

# Interruptions in Emergency Medicine: Is there More than Meets the Eye?

Lateef Fatimah

Senior Consultant, Dept of Emergency Medicine, Singapore General Hospital, Professor, Duke NUS Graduate Medical School, Professor, Yong Loo Lin School of Medicine, National University of Singapore Board and Founding Member, World Academic Council in Emergency Medicine (WACEM).

*fatimah.abd.lateef@singhealth.com.sg*

**\*Corresponding Author:** Lateef Fatimah, Professor, Yong Loo Lin School of Medicine, National University of Singapore.

## Abstract

*Interruptions (in the context of this paper) refer to any external event or person that disrupts any tasks or work process of an Emergency Physician (EP), thus requiring a redirection of the focus away from the current or primary task that is being performed. Interruptions can be viewed as breaks in the action that introduces new tasks on top of an ongoing one, often unexpectedly.*

*Distraction on the other hand, refers to what attracts the eyes, the mind and the ears. Attention is then diverted and directed to a different object, person or situation. It is challenging to eliminate distractions completely, knowing the kind of environment we live and work in today. This is especially true in the Emergency Department.*

*This paper will present a discussion from an EP's perspective. What are the current understanding and postulations on interruptions? What does the latest in Interruption Science suggest and what strategies are available to handle and manage interruptions?*

*In the end, there are many variables when considering interruptions, thus making the outcomes and results not uniformly predictable. The end game will be to get a better handling of these interruptions which happens in one's work or environment and come up with appropriate and practical, management and coping strategies.*

**Keywords:** interruptions, distractions, emergency medicine, healthcare, interruption science.

## INTRODUCTION

Consider the following.....

Your shift starts at 0800 hours. As the attending emergency physician on morning shift, you log in to the computer to assess how many patients have been registered to be seen. There are 5 who had registered within the last 30 minutes. As you start to review the first patient, a nurse from the Triage area comes in with a 12-lead electrocardiogram (ECG) to consult you. This was for a patient with chest pain. You review the ECG and provide her the appropriate advice. Thereafter you return to your list of patients, only to be approached next by your second year resident to discuss a patient, with abdominal pain, she had just seen. You decided you would have to go over to review

this patient personally, but the nurse said there was an urgent phone-call for you to take from another hospital, pertaining to a transfer patient. You accepted the transfer patient, and proceeded to review your resident's patient with abdominal pain. Halfway through the examination, the 'standby' alert sounded, indicating an EMS (emergency medical services) transfer of a critical patient. This time, it was a cardiac arrest and the ETA (estimated time to arrival) was 3 minutes. You rushed to the resuscitation room to ensure the team of resident, nurses and equipment were all ready. You gave the team instructions and whilst they await the arrival of the cardiac arrest patient, you were asked to order a pain medication for a young man who was in for a fracture of the forearm. The number of tasks go on and on.....

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This list of things to do, patients to see, correspondences to take etc. went on for the full 8 hours you are on shift in the emergency department (ED).

It represents almost a typical day for an emergency physician (EP): hectic, fast-paced, quick decisions on one's feet, handling life and death situations and the need to have top-notch verbal and non-verbal communication skills, in order to handle it all. The tasks are numerous and of great variety, each to be executed with professionalism, focus and confidence. The issues facing an EP can be tangential, but each requires the utmost level of timely attention.(1-5)

For 2 weeks, I personally calculated the number of interruptions I encountered during my shifts in the ED. I consciously put a strike down on record for every interruption I encountered. It turned out, I experienced between 12-16 interruptions per hour, across all areas of the ED. As I was engaged in a variety of different back to back, activities and tasks, many of the interruptions came in the midst of one of these tasks, before I had reached completion of the original task being performed. Some examples of these include computer-based tasks, skills-based tasks, telephonic communications, instruction of others, supervision of residents and other staff, review of patients, talking to patients and performing procedures myself, not forgetting, proper documentation, handling emails and even other personal matters which may crop up during work.(2,4)The number may not seem very different from that reported by Gore DC et al, where it was noted that there was greater than 1 interruptions per minute in the trauma operating room setting.(3). Similar observations have also been made by other authors, both in the ED and operating theatre settings. (4, 6-11)

The tasks that an EP has to perform can be categorized as: (4, 5,7, 8)

- a. Decision making tasks: example would be treatment options for each patient that has to be customized and personalized
- b. Problem solving tasks: working up a new patient with undifferentiated complaints such as shortness of breath or chest pain
- c. Procedure- or skills-based tasks

The Emergency Department (ED) is packed with disruptions and interruptions, thus, the mental model and approach to work for an Emergency Physician (EP) is different from that of many other specialists.

The range of skills, capabilities and demands spans a variety of domains. The interruptions too are many and varied. The demands are high; the expectations, even higher... and the stakes are always high when dealing with human lives and acute diseases. It may not be feasible or possible to prevent interruptions completely, but to learn how best to manage them. Interruption is pervasive and almost universal in clinical practice.(2,4, 11-14)

The fundamental need to look at interruptions in healthcare stems from the fact that there is more and more potential link between it and the genesis of clinical errors and patient safety issues. (1,9-13)Also, as interruptions happen ever so frequently in many environments, it becomes almost routine or second nature that we may not even realize it. Interruptions may appear small or insignificant at the individual level, but when collated together, the sheer numbers can turn out to be a significant or even a very costly issue. This, I would term as the intangible cost of interruptions.

### THE CHALLENGES OF INTERRUPTIONS

Interruptions refer to an external event or person that disrupts any tasks or work process of an EP (in the context of this paper), thus requiring a redirection of the focus away from the current or primary task that is being performed. Interruptions can be viewed as breaks in the action that introduces new tasks on top of an ongoing one, often unexpectedly. Some authors differentiate internal and external interruptions. Internal interruptions are related to internal decisions to stop an ongoing task in order to attend to another one, due to personal thought processes or choices (10, 13-15).

Distraction on the other hand, refers to what attracts the eyes, the mind and the ears. The attention is then diverted and directed to a different object, person or situation. It is challenging to eliminate distractions completely, knowing the kind of environment we live and work in today. (1,13)

If you work in an environment where there are other people around, there is bound to be interruptions. Some of these are necessary and unavoidable. These may include those that require your attention, expertise and decisions such as in making timely treatment plans or even resuscitation. Others may be less critical, non-urgent or even unnecessary. Not all interruptions are bad or negative. Some interruptions

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are essential to patient care processes and may even be helpful to healthcare professionals with the relevant information.(1,13-17). Interruption is very often linked to a higher perceived workload and it is seen to cut into our “time budget”.Is this perception valid, or could it be that with higher workloads, the situation itself attracts more interruptions? Whatever it turns out to be, we can clearly say that the effects of interruptions are context specific. (18-20)

Interruptions in healthcare can have a variety of consequences on human cognition such as increase in diagnostic errors, patient safety lapses as well as increased stress levels. There can also be a reduction in diagnostic accuracy, work accuracy, precision in the work as well as productivity. Interruptions can also appear as time-wasters. Being in a busy and hectic work environment can also result in more visual and auditory interruptions. All these interruptions can potentially result in psychological distress, reduction in morale, motivation and even fatigue. These are some of the possible and potential negative effects. (1,12,13,20)

Having said that it is still not easy to show the direct causal links between interruptions and all these negative events and effects. There are, however, increasing numbers of such observations, case reports and anecdotal incidents in the literature today. As interruptions are multi-dimensional in nature, there are often too many variables to consider.

Some of these would include: (1,6,16-22)

- What is the primary task; is it high demand or low demand; is it high stakes or low stakes
- What is the type of interruption and its nature
- At which point of the primary task is the interruption happening
- How long is the lapse in time between stopping the primary task and resuming it ( after completion of the interruption)
- How similar or different is the nature of the interruption from the original primary task that is being performed
- Are both tasks (the primary task and the interruption) skills- based or decision making (cognitive) type of tasks

Some studies have commented that an interruption that is similar to the primary task is more likely to disrupt task performance than a dissimilar

interruption, resulting in poorer memory, reduced task efficiency and spatial memory, upon task resumption. Interruption similarity is important in the clinical environment. For example, when a nurse who is documenting a task for Patient Number 2 is interrupted to document a task for Patient Number 1, whom she had seen earlier, Patient Number 2’s information may be affected by Patient Number 1’s information, or vice versa. She may even document or put in the wrong entry, if the two patients’ information gets mixed up. (23-28) Moreover, interruption occurring during execution of a task have been consistently shown to be more disruptive than those occurring in between tasks.(23-25) Interruptions can add further risks if it occurs when a healthcare staff is in the process of preparing infusions, injections, chemotherapy drug dilution and even when drawing injections.(12,13,17) One other way to look at this is utilizing the Multiple Resource Theory, which refers to the basic tenet that when two tasks compete for the same processing resource, within any task dimensions, performance is likely to be hampered. (20)

## INTERRUPTION MANAGEMENT STRATEGIES

When interrupted an EP can respond in a few possible ways: (28,29)

1. To tend to the new task (the interruption) immediately (eg to manage a cardiac arrest or patient with arrhythmia immediately and stop the primary task)
2. To reject the new task (eg could be an administrative or paperwork issue)
3. To defer or delay the new task until the primary task is stable or reaches completion
4. To multi-task and work on both task simultaneously or side by side ( eg giving a verbal response to a query whilst typing patient notes on the computer)

Even the recovery time after interruptions vary from person to person. The context in which the interruption takes place is also important. The sources of interruption can be from other staff in the ED such as nurses, residents, other medical colleagues and other discipline doctors. Paramedics and clerical or administrative staff can also be a source of interruption. Other examples may include handling phone calls, paper work, prescriptions, emails and other non clinical tasks. The interruption time too can

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be variable, depending on the type of interventions needed.

Different people handle interruptions differently and it may also be linked to factors like their personality and character. (23,24) Some may quickly disengage from the interruption and move on with their primary tasks. They wish to 'resume their planned task' as soon as possible. Others develop their own coping mechanisms. For some people they may encounter what is known as 'attention residue', ie. they continue to worry and think about the original task they were performing when the interruption happened. This may then mean they are unable to focus on the interrupted task adequately. (20,21) The human brain may find it challenging to switch quickly or to switch away from an incomplete task. Thus each person will have to find ways to help them (and their brains) transition efficiently and effectively from one task to the next, and the next or to handle an interruption. Many people who work and thrive in hectic, fast-paced environments have learnt and developed an ability to complete their cycles of work and action as they deem fit and efficient. (16,17,19, 29-31) EPs may learn to take short-cuts, whether intentionally or unintentionally, or even develop compensatory mechanisms to cope with the day to day work and stressors in the ED. These may be personal to each EP. They may also evolve over the course of an EP's career, as with more experience, it may open up new options and ideas for them. (4,5,10,14,28)

Some examples of ways to handle interruptions include: (10,13, 21,22,23,28)

1. To plan for it, knowing it is bound to happen. Management of one's mindset is important. This is especially true in the Emergency Department, where we know there will be multiple and different types of interruptions happening.
2. To take control of the situation. As a senior or attending in the ED, there are multiple responsibilities and one may have to be in control and provide instructions to the relevant persons involved
3. To change and regulate your responses. Knowing and being conscious about the potential errors and disruption is important. Being in control will help to enhance your mood, emotions and satisfaction levels as well
4. To learn when and how to say "No" or "Hold On" is also another strategy. This is about prioritization

5. To develop or utilize environmental cues to aid recovery from interruptions. This is called cognitive engineering. An example would be to stick a "Post-It" tab at the point in the notes where you were interrupted. This can serve as a cue when you return to the screen after handling the interruption.
6. To use a strategy to repeat the main or primary task to yourself. This is sometimes called "memory rehearsal". This can certainly help reinforce and be easier for you to recall.
7. To use a tactic called "course break point". This is where you learn to buy yourself a little more time when interrupted to get to an appropriate stopping point in your primary task. This may be a point that makes sense to you and thus, when coming back to resume the primary task, it is less challenging to know where to continue. It could be stopping only at the end of a paragraph or the end of a page, or even as you complete the notes for one patient first.
8. To educate and create the necessary awareness of all staff in the ED, about interruptions. With awareness comes understanding and reflection and perhaps staff will then know when to interrupt and when not to, or which are the really necessary interruptions.

In the end, metacognition is an important consideration for EPs. This refers to the analysis and awareness of one's own learning and thinking process. It is also about understanding our own strengths and weaknesses in certain skills. As noted there will be individual differences in interruption management. Being open to new experiences is a characteristic which may help a person adapt to handling interruptions better as compared to an individual who must maintain a personalized working structure and approach. People may also learn to cope with interruptions by working faster, but this may come at a price--- more stress, higher levels of frustrations and feeling of time pressure. (31-35) The Aviation Safety Agency (ASA) of the USA has a requirement of a "Sterile Code Point" (US FAR\_ Part 121, 542) This states that "no commercial pilot and no flight crew member may allow any other activity during a critical point in the flight, which may confuse any flight crew from the performance of his/ her duty or interfere with his/ her performance of duty". (6,13, 18) Perhaps in the healthcare context, the formation of "No Interruption" zones could be considered for those

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involved in high performance, critical work. “Do not disturb” or “Do not Interrupt” signages can be placed as a form of reminder or memory jerk. (13,18, 21). Doing these may help you create an oasis whereby you will not be disturbed or interrupted, at least for a specific period of time.

The discussion on this topic will today not be complete without some mention on the use of mobile devices. Its use has become very widespread today and perhaps even to the extent that it may be controlling our lives and work. It requires some degree of self discipline and control to regulate our use of these devices during work, just as it is during driving. These devices serve as a form of interruption and often it is a personal type of interruption ( ie , using these devices for non-work related issues)

### INTERRUPTION SCIENCE.... AND WHAT IT TELLS US.

The understanding Interruption science is of increasing importance in making healthcare safer and more effective. It is like deciphering the complicated links between clinical work, work places and human cognitive processes. For better or worse, interruptions have become a part of our everyday life and communications processes. There are now more interest generated to study the topic and there has been some light shed by the science of interruption. It is a challenging topic to study and there is no exact science or methods, nor tools to calculate interruptions strictly and very objectively. Thus, tools have to be innovative and creative and often times, observational methodologies are applied. (25-27) There is a dearth of common theoretical models for research into interruptions, but there is now the realization that we need to move on from just counting interruptions to understanding it deeper. As we harness this understanding it may open up new ideas and opportunities which can be incorporated into designs of systems and electronic technologies

planning interfaces which can be clearly defined and delineated. Below are some of the observations that have been made: (30-37)

1. Multitasking has become a common and essential working strategy for most people in most jobs, including EPs in the EDs. The interruptive environment of the workplace is unavoidable
2. Interruption increases task completion time, affects decision making, may lead to more errors, frustration, annoyance and anxiety.
3. Interruptions affect both motor skills and performance (eg activity, connecting, pressing, procedures performance) as well as cognitive processes (eg. Analyzing, calculating, estimating)
4. The effects of interruptions can also be task dependent. For example it can affect:
  - a. Skills based human behavior, ie physical activities and procedures
  - b. Rule-based human behavior ie. selecting, applying formulae
  - c. Knowledge-based human behavior ie. solving and inferring
5. After interruptions, it takes time to get back into groove or the normal tempo of things. This could be due to the psychological, emotional issues or other specific factors, depending on the interrupting tasks. (Fig 1) In other words, the ‘resumption lag’ phase is time needed to collect your thoughts and restart the primary task, after the interruption is over or handled.
6. When interrupted people may respond using System 1 or System 2 decision making responses. System 1 is fast, unconscious, automatic, often used in everyday decisions and more prone to errors. System 2 thinking is slower and more

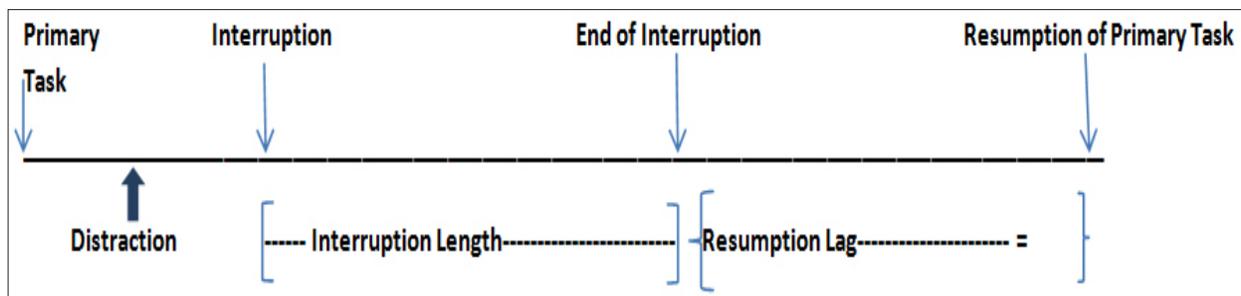


Fig 1. Task and Interruption Phases

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conscious and effortful. It is more deliberated and is used for complex decision making. This type of thinking/ decision making may be more reliable and uses logical deductions. It is still controversial as to whether these dual processing model is used in isolation at any one time or whether there is competition involved. As we understand and become more conscious about the fast and slow thinking processes, it can be the basis that helps us find rational solutions to the problems we face. It can help as a guide for our personal decisions. Each system thinking has its own limitations. System 2, or slow thinking, involves a sequence of steps: (31,32,36)

- a. Retrieval from memory of the cognitive processes involved
  - b. Implementation or carrying out the action/ making the decision
  - c. Keeping information and experience in the memory store
7. These are the fundamental steps in the mental work, deliberate and organised prototype of slow thinking. Some people are more able to integrate both elements of fast and slow thinking very well.
8. Task switching is moving from one task to the next in a planned manner. Task interruption, on the other hand, is moving from one task to another in an unplanned or forced manner. Task switching requires some level of flexibility and the ability to shift focus between different tasks. It requires the person to have a certain level of cognitive control. Task interruptions may come in predictable or unpredictable sequences. In the ED, the latter is true as one cannot foresee what cases will come next or just surface with an immediate life-threatening diagnosis. Both task switching and task interruption requires some degree of reconfiguration of people's cognitive systems. It also involves a cue-based memory retrieval process. (29,30)

### INTERRUPTION AND CULTURE

Like many other things, interruption can be culture-driven and culture-dependent. On the other hand, are we going to be able to resist the culture of interruption? Societies whereby monochronic culture predominates, will have people preferring to do one

thing at a time, whereas polychronic cultures tend toward doing multiple things at one time. The former values orderliness and there must be an appropriate time and place for everything. This culture may thus, not accept interruptions as readily.(25, 33, 37, 38)

Besides, the culture of the community we live in, and the ethnic groups can also play a part. In some societies, with eastern cultures ( eg In Asia and South east Asia), hierarchy and rank is more seriously viewed and there may a certain level of courtesy or decorum for interrupting people higher up the hierarchy. In the more western culture or countries where people tend to be more vocal and expressive and are more laterally integrated ( versus the vertical, hierarchical structure), interruptions can be more forth-coming and direct. In that same context, culture and race too may have influence on interruptions and the interrupting process. Thus these factors may have an effect on the 'wait versus speak up' culture. Other factors that need to be considered when discussing interruptions would also include how widespread is the adoption of open culture, just culture and non-blaming culture in the organization or workplace. (39,40)

### CONCLUSION

There are many variables when considering interruptions, thus making the outcomes and results not uniformly predictable. The end game will be to get a better handling of these interruptions which happens in one's work or other environment and come up with management and coping strategies. These could be personalized, and as long as they work for you, it can be applied. Being able to identify the risks that comes with interruptions is also important. This must become part of your risk management for your work environment. Identifying the situations which are susceptible and predicting them as well as sharing with the staff and others can help create awareness. An EP who is mindful and conscious of the negative effects of interruptions may respond and react with increased focus, awareness and concentration, to centre his attention. This may help the EP to initiate changes to his / her work pattern, to better manage interruptions. (1)

Open discussion with clinical staff can help improve the sense of control over interruptions and can lead to better affective states----- reduced stress, frustration, annoyance and thus improved primary task performance

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