**Chapter 9   
The challenge of the undifferentiated patient**

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**Introduction: the call-taking process**

When a patient calls 9-1-1 and speaks with a medical communications officer, the complex process of provision of care has been initiated. This first point of medical contact, the interaction between the patient and communication officer, can influence every subsequent experience of the patient during his or her prehospital and even in-hospital care. Consequently, it is essential for the communication officer to initiate and optimize the patient for the subsequent paramedic–patient contact; the paramedic in turn optimizes the patient for contact with the local emergency department (ED) or other destination.

Although many consider that the 9-1-1 medical communications center is involved only in resource allocation such as dispatching ambulances, it also has a pivotal role in the provision of patient care [1]. The accurate identification of the chief complaint by the communications officer serves as an adjunct to the field personnel by allowing them to incrementally build on the dispatch “diagnosis” and initiate the appropriate therapy. If the communications officer incorrectly identifies the chief complaint, this may result in ineffective or inappropriate prehospital therapies, and even worse, it may introduce systematic biases that affect provision of patient care from the paramedic–patient contact onward [2,3]. (For simplicity, the term *paramedic* will be used in this chapter, though the principles apply to all provider types including EMS physicians.)

For example, during the initial steps in the communicator–patient interview, if the chief complaint includes scene safety (e.g. drowning or electrocution case), the dispatcher decides on the protocol that best addresses the issues [3,4]. If the chief complaint involves trauma, then the dispatcher decides on the protocol that best addresses the mechanism of injury (e.g. fall, traffic accident). When the chief complaint appears to be medical in nature, the dispatcher chooses the protocol that best fits the patient’s foremost symptom, with the priority symptoms taking precedence. Regardless of which call is assessed, the subsequent dispatch information can influence the thought processes of the responding paramedics and potentially influence how the paramedics approach the patient [5]. For example, in the case of drowning or electrocution calls, the paramedics are preparing themselves for this type of call, essentially reviewing in their minds the protocols and procedures to use when approaching the patient. For all calls, the EMS personnel consider their previous experiences to determine how to proceed with the call when they initiate their own first medical contact.

**En route to the patient**

Just as emergency physicians do when they pick up a medical chart, view the chief complaint, and begin their approach to the patient with some element of preconceived notions based on the recorded chief complaint, so do field personnel when they are approaching the patient after being dispatched with some form of dispatch code. This can be beneficial to the paramedic in that it may immediately confer some sense that the patient has no high-priority symptoms, thereby requiring the paramedic to delve further into the reason for the EMS call. It can also be detrimental for the paramedic, in that it may mislead him or her into assuming that no priority symptoms are present when in reality one or more may be present. It may also be detrimental for the patient because it may mislead the paramedic into minimizing and/or underestimating the patient’s symptoms, which could result in inaccurate or ineffective use of protocols. This may also pose an increased risk to the patient if the paramedic has a negative interaction with the patient, leading to mistrust, and in some cases, no transport to hospital [5].

Emergency medical services personnel must compile a massive amount of information in a relatively short period of time. They must incorporate this information with their prehospital clinical skills and baseline knowledge in their clinical decision making, which is necessary to diagnose and treat patients effectively. Similar to emergency physicians, paramedics have become very fast in their decision-making processes, using strategies of both efficiency and thoroughness. Paramedics have also developed certain rules of thumb, shortcuts, and abbreviated thinking to make fast, efficient, and accurate decisions, or what clinical decision experts term *heuristics*[6]. Various ethnographic and descriptive studies exploring medical errors, adverse events, and near misses in EMS have shown that paramedic decision making is a predominant factor influencing patient safety in EMS [7,8].

When paramedics are interacting with a patient, there is clinical reasoning related to both the line of medical inquiry, such as the history, physical examination, and diagnostic tests, and the clinical decision making (i.e. the cognitive process of using data to evaluate, diagnose, and treat the patient) [9]. Clinical reasoning is a tremendously complex process and is under intense ongoing investigation. There is no single model of clinical decision making that adequately relates to the very complex environment that exists in the emergency setting. Rather, there are several models or strategies that individuals use in clinical decision making or cognitive performance including:

* pattern recognition or skill based (e.g. making a diagnosis immediately on entering the room, which is frequently unconscious, automatic, and based on years of experience)
* rule based (e.g. Advanced Cardiac Life Support algorithms)
* hypothetical deductive or knowledge based (considered the highest level of deduction; a clinician generates a hypothesis and uses existing and new knowledge to find an answer) [6,10].

Some experts describe a fourth model of a naturalistic or event-driven process of decision making (i.e. treating the patient first and then making the diagnosis) [6]. Interestingly, how and where paramedics make decisions and the density of decision making of paramedics in the patient journey are postulated to differ from those of other health care providers, and are under ongoing research [11].

**History taking**

It is essential that regardless of the dispatch determinant, the EMS crew approaches each patient in the same manner [2,5]. Field personnel should acquire a history in an unbiased manner by using effective communication strategies. A balance of both subjective and open-ended questions (e.g. Can you describe your pain for me?) and objective and close-ended questions (e.g. Is the pain sharp?) should be used. In fact, throughout all disciplines of health care, traditional dictums state that effective history taking can lead to an accurate diagnosis in the majority of cases.

Three possible outcomes can result from the history taking from a patient dispatched with an undifferentiated dispatch code. First, the paramedic may identify a prehospital diagnosis related to one of the 27 chief complaint conditions listed amongst the non-priority symptoms in the Medical Priority Dispatch System algorithms [4]. It is important that the paramedic does not trivialize the patient’s needs in the absence of priority symptoms, as each patient defines his or her own emergency. Second, the paramedic may establish a prehospital diagnosis that is accurate but not one of the 27 chief complaint conditions. In these situations, the crew members must coordinate their prehospital care knowledge to effectively care for the patient's needs. Third, perhaps the most frustrating for the crew, the paramedics may be unable to identify the specific chief complaint. This last outcome may be the first indication that the patient truly has an undifferentiated condition. At this point, it is important for the crew members to truly optimize the provider–patient interaction, while minimizing the time to treatment and time to transport.

The following strategies can be used to improve diagnostic accuracy during the history taking [6,10].

* Collect information to confirm or exclude life-threatening conditions first, then focus on the most likely diagnosis.
* Reaffirm that there are no high-priority symptoms present that could be affecting the patient’s ability to render accurate answers, such as hypoglycemia or receptive and expressive aphasia with stroke.
* Ensure that the patient is oriented to person, place, and time, and that there is no underlying cognitive impairment due to drug ingestion, delirium, dementia, etc.
* When feasible, sit at the patient’s bedside to collect a thorough history.
* Use adjuncts to facilitate the history taking (e.g. drawing diagrams or using other visual aids).
* Optimize communications so that the patient clearly understands the language and questions (e.g. asking simple questions).
* Obtain collateral information from the next of kin, friends, or bystanders.
* Allow a few moments of uninterrupted time to mentally process each patient.
* Generate “most life-threatening” and “most likely” diagnostic hypotheses.
* Mentally process one patient at a time.
* Avoid decision making when overly stressed or angry; take time out, regroup, and reevaluate the decision.
* Move on to physical examination to augment the history that has been elicited.

**Physical examination**

Sir William Osler taught that what was not found in a history was aided by completing an appropriate physical examination, and specifically that the history provided 90% of the diagnosis, that physical examination provided 9%, and that diagnostic tests contributed the remaining 1% of diagnostic certainty.

In the situation of the patient who remains undifferentiated despite optimizing the history, it is paramount that the paramedic perform a thorough and complete physical examination [5]. This begins with ensuring that a complete set of vital signs is taken and recorded. The following strategies can be used to improve the diagnostic accuracy during the physical examination process [5,6,10].

* Ensure a complete and uninterrupted physical examination or secondary survey.
* Clarify the history while conducting the physical examination.
* Perform an environmental scan of the patient’s physical surroundings to complement the history (e.g. general surroundings, state of disarray, etc.).
* Have a structured and simple differential diagnosis or impression, based on the presenting history and physical information currently available (e.g. an altered level of consciousness can be broken down into structural, metabolic, and toxicological etiologies).

**Adjuncts to the history and physical examination: prehospital diagnostic tests**

In the case of the diagnostically undifferentiated patient, paramedics should use appropriate prehospital diagnostic tests to facilitate the working diagnosis. This would include such tests as the fingerstick glucose assessment and a prehospital 12-lead ECG. The following strategies can also be used to improve the clinical decision making for use of diagnostic tests [6,10].

* Employ any readily available decision-making algorithms or decision rules. A classic example is the Ottawa Ankle Rules that help emergency physicians in deciding on ordering ankle x-rays for injured patients. Although there are very few clinical guidelines in practice for the out-of-hospital setting, with the increasing body of evidence, these will increase in the future.
* Use existing prehospital protocols for specific therapeutic decisions whenever possible.
* Use only those tests that will affect the disposition or treatment of the patient by confirming or excluding the disease hypothesis at hand.

**The truly undifferentiated patient**

The patient who remains truly undifferentiated after the aforementioned maneuvers requires the same degree and level of care as those patients who have clear prehospital diagnoses. To further facilitate the care of the patient, it is important to advocate for the patient and relay the paramedic’s concerns to the receiving facility. The hospital in turn can then continue to optimize the patient interaction to identify and meet patient needs.

**Transition of care to the receiving facility**

Just as the transition of care from the dispatcher to the paramedic occurs, there is also a transition of care between the paramedic and the hospital ED. It is of tremendous importance that this hand-off process maintains and facilitates the continuity of patient care and does not jeopardize patient safety. Many if not all EDs experience the difficult situation of ED overcrowding and long turnaround times for EMS staff. When a paramedic crew brings in a patient with no priority symptoms and no identifiable chief complaint, this may lead to confrontation between the charge nurse or physician and the paramedics. Moreover, this may lead to the receiving ED triaging the patient to the waiting room or to a lower triage score than is actually required. If the patient is truly deemed to be undifferentiated, then the paramedic must clearly state this to the receiving ED and elaborate on what has been done to optimize the history and physical exam, and provide insight and recommendations for next steps.

**Consequences of an undifferentiated patient**

There may be absolutely no significant consequences to either the patient or the EMS crew when the patient is undifferentiated. The patient may have an uneventful transport and ED stay. The main frustration is that both the paramedic crew and the patient are left with perhaps an unsatisfactory health care transaction. However, it is also possible that these patients may be subject to increased medical error and potentially compromised patient safety due to undifferentiated diagnoses.

Error in all aspects of medicine has become an international issue with recent publications of the Institute of Medicine report *To Err is Human*[12], and several large retrospective studies (the Harvard Medical Practice Study [13], the Colorado-Utah Study [14], and the Quality in Australian Healthcare study [15]). In the Institute of Medicine report, error is defined as the “failure of a planned action to be completed as intended or the use of a wrong plan to achieve an aim [12].” All these retrospective studies, which evaluated patients admitted from the ED, found surprisingly high rates of medical errors, many of them originating in the ED, and most of them preventable. There have been no large prospective studies describing error in the ED or the prehospital environment. Also there have been no reported associations between undifferentiated patients and the risk of medical error.

There are several ways of classifying clinical errors, which in turn provide a means of reducing or preventing these errors [6,10]. A common way is to have errors classified based on the models of cognitive performance or clinical decision making: skill-based errors (generally known as slips, or a failure in the execution of an action sequence, and lapses, or a failure of execution when the action was not the intended action), rule-based errors (mistakes such as the wrong rule is chosen due to misperception of situation or misapplication of rule), and knowledge-based errors (mistakes such as the lack or misapplication of knowledge or misinterpretation of knowledge) [10]. An alternative approach is to categorize errors into procedural errors (i.e. IV starts, intubations, and such), cognitive errors (any error in the course of diagnosis, management, and disposition of patients), and affective errors (emotional state of the medic unduly influences the clinical decision-making process) [10].

An alternative method of categorizing error is to overlay it on top of the clinical decision sequence of events that occurs when a patient is seen. For example, the progress of a patient through the ED or the ambulance is driven by multiple decisions underlying the sequence of patient assessment, diagnosis, treatment, and disposition. Many experts feel that the largest weighing or pivotal feature in this sequence is the diagnosis and its associate clinical decision making. There are three commonly described sources of diagnostic error: no-fault, system, and cognitive errors. No-fault errors can be related to a variety of factors focused mainly on the patient. This would include situations in which the history is atypical or undifferentiated; patients who are confusing, inaccurate, uncooperative, or non-compliant; and patients who misrepresent their conditions. System diagnostic errors result from a large variety of error-producing conditions (multiple interruptions, stress loads, busy shifts, etc.), equipment failure, and organizational failures. Cognitive diagnostic errors, as the preceding discussion reflects, are any of the errors related to line of medical inquiry.

Diagnostic error, such as misdiagnosis, can thus result in an incorrect choice of therapy, failure to use an indicated diagnostic test, misinterpretation of test results, and failure to act on abnormal results, which in turn may lead to patient harm in the form of incorrect treatment protocols, incorrect destination choices, and risks of no transfer.

**Strategies for minimizing errors in clinical reasoning**

Paramedics can limit errors in their clinical reasoning by recognizing the potential biases that may be present and incorporating certain strategies or heuristics. The science and evidence around heuristics, clinical decision making, and reasoning are in relative infancy and require prehospital care providers to extrapolate from the current and evolving evidence regarding the heuristics of decision making in medicine and emergency medicine. These may include the following [6].

* Many experts will avoid using a previous diagnosis to influence their diagnosis – perform your own history, conduct a physical exam, employ strategic diagnostic tests, and with your clinical knowledge formulate your own diagnosis and management plan.
* Minimize the influence of personal or external biases (e.g. an overzealous partner or other health care provider) on your clinical decision making.
* Check for critical items in the past medical history and/or risk factors for serious disease.
* Pay particular attention to the vital signs of the patient.
* Avoid premature closure if the diagnosis is uncertain or undifferentiated.
* Be careful of high-risk environments and times, such as high-volume and high-acuity times of day, and personal and emotional fatigue.
* Be careful of high-risk patients – refusal of care, abusive/hostile/violent patients, confrontational and annoying patients, and those with drug etiology or psychiatric disease.
* Be careful of situations in which the presumptive diagnosis does not match the history, physical exam, or diagnostic test results. Go back to your assessment of the patient and reformulate a working plan.

**Conclusion**

Although some may consider the undifferentiated patient a difficult or frustrating patient to manage in the prehospital setting, others may consider that they are a complex yet challenging patient population to manage. It is paramount that paramedics recognize the importance of clinical reasoning related to both the line of medical inquiry, such as conducting an effective and efficient history, physical examination, and diagnostic testing, and tempering this with their clinical decision making (i.e. the cognitive process of using data to evaluate, diagnose, and treat the patient). Because there is no single model of clinical decision making that adequately relates to the very complex environment that exists in the ED or the out-of-hospital environment, paramedics must be familiar with the various ways in which they can cognitively evaluate, diagnose, and treat the patient. By recognizing effective strategies to optimize collecting a history, conducting a physical exam, and using diagnostic tests, they will reduce and prevent medical error, leading to improved patient safety.