

Stress: A Healthcare Challenge

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Stress is a significant health care problem that affects both physical as well as the mental health of people. Stress is defined as a situation where the organism's homeostasis is threatened or the organism perceives a situation as threatening. Stress within our comfort zone can help us perform under pressure, motivate us to do our best, and even keep us safe in the face of danger. However, when stress becomes overwhelming and is prolonged, it can damage our mood and relationships, and lead to many serious mental and physical health problems.

Stress levels of adults continue to rise in the developed world such as the United States, Europe and Singapore. In a 2015 report by American Psychological Association (APA), American adults rate their average stress level as 5.1 out of 10 which is up from 4.9 in 2014. American adults report that a healthy stress level at 3.8 which means that the actual average stress level is 1.3 points higher than the healthy stress level. In addition, compared to just a year earlier, a greater percentage of American adults report experiencing at least one symptom of stress (78% in 2015 vs. 75% in 2014). The same study linked stress with health problems. Those who reported their health as only "fair" or "poor" have higher stress levels on average than those who identified their health as "very good" or "excellent."

Another report conducted by Statistics Brain in July 2016 found that 77% of Americans regularly experience physical symptoms caused by stress and 73% regularly experience psychological symptoms caused by stress. In the same study, 48% report that stress has a negative impact on their personal and professional life. Annual costs to US employers in stress related health care and missed work are as high as \$300 billion. The study reported that the most common causes of stress are: 1) job pressure 2) money 3) health 4) relationships 5) poor nutrition 6) media overload, and 7) sleep deprivation (Statistics Brain, 2016).

In Europe and Singapore, the picture is very similar. According to the World Health Organization, stress, especially that relating to work, is the second most frequent health problem, impacting one third of employed people in the European Union. In Singapore, stress is also on the rise. In one survey conducted by Roffey Park in August 2016, 52% of Singapore workers surveyed say their stress level has gone up over the last six months (Siow, 2016). The survey found that the top three sources of workplace stress across Singapore, China and Hong Kong are 1) workload 2) lack of support and 3) organizational politics. In another survey conducted by

Singapore Jobs Central in July 2016 found that of the 2,281 respondents, 83.3% said that their work stress has increased in the last six months.

In 2009, Camara Jones et. al first used the “cliff analogy” to describe the different levels of health services in children’s health. Jones described the levels of intervention as 1) an ambulance at the bottom of the cliff, 2) a net or trampoline halfway down, 3) a fence at the top of the cliff and 4) the deliberate movement of the population away from the edge of the cliff. The cliff analogy can be used to examine many different health issues, and this paper will examine stress as a health issue using the four levels of cliff analogy.

What is stress?

Claude Bernard (1865/1961) noted that the maintenance of life is critically dependent on keeping our internal setting constant in the face of a changing environment. Walter Bradford Cannon (1929) called this “homeostasis.” Hans Selye (1956) used the term “stress” to represent the effects of anything that seriously threatens homeostasis. The actual or perceived threat to an organism is referred to as the “stressor” and the response to the stressor is called the “stress response.” The body responds to stress by releasing a flood of stress hormones, including adrenaline and cortisol, which set up the body for emergency action. The person’s heart pounds faster, breath quickens, muscles tighten, blood pressure rises, and senses become sharper. These physical changes increase a person’s strength and stamina, speed for reaction time, and enhances one’s focus. This is known as the “fight, flight or freeze” stress response and is our body’s way of protecting us.

When stress is within our comfort zone, it can help us stay focused, alert and energetic. In emergency situations, stress can save our lives; stress can also help us rise to meet challenges. But when stress is beyond our comfort zone and becomes chronic, it stops being helpful and can start causing major damage to our mind and body.

Although stress responses evolved as adaptive processes, Selye observed in 1956, severe, prolonged stress responses might lead to tissue damage and disease. Chronic stress disrupts nearly every system in the body. There is a substantial body of research connecting stress to cardiovascular disease (Lambert, 2010), the future manifestation of hypertension related to the individual’s response to stress (Spruill, 2010), metabolic syndrome (Kyrrou, 2006), obesity (Brunner, 2007), and emotional overeating (Adam, 2007). Stress also fuels approximately 50% of depression cases through disturbance of the HPA axis and increased cortisol levels (Nemeroff,

2005). In addition, biological markers associate the immunoendocrinological disturbance brought by stress to infertility (Li, 2011). There is also data relating the role of stress in infectious disease (Pedersen, 2010) and cancer (McGregor, 2009), and leaving a person vulnerable to many other mental and physical health problems. Given the negative impact of stress at intrapersonal and somatic level, it is important for healthcare professionals, governments and organizations to treat stress at all 4 levels in the cliff analogy.

Level 1: at the bottom of the cliff

Someone who is at the bottom of the cliff as a result of stress would be someone who has already developed the myriads of health issues caused by or exacerbated by chronic stress. For example, it would someone who has had a heart attack or stroke, who has heart disease, diabetes, obesity or high blood pressure. It would also be someone who has developed mental health issues, such depression, anxiety, substance abuse disorder or eating disorder.

The focus at this stage should be to treat the illness itself. For example, if someone has had a heart attack or stroke due to stress the intervention would be to save him from dying from the heart attack or stroke followed by all the necessary treatments to help him with recovery. If someone has developed major depressive disorder due to stress the intervention would be to treat him/her for the depression using psychotherapy techniques such as cognitive behavioral therapy or mindfulness-based cognitive therapy or pharmacological ways such as prescribing antidepressants, or a combination of the two. After the actual health problem has been treated, stress reduction techniques discussed in levels 2-4 would be added to prevent him from falling down the “cliff” in the future. Stress reduction techniques may also be added in conjunction with treatment of the health problem itself to compliment and / or speed up the treatment.

Level 2: caught in a net half way down

This level includes people who are experiencing some negative health consequences of stress but have not developed full-blown health issues such as those described in level 1. One intervention at this level is to educate individuals how to recognize signs and symptoms of excessive and chronic stress, which can be cognitive, emotional, behavioral and physical as listed below:

Cognitive symptoms	Emotional symptoms	Behavioral symptoms	Physical symptoms
• Anxious or racing thoughts	• Anger, irritability or moodiness	• Eating more or less	• Aches and pains

<ul style="list-style-type: none"> • Constant worrying • Inability to concentrate • Memory problems • Poor judgment • Seeing only the negative 	<ul style="list-style-type: none"> • Anxiety and agitation • Burnout • Depression or general unhappiness • Fatigue • Feeling insecure and overwhelmed • Forgetfulness • Loneliness and isolation • Restlessness 	<ul style="list-style-type: none"> • Food cravings • Frequent crying • Nervous habits (e.g. nail biting, pacing) • Procrastinating or neglecting responsibilities • Relationship problems • Sleeping too much or too little • Sudden angry outbursts • Use of alcohol, cigarettes, or drugs to relax • Withdrawing from others 	<ul style="list-style-type: none"> • A tendency to sweat • Chest pain, rapid heart rate • Diarrhea or constipation • Erectile dysfunction • Fainting spells • Frequent colds or flu • Hypertension • Nausea, dizziness • Nervous twitches • Loss of sex drive • Lower immunity against diseases • Stomach upset
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Another intervention at this level includes teaching individuals stress management techniques, which can also be grouped into the same four categories.

Emotional

Write. First it helps to keep a stress diary to identify the causes of short-term and frequent stress in one’s life. Just writing for 10-15 minutes helps to identify the sources of stress, how they made one feel, why the situation stresses one out and how much impact the stress has on one’s life. After we know more about our stress, we can use the other stress management techniques to reduce the stress or try to avoid stressful situations altogether.

Let the feelings out. Talk, laugh, cry, and express anger when we feel we need to. Talking with friends, family, colleagues, a counselor, or a member of the church about our feelings is a healthy way to relieve stress. As talked later in the paper, oxytocin is one of the stress hormones that is released during stress and it actually pushes us to seek support from other and to provide support for those in need.

Do things that we enjoy. Often people may feel that they are too busy to do these things. But making time to do things we enjoy can help us relax and may also help us to get more done in other areas of our life. These activities could include traveling, playing and caring for pets, or picking up a hobby such as gardening, playing an instrument, or pursuing creative activities such as writing, crafts, or art.

Focus on the present. Meditation and guided imagery are two ways to focus and relax the mind.

- **Meditation.** When we meditate, we focus our attention on the present moment. Paying attention to our breaths is one way to focus, another is transcendental meditation which repeats a mantra. Mindfulness-based stress reduction is another form of meditation that is very helpful with managing stress and learning how to better cope with it.
- **Guided imagery or visualization.** With guided imagery or visualization, one forms mental images to take a visual journey to a peaceful, calming place or situation. During visualization, one should try to use as many senses as possible, including smell, sight, sound and touch. With guided imagery, the guidance can come from audiotapes, books, or a teacher.

Behavioral

Work related stress is the most common cause of stress. Oftentimes workload overwhelms us due poor time management. To get better at time management people can take many freely available time management quizzes to identify where they can improve, and make sure that they use time management tools such as To-Do Lists, Action Programs, and Eisenhower's Urgent/Important Principle to manage their priorities. They can then use tools to think about what's most important in their role, in order to prioritize their work more effectively. This will help people reduce stress, because they get the greatest return from their efforts, and minimize the time spent on low-value activities. Another way to reduce stress to avoid multitasking. Many studies have shown that multitasking actually wastes time and reduces work quality, and more importantly increases stress levels (Woolston, 2017). One can avoid multitasking by checking email only at certain times, by not doing other work during calls or

meetings, and avoid using electronic devices for a while before going to bed to fully "switch off".

Another source of work stress reported by employees is lack of support at work. There are many things employers can do to create a more supportive work environment, but there are also initiatives individuals can take to obtain more support at work. These include being more proactive, not being afraid to ask for help when needed, talking to one's manager about one's concerns, speaking up when the workload gets unmanageable, establishing meaningful relationships with colleagues and seeking a mentor and / or coach for guidance.

It is also helpful to incorporate stress reduction techniques throughout the day. The simplest yet one of the most effective techniques is to take a few deep breaths whenever we feel stressed. Breathing deeply sends a message to the brain to calm down and relax. The brain then sends this message to the body. The reactions when we feel stressed, such as increased heart rate, fast breathing, and high blood pressure, all decrease as we breathe deeply to relax. Other simple techniques can be getting up regularly from our desk to walk around the office. This not only activates the body which reduces stress it also facilitates connections with colleagues. Having meaningful relationships is one of the most important factors for a happy and less stressful life.

In a December 2015 CNN video on managing stress, Kathleen Hall, CEO of Stress Institute, gives simple tips to incorporate in the daily life to reduce stress (Gupta, 2015). These include:

- Finding things that bring you home to yourself such a picture of your family
- Putting an organic lavender eye bag over your eyes for 5 minutes – studies show that the smell of the organic lavender lowers blood pressure, heart rate and immediately calms the body, mind and soul
- Having a picture of something that calms you down on your mousepad or on the wall, such as a beach or a pet
- Have a concern box with a family picture in the family room and have every member write down what they are concerned about
- Having fresh flowers in the house or in the office – a Harvard study showed that it increases happiness by 40%

Physical

Exercise. Regular exercise is one of the best ways to manage stress. Walking is a great way to get started. Even everyday activities such as housecleaning or yard work can reduce stress. Stretching can also relieve muscle tension.

Relaxation techniques which involve refocusing one's attention on something calming and increasing awareness of one's body. These techniques include:

- **Progressive muscle relaxation** is a technique for reducing stress and anxiety by focusing on slowly tensing and then relaxing each muscle group. This helps one focus on the difference between muscle tension and relaxation, which leads to one becoming more aware of physical sensations.
- **Autogenic relaxation.** Autogenic means something that comes from within oneself. In this technique, the individual learns a set of directions/exercises that command the body to relax and control breathing, blood pressure, heartbeat, and body temperature. The person learns each exercise by reading about it or watching a teacher, then practicing it for a few minutes several times a day. For example, the individual may imagine a peaceful setting and then focus on controlled, relaxing breathing, slowing his heart rate, or feeling different physical sensations, such as relaxing each arm or leg one by one.
- **Diaphragmatic breathing**, or abdominal or deep breathing is marked by expansion of the abdomen rather than the chest when breathing. Diaphragmatic breathing is defined as a manipulation of breath movement, contributing to a physiologic response characterized by (a) the presence of decreased oxygen consumption, decreased heart rate and blood pressure, and (b) increased theta wave amplitude in EEG recordings, increased parasympathetic activity accompanied by the experience of alertness and invigorating (Jerath, 2006). It is hypothesized that voluntary slow deep breathing functionally resets the autonomic nervous system, which synchronizes neural elements in the heart, lungs, limbic system and cortex (Jerath, 2006).

Yoga, tai chi, and qi gong. These techniques combine exercise and meditation. For example, yoga is an ancient mind-body practice that combines physical poses, controlled breathing, and meditation or relaxation. Many studies have demonstrated the effect of yoga in reducing stress and relieving muscular tension or pain.

Cognitive

Cognitive approaches include changing the way we perceive stress and stressful events. Researchers found that, when we are trying to manage stress, what matters more than the event itself is our thoughts about the event (Nordqvist, 2015). How someone sees that stressful event will be the largest single factor that impacts their physical and mental health. How one interprets the events and challenges in life may decide whether he/she finds them invigorating or harmful.

Perception of stress affects heart attack risk. For example, one research found that people who believe their stress is affecting their health in a big way are twice as likely to have a heart attack ten years later (Nordqvist, 2015). In a study done at Pennsylvania State University, researchers found that stress was not the problem, but rather how we react to stressors. It appears that how patients react to stress is a predictor of their health a decade later, regardless of their present health condition and stressors. Lead researcher, Professor David Almeida said "For example, if you have a lot of work to do today and you are really grumpy because of it, then you are more likely to suffer negative health consequences 10 years from now than someone who also has a lot of work to do today, but doesn't let it bother her" (Nordqvist, 2015).

In a 2013 TedTalk and in her book *The Upside of Stress* Dr. Kelly McGonigal takes the perception of stress even further to say that stress can actually be helpful. She begins by citing a study that tracked 30,000 adults in the US over 8 years (McGonigal, 2013). The study found that people who experienced a lot of stress in the previous year had a 43% risk of dying; but that was only true for people who also believed that stress is harmful for your health. People who experienced a lot of stress but who didn't believe that stress was harmful to their health had no higher risk of dying. In fact, they had the lowest risk of dying, including the people who experienced relatively little stress. Researchers estimated that in the 8 years that they were tracking deaths there were 182,000 Americans who died prematurely not from stress but from the belief that stress is bad for you. That is over 20,000 deaths a year, which if it's correct, would make believing stress is bad for you the 15th largest cause of death in the US in 2012, killing more people than skin cancer, HIV/AIDS, and homicide.

Then Dr. McGonigal goes on to cite another study called the social stress test, where participants were asked to perform stressful tasks such as standing on stage and giving a speech to a panel of expert judges about their weakness and doing difficult math tests as fast as they can, all while these judges were giving them judgmental looks and making condescending remarks.

Most people would view this scenario pretty stressful and normally we would interpret the physical changes, such as pounding heart and faster breaths, as signs of anxiety or that we are not coping very well with the pressure. But Dr. McGonigal asked, what if you viewed these signs as your body was energized, was preparing you to meet this challenge? This is exactly what the participants in this Harvard study was told. Before taking the social stress test they were told that their stress response was helpful – that pounding heart is preparing them action, the faster breath is getting more oxygen into their brain, When participants viewed their stress response as helpful for their performance they were less stressed out, less anxious and more confident.

The more fascinating part about the finding was how their physical stress response changed. In a typical stress response. the heart rate goes up and the blood vessels constrict. This is one of the reasons that chronic stress is associated with cardiovascular disease – because it’s not healthy to be in this state all the time. In the study where participants viewed their stress response as helpful, their blood vessels stayed relaxed. Their heart was still pounding but this is a much healthier cardiovascular profile. It actually looks a lot like what happens in moments of joy and courage. Over a lifetime of stressful experiences this one biological change could be the difference between someone who gets a stress-induced heart attack at age 50 versus someone who lives well into their 90s. Therefore, Dr. McGonigal believes that the new science about stress is no longer about getting rid of stress but rather getting better at stress.

Dr. McGonigal talks about another benefit of stress, which is making us social. Oxytocin, traditionally viewed as the “cuddle” hormone, is also a stress hormone. It is as much part of the stress response as the adrenaline that makes our heart pound. When it is released during the stress response it is motivating us to seek social support. When life is difficult our stress response wants to make sure that we are surrounded by people who care about us. Oxytocin doesn’t just act on our brain but it also acts on our body. One of the benefits is that protects our body from the stress response – it’s a natural anti-inflammatory, it also helps our body stay relaxed, and it even helps heart cells regenerate and helps the heart heal from any stress-induced damage. All these physical benefits of oxytocin are enhanced by social contact and social support. So when we reach out to others either to seek support or to help someone else, we release more of this hormone, our stress response becomes healthier, and we recover faster from stress. This means that our stress response has a built in mechanism for stress resilience, and that mechanism is human connection.

To illustrate this point, Dr. McGonigal brings up a 2013 study done at University at Buffalo that tracked 1000 adults aged 34 to 93. The researchers started the study by asking how much stress have you experienced in the last year. They also asked how much time have you spent helping friends, neighbors, people in your community. And then they used public records over the next 5 years to find out who died. They found that for every major stressful life experience such as financial difficulties or family crisis that increased the risk of dying by 30%. But that wasn't true for everyone. People who spent time caring for others showed absolutely no increase in stress-related increase in dying. This means caring created resilience. This once again shows that the harmful effects of stress on our health are not inevitable. How we think and how we act can transform our experiences of stress.

Ways to educate people about stress management techniques

One avenue of educating individuals of the symptoms of stress and stress management techniques discussed above is through the healthcare system, for example when people go into doctor's offices for regular check-up. Another is through mass communication such as posters in hospitals and physician's offices, in public places sponsored by government bodies, as well as on the walls of workplaces. A third way would be through stress management sessions organized by employers for their employees and by community centers for people in their community.

Level 3: On the edge of the cliff

This level includes people who are experiencing some level of stress but who have not developed symptoms discussed in level 2 yet, but if not managed well may start to develop those symptoms. Intervention at this level includes the stress management techniques discussed in level 2. The difference between this level and level 2 is that it is a more proactive approach. Employers, governments and communities would be more preemptively educating people about how to incorporate stress management techniques into their daily lives, organize events that are aimed at stress reduction and even bring in cutting research such as those by Dr. McGonigal about viewing stress in a different way to make it more helpful and to make us more social and empathetic. For example, my company has organized health talks on stress management, positive psychology, and healthy eating. The company also sponsors employee groups such as the running club, photography club and baking club. It also organizes periodic group activities such yoga, aerobics classes, soccer games and cricket games. All these activities have the

purpose of establishing stronger bonds among employees but also have the very important benefits of promoting healthy life style and reducing stress.

In the same 2015 CNN video mentioned previous, Dr. Sanjay Gupta tells the story of a veteran, John Thurman, who survived the 911 attack on Pentagon and who was struggling with post-traumatic stress disorder (PTSD). John tried everything, including drugs and sleeping pills, but it was eventually yoga that helped him to get over his PTSD by reducing his mind chatter, achieving mental sharpness and focus, and eventually heading towards mental stillness. John benefited from yoga so much that he took a teacher training class and eventually left the Army and pursued yoga fulltime. Now he teaches a weekly yoga class at the Pentagon with 40-50 participants with a mix of active and retired military as well as civilians. The Department of Veteran Affairs estimates that 20% of veterans returning from Iraq and Afghanistan suffer from PTSD. In a move to cut down on prescription health medications, the US Veterans Health Administration has started incorporating yoga into alternative therapy programs to treat PTSD.

This case is an example of intervention at all four levels. The first level is John using yoga to take him out of the bottom of the cliff, the stress induced disorder PTSD. Similarly, the US Veteran Health Administration incorporating yoga to treat PTSD is also intervention at level 1 by getting people out of the bottom of the cliff. The 2nd and 3rd level is John teaching yoga at the Pentagon which helps people who are experiencing stress related symptoms (level 2) or those who live in stressful environments (level 3) to manage stress better so they don't fall to the bottom of the cliff or don't fall at all. It even operates at the 4th level as yoga helps people to get into a more peaceful and accepting state where they are less prone to the harmful effects of stress but rather accepts stress as a part of life and even thinks about stress as something helpful.

Level 4: Getting people away from the edge of the cliff

The aim at this level is not only to educate people to manage and get better at stress as described in levels 2 and 3, but also for employers and governments to create work environments that minimizes stress. Since the number 1 cause of stress is work related, there is a lot that employers can do to create less stressful work environments. Fortunately, it is in employers' best interest to reduce stress for their employees since stress leads to more missed days at work, less productivity, lower morale and increased health care cost. The annual costs to US employers in stress related health care and missed work was \$300 billion in 2015. Ways to create less

stressful work environments include reducing employees' workload, providing flexible work hours and ability to work from home, providing adequate paid leaves, reducing corporate politics, training leaders and managers to be more supportive and caring for their employees, creating a supportive and collaborate work culture, and establishing events and employee groups that promote health and wellness and that foster greater connection among employees.

For example, my company has redesigned our office to a concept of no assigned seats, no individual offices for management level, more open spaces and many diverse types of work spaces for different types of work that needs to be done, including regular desks, standing work stations, quiet cubicles, huddle corners and first-come-first serve conference rooms and phone booths. In this kind of environment, we all find that it is easier to socialize with each other, it is more conducive for collaboration, and reduces the perception of hierarchy. It has many elements that helps to reduce stress and most employees find it a much more enjoyable place to work. More and more we are seeing companies redesigning their office spaces in this way.

Conclusion

In today's fast-paced world, it's impossible to avoid stress completely, but we can manage it. Since stress is one of the most frequent health problems, each individual, company, the healthcare system and the government have a responsibility to contribute to better managing it. When someone is already suffering from serious physical and mental health issues induced by stress – at the bottom of the cliff – the key intervention is to treat that illness. Once the individual is out of the bottom, the most important is to educate him/her about how to manage stress. There are many types of stress management techniques, some are emotional such as writing, engaging in hobbies, meditation; some are behavioral such as better time management, prioritization, and incorporating stress reduction techniques throughout the day; some are physical such as exercise, yoga and engaging in relaxation techniques; and some are cognitive – may be some of the most powerful, which is changing the way we perceive stress – from something that harms our health to something that is helpful for our performance and that makes us more social and empathetic. At the highest level – moving people away from the cliff – employers have a big role to play. They can make the work place less stressful by reducing workload, creating more pleasant and stress-reducing office spaces, and creating more collaborative and supportive work cultures.

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