportunities to teach the skills of decision making. Counselling and mentoring can help identifying personality types that are more prone to error, such as overzealous risk takers or overly timid noninterventionalists¹⁷. Trainers should not expect trainees to learn decision-making by simply "doing what I do", but rather they should disclose their own decision-making strategies such that trainees can examine and challenge their reasoning. It is important not to train future EPs to perpetuate one's decision-making blind spots but to encourage constant improvement in EM clinical decision-making. EP's and trainees should be encouraged to develop their metacognition skills, explore decision-making resources⁶ and include clinical decision-making in their future professional development. We are encouraged to become "skilled companions" to ourselves and our junior colleagues as we continuously improve the quality of our decision-making skills.

Thinking about our thinking is only worthwhile if it results in better outcomes for patients. Albert Ellis, an American psychotherapist, is quoted as saying that if the Martians ever get down to Earth and find out how human beings think, "they'll die laughing"²⁰. Although, it may be true that humans think in ridiculous ways, EP's can only do their best to apply their limited cognitive and metacognitive skills to the many clinical and diagnostic challenges they face. Hopefully those Martians will leave before they need resuscitation!

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Toma de decisiones clínicas en Medicina de Urgencias y Emergencias

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Se revisan los mecanismos en los que se basa la toma de decisiones en Medicina de Urgencias y Emergencias. Esta toma de decisiones, lejos de basarse en el principio de acción-reacción, se rige por procesos cognitivos que desarrollan estrategias y habilidades complejas y que permiten su ejecución correcta. En estos procesos cognitivos influyen factores relacionados con el profesional, con el propio servicio de urgencias y con los pacientes. Como resultado, se definen dos modelos generales de razonamiento clínico. El "sistema 1" es instintivo y alimentado por el reconocimiento. Se adquiere con el tiempo a través de la experiencia. El "sistema 2" es sistemático y analítico. Es más fiable que el primero y menos propenso al error, aunque más largo en el tiempo de aprender y más caro. La combinación de ambos sistemas de pensamiento es usualmente lo más efectivo para afrontar la mayoría de las situaciones clínicas. A lo largo de este artículo se describen los aspectos clave en la toma de decisiones, cuyo objetivo último es minimizar el riesgo de error en la práctica de la Medicina de Urgencias. [Emergencias 2010;22:56-60]

Palabras clave: Medicina de Urgencias y Emergencias. Toma de decisiones. Procesos cognitivos.