'Inattentional Blindness'

What Captures Your Attention?

Matthew Grissinger, RPh, FASCP

Mr. Grissinger is Director of Error Reporting Programs at the Institute for Safe Medication Practices in Horsham, Pa. (www.ismp.org).

INTRODUCTION

A nurse pulls a vial of heparin from an automated dispensing cabinet. She reads the label, prepares the medication, and administers it intravenously to an infant. The infant receives heparin in a concentration of 10,000 units/mL instead of 10 units/mL and dies.

A pharmacist enters a prescription for methotrexate daily into the pharmacy computer. A dose warning appears on the screen. The pharmacist sees the warning, bypasses it, and dispenses the medication as entered. The patient receives an overdose of the medication and dies.

A nurse reaches into the refrigerator for a piggyback antibiotic for her patient. She reads the label, spikes the bag with intravenous (IV) tubing, and administers the medication to her patient. The patient receives a neuromuscular blocking agent instead of the intended antibiotic and dies.

A pharmacy technician labels and delivers an IV infusion to the dialysis unit. The nurse reads the pharmacy label and hangs the bag while preparing her patient for dialysis. The patient receives sterile water for injection instead of 0.9% sodium chloride and dies.

A nurse picks out a prefilled syringe of pain medication for her patient. She reads the label and administers the medication intravenously. The patient receives hydromorphone instead of morphine and experiences a respiratory arrest.

All of these real-life errors, and many more in health care and other industries, have happened under similar circumstances: the person performing the task fails to see what should have been plainly visible, and later, they cannot explain the lapse.[1] In many cases, people involved in the errors have been labeled as careless and negligent. However, these types of accidents are common and can even be made by intelligent, vigilant, and attentive people. The cause is usually rooted in "inattentional blindness," a condition all people exhibit periodically.[1]

HOW DO WE PROCESS INFORMATION?

Most mental processing occurs outside of conscious awareness.[1] The amount of information that can be taken in by our senses is limitless, but the brain has limited resources when it comes to attentiveness. Our senses receive much more information than what can possibly be processed at one time. To combat information overload, the brain allows large amounts of information to enter, almost entirely unassimilated, and peels off just a few pieces of selected information for a closer look.[2]

In deciding what to focus on, the brain scans about 30 to 40 pieces of information (e.g., sights, sounds, smells, tactile data) per second until something captures its attention.[2] Our attention filter selects just a small amount of information to process, and anything left over gets short shrift. The rest of the information never reaches our consciousness (inattentional blindness). Unfortunately, the brain is a master at filling in the gaps and compiling an integrated portrait of reality based on just a flickering view.[1]

Accidents happen when attention mistakenly filters away important information and the brain fills in the gaps with what is aptly referred to as a "grand illusion."[2] Thus, in the preceding examples, the brains of the individuals involved in the errors filtered out important facts on medication labels and computer screens and filled in the gaps with erroneous information that led them to believe they had the correct medication or had read the warning appropriately.

VISUAL ATTENTIVENESS

Visual attentiveness, or what captures our attention, is shaped by four factors.

Conspicuity. The degree to which an object or piece of information jumps out to capture our attention falls into two categories:[1]

Sensory conspicuity refers to the physical properties of information. For example, a high degree of contrast with the background is the most important feature in making information conspicuous,[1] and luminance (brightness) contrast is more important than color contrast.[3] Factors such as bright colors, movement, and flicker do not ensure conspicuity;[1] however, pre-attentive properties (in which the brain automatically processes information without being aware of it), such as color and shape, have been used successfully on visual displays to call attention to specific items or categories.[3]

Cognitive conspicuity refers to the perceived relevance of the information. The "cocktail party effect" is a classic portrayal of this factor.[1,4] This effect refers to the phenomenon of being in a crowd, listening to a conversation, and still being able to hear your name mentioned across the room.[3] Functioning somewhat like the volume control on a radio, you can turn down the volume of background noise at a cocktail party and turn up the volume as you listen attentively to one conversation at a time. While engaged in conversation, if someone behind you mentions your name, you are automatically attracted to the other conversation because it is meaningful to you.

Meaningful visual information can also jump out at us automatically, such as when we scan a newspaper and find our attention drawn to articles that include the first name of our child or a close relative, for example.

Attention to something of particular relevance can also be purposeful. For example, we might scan a luggage carousel for our black suitcase, looking purposefully for the broken wheel or yellow ribbon that distinguishes our suitcase from all the other black suitcases on the carousel.[1]

Mental workload and task interference. Inattentional blindness is more

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