Multitasking: A Survival Tool for Wellness or Road to Destruction?

The average grade school student can easily define multitasking. It is simply doing more than one thing at the same time. First introduced in the context of computer operations – multitasking was recognized as the CONCURRENT performance of several jobs (running more than one application simultaneously). It is not surprising that this definition has easily entered into our vernacular as a generation has grown up with computers intimately integrated into every aspect of our professional and personal lives. An achievement of sorts, "multitasking" has reached the status of a noun, a verb and an adjective; a good indicator of its place in our daily activities.

Can we perform like computers?

The study of 'human factors' is the discipline that addresses human behavior, limitations and relationships in its interaction with the work environment. Early research related to multitasking was produced predominantly by psychologists in this field, investigating both the work place and the academic setting (Parush et al). The generally accepted conclusion after almost three decades of studies is that humans are not capable of true concurrent multitasking. We cannot focus on several different items equally at the same time (Kirkmeyer, Frick).
Multitask processing occurs in the fronto-polar cortex (Charron, Harmon). The goals of an activity (goal orientation) are recognized in the anterior frontal cortex and transferred to the posterior frontal cortex (goal achievement). By using MRI mapping during tasking, researchers were able to demonstrate how the brain is able to handle multiple tasks. With the addition of a second task, the brain was able to separate goal orientation and goal achievement for each task into hemispheres. However, it was clear that both hemispheres were not capable of functioning simultaneously but able to provide switch back and maintain both activities in the forefront (if you will). The addition of a third task" created general chaos ". Increasing the complexity of the tasks still demonstrated similar brain compartmentalization until one task required "too many thoughts" at which point the ability to switch back effectively was lost and the entire frontal cortex became involved

in the tasking –e.g. the conversation on the cell phone becomes too engaging while driving.

Why do we multitask?

While many consider multitasking as a survival skill, there is evidence to show that it can also be somewhat addictive biologically. The reticular activating system (RAS) is an "attention center" in the brain with a network of neurons extending from the brainstem to the midbrain (Mena-Segovia). It acts as a point of convergence for signals from the outside world and the internal environment subsequently creating dynamic effects throughout the brain cortex. When functioning normally, this process allows the addition of new information and the ability to pay attention to ongoing tasks. Much has been studied regarding this system as it relates to attention deficit disorder. The RAS is stimulated by novelty and the system is attracted and activated by new input which progressively activates other neurotransmitters throughout the brain.
Constant input stimulates a response to immediate opportunities and needs. This provokes excitement causing a release of adrenaline and dopamine (Gratten). Without this constant stimulus, one can become bored. We create an illusion that we have to go "Mach 5 with your hair on fire".

Is multitasking effective?

Mounting evidence suggests that multitasking is a misnomer – humans do not really perform multiple tasks simultaneously but switch back and forth from one task to another. A study by Meyer et al described the act of task-switching and labeled it into two components: goal shifting and rule activation , that is the ability to switch from one task to another with a different set of rules or parameter (Meyers, Meyers). Despite familiarity of the activity, task switching was found to be time consuming (using up to 40 % of productivity time). It was apparent from this study that multitasking was not an effective process . Completion of a task list was much more effective with focus on each individual task until completion. (Monsell, Rubinstein, Rogers).

Is multitasking harmful?

Chronic multitasking has been shown to significantly increase stress which has implications to long term health (Weigi). Not only is this seen with systemic health issues such as high blood pressure and heart disease but it is also recognized that long term stress in the pre-frontal cortex from multitasking can directly affect this area of the brain and its associated functions such as assessing tasks, prioritizing and providing mental resources to a task (Conrad). The hippocampus is also affected from long exposure to stress and can influence the ability to manage new memories and access existing ones (acquiring new skills)(Amsted). It seems that "giving the brain a rest" is accurate and important.

Multitasking has also been shown to be detrimental in other ways including a decrease in job satisfaction. There is clear evidence that driving and talking on the cell phone is as dangerous as drunk driving (Strayer '06, Strayer '15). Multitasking has also been shown to decrease IQ. Professor Glenn Wilson and associates at King's College England demonstrated a temporary 10 point drop during a work day from a study group asked to media multitask. This is greater than the 4 point drop that is often seen from those who habitually partake in marijuana (Powell). Multitasking has also been shown to produce short term memory problems and difficulty concentrating.

How about our supertasker millennial generation?

Students today have lived most of their lives with a constant influx of information and input. They have become the poster child for multitasking both at home and at schools (especially with the advent of laptops in the classroom). Should they not demonstrate better prowess with this skill set?

Studies from the Proceedings of the National Academy of Science (Nass) explored this question. Heavy multitaskers were compared to non-multitaskers in two areas 1. Are chronic multitaskers better at multitasking than non-multitaskers 2. Can heavy multitaskers focus as well or better than no multitaskers when needed to complete a task? Chronic or heavy multitaskers were more susceptible to interference with irrelevant stimuli (poor at filtering). One of the studies involved keeping count of baskets made by a basketball player during which time a gorilla suited man walked through the study group. The non-multitaskers did not notice the suited man. However high multitaskers saw the gorilla man but lost count of the baskets.

High multitaskers were also much slower in switching from one task to another and back. They also had difficulties with mental organization. The conclusion was that constant input decreases the ability to filter important and irrelevant data.

Studies have shown lower test scores in the class room in the study groups allowed to text (Ellis) and in those students using distractive windows on their laptops in the classroom (Kraushaar). Instant messaging by a student cohort during lectures increased the length of performing a task such as reading through an assignment despite accounting for the time spent on instant messaging (Bowman). GPA's were found to be significantly lower in a large cohort allowed to multitask in class (Barak, Fried).

Multitasking in Healthcare?

Healthcare providers perhaps more than any other profession are often inundated with relentless input whether it is an issue with the parent care, phone calls, lab results, or non-medical demands from a practice or hospital. Providers have significantly increased professional input points and often the urgency to address each and every input in real time is present and can be overwhelming. It is difficult to find an effective barrier, our own "sensory deprivation chamber".

An unavoidable but necessary element, health care providers do not have the luxury of controlling and minimizing multitasking from our daily activity. So how do we embrace this challenge? It is important to understand that previous studies demonstrating the ineffective and often harmful result of multitasking are applicable to our profession. Furthermore, multiple reviews and case reports have demonstrated mishaps in care related to multitasking, especially in early training when automated activities are not well established (Taban, Bongers, Hamala). Intra-operative performance has also been demonstrated to decrease with secondary tasks (Suh el al). However, we are taught early in our clinical introduction that task-stacking and multitasking may be the only way to eliminate our to-do list for the day (Weigi).

Multitasking and constant media input should also be managed appropriately within our personal lives. Recovery, whether a few minutes in a doctor's lounge, in the evenings after work or on vacation, is an invaluable time that allows us to reenergize for the task ahead and for our family and friends. This time should be jealously guarded including from our digital

tools. What we do well in our private lives are intimately related to what we are able to provide for our patients.

An "Epidemic of Distraction"?

For most healthcare providers a large part of multitasking in the work place is really about managing interruptions referenced in some reviews as an "Epidemic of Distractions" (Weksler). It is evident that we are not able to effectively engage in two complex tasks concurrently. Rather it is actually a conscious or unconscious act of switching and prioritizing our focus. Some automated activities (suturing, etc) may allow for concurrent involvement of tasks. However, it is important to develop an 'executive control' to consciously shift out of tasks (set-shifting) as the input demands (Hammerness and Moore).

The specialty of Emergency Medicine has provided some advanced analysis into recognizing this process and incorporating it into resident training. It is clear that working effectively in an Emergency Room, perhaps more than any other place in the hospital, requires the ability to constantly address multiple areas of attention with varying levels of urgency and constant interruption (Chishom, et al).
Emergency Medicine actually recognizes multitasking as a core skill and defines this skill set as "the ability to prioritize and implement the evolution of management of multiple patients in the ER" (Heng). This activity has been decomposed in a manner that allows both improvement measures and strengthening set skill sets.

The process of multitasking begins with an interruption which may extend from temporary (perhaps trivial and innocuous) to potentially life threatening (Schneider). Studies have shown that interruptions are a major source of errors (e.g. quite zones around medicine carts at nurse's stations) (Westbrook). If the physician is involved in an automated task (suturing), often the interruption can be addressed easily. If the primary task is controlled- the same cognitive domain may be required and "Task stacking occurs". It is then important to prioritize the tasks appropriately. The interruptions may require active task switching from a primary task as in a life threatening situation or a new patient requiring immediate evaluation. The process of "triaging" interruptions may create significant errors if there is too much dependency on short term memory and vigilance (Stephens).

It is important to recognize the act of interruption, the nature of the primary task, task switching and task stacking on order to provide a safe and effective flow yet address all the needs in order of urgency (Li, Andrews). Interruption pathway strategies should be premeditated including when to ignore interruptions, how to appropriately suspend the primary task and how to utilize effective tools to return to a previously interrupted task. These may include recall techniques including visual cues, notes or utilizing support staff (Coiera, Rivera-Rodriguez).

How about as role models?

Much about what we understand regarding safe practices and how to appropriately handle multitasking are often seen as experience from many years of practice. As we welcome our super tasking generation of physicians, it is important to understand some differences that exist between that generation and others. What we feel is unnatural and obviously dangerous to patient care arising from interruptions and multitasking may seem quite normal and expected for our young physicians. It may be even more important in this generation to pro-actively engage in outlining a better understanding of the multitasking process and establishing the appropriate skill set for physicians at a time when they may be most vulnerable to these pitfalls.

Is multitasking a part of Wellness?

Multitasking is an unavoidable part of our lives as healthcare professionals. As with much in wellness, it begins with mindfulness in both our professional and personal lives. It should be a conscious act, managed with the appropriate skill sets. Limitations of multitasking should be recognized and careful attention should be given to the appropriate use of multitasking as health-givers especially the need to handle interruptions. Multitasking should not be an attitude or a habit, but a learned and managed skill.

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