Stressed out and Under Pressure: Decision-making in the Healthcare Field

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ABSTRACT

The healthcare working environment is a stressful experience, with the constant need to make professional decisions based on ambiguous information and clinical experience to provide ideal patient care. Previous neuroscience research has indicated that environmental factors, such as pressure and stress, influence the neural decision-making process. However, little information is available beyond economically-linked research that focuses on risk assessment within decision-making which is not generalizable to patient based assessment. The purpose of this study is to investigate the influence of induced pressure on intuitive decision-making when faced with ambiguous health care scenarios.

INTRODUCTION

Within the healthcare system, nurses face many decisions that require their professional judgement on a daily basis. The healthcare profession is a career that requires autonomous decision-making associated with patient care, technology, and the specialization of cases. Focusing on the nursing profession, those in this career manage a wide range of information to make the clinical judgements (Bakalis & Bowman, 2003). Those in the nursing profession encounter unique situations that differ in terms of ethical principles, clinical ethics, and ethical dilemmas that complicate the rational process of cognitive activity in nurses (Ebru et al., 2019). These ethical dilemmas have been found to impact patient recovery negatively and have led to increased healthcare costs overall (Ebru et al., 2019). However, the most common issue occurring in the nursing profession is that it is difficult to integrate intuition, evidence, and the ability to avoid bias within patient care (Lamb & Sevdalis, 2011). These biases can fall into categories such as gender-influenced care, race-influenced care, sexual-orientation- influenced care as a few examples. Although these studies primarily focused on the nursing profession, other careers in the healthcare field face the same, strenuous environment throughout the day whether that be as a certified nursing assistant or as a surgical doctor. Despite having very different roles, the act of patient care in a fast-paced setting led to the strenuous working environments for all patient care-based working positions. (Ebru et al., 2019) It is the act of living and working inside a healthcare setting that requires the ability to be ready to face unknown, stressful situations where time pressures are constant ethical dilemmas presented at any moment due to the variety of patients that one faces. (Lamb & Sevdalis, 2011)

Healthcare decisions are often influenced by heavy time pressure and initial ambiguity when attempting to treat patients, hindering the ability to acquire necessary evidence for efficient patient care (Wang et al., 2016). A goal of healthcare would be to provide the most efficient and effective patient treatment but the process of getting to this decision may not be simple. The idea of getting to a good and beneficial medical decision is difficult to identify due to uncertain situations in the healthcare environment, which create a lack of a clearly correct choice. (Hamilton et al., 2017) Again, those in the healthcare field want to make the best possible choice; one that benefits the patient in the most beneficial way possible and causes the least amount of stress on the healthcare workers. (Hamilton et al., 2017) To come to an effective and efficient medical decision, healthcare workers often rely upon affective decision-making, a strategic model where an individual makes an innate choice dependent upon risk and uncertainty. One example can be occur when an emergency room nurse is required to make a quick treatment decision for a patient having abdominal pain with an unknown cause, a situation that can be life threatening if not treated with proper time and understanding of symptoms. (Chatpentier et al., 2016) However, the role of affective decision-making, under specific circumstances littered with uncertainty and ambiguity, can interfere with making a proper medical decision in this environment. (Hamilton et al., 2017) Unfortunately, uncertainty and ambiguity is commonplace within a healthcare setting, even if patients are simply coming for an average check-up because health care workers can easily come upon an expected health crisis within a patient. Focusing specifically on the emergency room

experiences, a common feature is even further increased pressure and ambiguity in comparison to other healthcare environments. The worsened lack of ability to predict what patient circumstances may arise results in one of the most stressful environments for healthcare workers. (Wang et al., 2016) Although emergency room environments are not the focus of the current study, the majority of medical decision-making has been focused on the emergency room environments because of the worsened stress levels in these research environments. This research is still applicable to the current study on decision-making in healthcare environments because it focuses on stress influenced healthcare environments.

Decision-making is the cognitive process that results in the selection of a belief or a course of action among several alternate options, one that is present throughout the lives and environments of all individuals. (Miller & Katz, 2013) Green et al. (2004) identified decision-making as a deliberative process that results in commitment to a categorical result that reflects the formation of preferences, selection and execution of actions, along with the evaluation of outcomes. The process of decision-making was defined by the factors that can lead to it such as stress, previous experiences, and the external environment surrounding the topic. (Wang et al., 2016) In terms of health care patients, the overwhelming and distressing emergency department environment is one that forces immediate decisions on difficult health related issues that do not properly give the necessary time to process the decision. (Wang et al., 2016) In itself, the process can be prone to the speed-accuracy tradeoff (SAT), an issue that is created due to favoring speed of a decision over accuracy of a decision due to environmental stressors and leads to error-prone-decisions. (OCD Uncertainty) However, in a study investigating decision-making of individuals with Obsessive Compulsive Disorder, SAT was found to decrease in areas with high uncertainty perceptual contexts that caused longer response times due to higher decision based thresholds. (Antonella et al., 2019) Essentially, if an individual had an extremely unfamiliar situation, there was a significant increase in the individual taking longer to process and respond with a decision. This is contrary to some other studies, but has suggested that there is potentially a threshold for ambiguity, or a maximal level when ambiguity hinders the SAT, in decision-making that may take place in multiple settings including healthcare environments.

The complexity of decision-making is not solely focused on the healthcare setting, and can often be found with research involving economic decision-making. This style of research is focused on assessing goods and services and on how decisions require trade-offs and compromises which can be usefully applied to healthcare decision-making. (Papinkolaou & Palfreyman, 2013) The Rational Choice Theory posits individuals take into account the motivational value and probability of expected gains in decisions in order to maximize outcomes according to the subjective value of these decisions. (Patterson et al., 2012) Animals and humans constantly make decisions based on imperfect, ambiguous perceptual information necessary to survive. (Miller & Katz, 2013) This process is affected by neural noise, or random intrinsic fluctuations in the neuronal networks, and makes the decision-making process more complicated with increased levels of neural noise because of the additional stimuli. Neural noise is further increased through the process of acquisition, processing and filtering of information through sensory transduction within the central nervous system. (Lee & Seo, 2016) Through previous research this detailed process has impacted alternative forced choice tasks in past research. (Miller & Katz, 2013) In the healthcare setting, neural noise comes from sources such as patients, machines, or co-workers. Each source can influence the ability to make a decision in the current situation because health care workers are constantly multi-tasking.

There are other facets of the decision-making process that also may impact patient care, including the pathways of decision-making that take place on a neural level. There are two distinct neural pathways for decision-making, the first pathway relies on concepts of analytical, detail focused decision-making while the second pathway focuses on affective, emotionally linked decision-making which was identified in the Affective Decision-making Heuristic. (Mikels et al., 2011) Past research utilized the Heuristic to identify age differences in decision-making, resulting in the possibility that the two are actually two distinct subsystems of the brain instead of one dual mode decision process. (Mikels et al., 2011) One of the subsystems focuses on the emotionally linked decision-making process while the other focuses on the more logical, analytical decision-making process that is less impacted by emotions. (Mikels et al., 2011) Different decisions require different processes since they involve different stakes- higher decision processing requires a higher capacity for decisions on a neural level. (Lee & Seo, 2016) The differences in the neural network of decision-making are important because it allows individuals to understand how patient interaction and care can be impacted. If a healthcare worker forms an emotional attachment with a patient, there may be increased likelihood to process decision-making through a more emotionally linked pathway. (Lamb & Sevdalis, 2011) At the same time, an individual may be attempting to avoid caretaker burnout and thus build less emotional attachment, which may lead to them relying on more logically, analytically processed decision-making. Modern life is full of complex decisions in which inferences rely on logical memory or emotional states, and the labeled affective heuristic has identified that relying on solely affective, intuitively connected decision-making, may lead to poor decisions based on emotional influences. (Mikels et al., 2011) In the case of the healthcare system, complex decision-making is a daily requirement, with healthcare providers rarely being able to fully predict what may occur throughout the day. How will all of these aspects impact decision-making in the healthcare environment?

The current study will investigate how induced situational factors such as pressure affects decision-making accuracy. It is hypothesized that the group of participants that have added pressure will be more likely to have significantly faster and less interaction-based decisions compared to the group of participants that have no pressure. A second hypothesis for the pressure condition is that the overall study will take less time in comparison to those in the no pressure condition. If our hypothesis is supported we will contribute to the growing research on decision making and contribute to research on healthcare workers.

Methods

Participants

The participants of this study were 183 undergraduate students from the University of Wisconsin-Lacrosse. Participants were recruited from the SONA participant pool for Psychology courses and received extra credit for their participation. Participants ranged in age from 18 to 40 years (M = 19.00, SD = 1.96) and consisted primarily of females (19% male, 81% female). The participants primarily identified as Caucasian (91%), and the remainder identified as Asian or Pacific Islander (6%), Native American (2%), Hispanic or Latinx (6%), African American (2%), or Other (1%). Participants were primarily first year students (57%), and the rest identified as second-year students (30%), third-year students (8%), and fourth-year students (3%). Participants all had background experience in the healthcare field. The participants' healthcare experiences were primarily in nursing home settings (29%). The other health-care experiences were in assisted living facilities (21%), hospitals (15%), clinics (9%) or other (25%). Lastly, the majority of the healthcare experience type was volunteering (72%), and the rest was between paid positions (24%) and internships (4.0%).

Materials and Procedures

Participants completed the experiment in Qualtrics. All participants were required to take the survey on a computer; the survey could not be completed on a mobile device. Mobile devices could not be used to accurately display the experiment and survey scales, thus all participants received a written note to take it on the computer. All participants that attempted to take the survey on the mobile device were excluded from the results.

All participants took a basic demographic survey with advanced questions about their previous healthcare experiences. (Figures 1-3) Following the demographics, participants completed the State Trait Anxiety Inventory (citation) to assess current levels of stress, anxiety, and pressure. The study included four medically-related ethical dilemmas. Participants were prompted to take the perspective of different healthcare professionals when reading the scenarios (Table 1). The participants experienced all four of the scenarios in a randomized order. Participants were randomly assigned to the pressure condition (experimental) or no pressure (control). The pressure condition is defined by a pressurizing text statement in the instructions before the scenarios and a 90 second time limit for completing each scenario

After each scenario, participants were asked to make a decision regarding patient outcome for each of the four scenarios. The dilemmas in the experiment were 1) Withholding Patient Diagnosis, 2) Omission of Treatment Options, 3) Co-Worker Mishaps Towards Patients, and 4) Lack of Equitable Care Among Patients. The Healthcare Position perspective were 1) Certified Nursing Assistant (CNA), 2) Medical Assistant, 3) Registered Nurse (RN), 4) Personal Care Worker (PCW). After deciding on an outcome, participants completed three scales : Confidence in Decision Making, Pressure Felt Relating to the Decision, and Anxiety About the Decision. Each of the scales were on a 1-100 scale, with 100 being the extreme of each feeling.

Results

Anxiety Scoring

First, an independent t-test was conducted to assess for significant differences between the two conditions on the State Trait Anxiety Survey. The test revealed no significant differences between the anxiety scores (t = -.37, p = .711) in the no pressure condition (M = 2.33, SD = .89) and in the pressure condition (M = 2.37, SD = .84). Overall, these scores reflect low anxiety levels for the participants before reading the scenarios. These results suggest that the participants have relatively similar anxiety scores across conditions prior to the scenarios and that any anxiety the participants later reported was based on the scenarios.

Timing

All of the sessions were timed; each specific scenario was individually timed as well. Although participants in the pressure condition took less time to read and make decisions (M = 501.98 sec, SD = 232.6) than participants in the no pressure condition (M = 612.9 sec, SD = 522.1); participants in the pressure condition were not significantly slower (t = -1.28, p = .181) There were also no significant differences when comparing individual scenarios across conditions. See Table 1.

Across the first scenario, there were no significant differences (t = -1.09, p = .202) in the pressure (M = 73.2

sec, *SD* = 23.4) or the no pressure condition (*M* = 101.3 sec, *SD* = 41.5). Within the second scenario, there were no significant differences (*t* = -1.79, *p* = .308) in the pressure (*M* = 87.3 sec, *SD* = 19.8) or the no pressure condition (*M* = 119.3 sec, *SD* = 38.9). Inside the third scenario, there were no significant differences (*t* = -2.08, *p* = .158) in the pressure (*M* = 81.2 sec, *SD* = 43.4) or the no pressure condition (*M* = 97.6 sec, *SD* = 61.2). Within the fourth scenario, there were no significant differences (*t* = -2.17, *p* = 1.12) in the pressure (*M* = 88.8 sec, *SD* = 51.2) or the no pressure condition (*M* = 100.5 sec, *SD* = 44.4).

Scale Responses

Each participant responded to the scales for each scenario on Perceived Time Pressure, Confidence in Making the Decision, and Anxiety About the Decision which are displayed in Table 1. In comparing each scenario through Independent T-Tests, none of the results were significantly different in any of the three scales. To determine the overall perceived felt pressure, overall confidence in the decision, and overall felt anxiety about the decision across the two conditions, an Independent t-test was utilized to compare the two conditions for each scale. There were no significant differences within the perceived pressure scale (*t* = 2.89, *p* = .304) between the no pressure condition (*M* = 49.58, *SD* = 29.1) and pressure condition (*M* = 45.63, *SD* = 28.5). There were no significant differences within the felt confidence scale (*t* = 1.73, *p* = .274) between the no pressure condition (*M* = 69.5, *SD* = 21.2) and pressure condition (*M* = 67.05, *SD* = 23.2). There were no significant differences within the felt anxiety scale (*t* = 2.23, *p* = 1.09) between the no pressure condition (*M* = 44.95, *SD* = 25.6) and pressure condition (*M* = 45.08, *SD* = 28.03).

Patient Outcome Responses

The responses of each participant were recorded to determine what level of interaction an individual would assume to have inside each scenario on a 1-6 scale with 1 being the highest level of involvement and 6 being the lowest level of involvement. All responses were personalized for the scenarios but had a general format for each answer. The first three responses in all the scenarios indicated a direct involvement with the patient/co-worker or someone close to them in the healthcare setting in order to assist the patient/co-worker while the last three responses indicate significantly less involvement in the patient/co-worker care. All responses except for the sixth responses indicate having care over the well-being of the patient/co-worker in the scenario. In the first scenario, the average response for the no pressure condition was 3.02 and was 3.12 in the pressure condition. In the second scenario, the average response for the no pressure condition was 2.63 and was 2.51 in the pressure condition. In the third scenario, the average response was 1.78 in the no pressure condition and was 1.84 in the pressure condition. In the fourth scenario, the average response was 1.89 in the no pressure condition and was 1.92 in the pressure condition. In all but the second scenario, the no pressure condition indicates slightly more direct interaction/involvement in the patient care/co-worker assistance. See Figure 1. On average, the participants selected more active interventions within all four of the scenarios. Inside the first scenario, the mode of both the no pressure and pressure condition was 3. In the second scenario the mode was 3 for the no pressure scenario and was 2 for the pressure scenario. The third and fourth scenarios displayed the same mode for both the no pressure and pressure conditions being 2 in all conditions.

Table 1. Participants' responses to follow-up questions

Conditions	No Pressure	Pressure
Perceived Time Pressure*		
Scenario 1	*M* = 59.6, *SD* = 28.5	*M* = 54.8, *SD* = 28.4
Scenario 2	*M* = 47.6, *SD* = 28.8	*M* = 46.0, *SD* = 27.3
Scenario 3	*M* = 47.6, *SD* = 29.2	*M* = 46.1, *SD* = 30.8
Scenario 4	*M* = 43.1, *SD* = 29.9	*M* = 35.6, *SD* = 27.3
Confidence in Making the Decision*		
Scenario 1	*M* = 61.2, *SD* = 24.3	*M* = 59.2, *SD* = 24.5
Scenario 2	*M* = 66.5, *SD* = 21.8	*M* = 64.3, *SD* = 22.5
Scenario 3	*M* = 73.9, *SD* = 20.5	*M* = 73.2, *SD* = 21.2
Scenario 4	*M* = 76.4, *SD* = 17.9	*M* = 71.5, *SD* = 24.5
Anxiety About the Decision*		

Scenario 1	$M = 56.0$, $SD = 27.5$	$M = 53.2$, $SD = 27.1$
Scenario 2	$M = 41.3$, $SD = 26.0$	$M = 44.0$, $SD = 26.4$
Scenario 3	$M = 44.2$, $SD = 27.2$	$M = 41.2$, $SD = 28.4$
Scenario 4	$M = 38.3$, $SD = 21.6$	$M = 41.9$, $SD = 30.2$

***All scales are on a 1-100 scale, with 100 being the most extreme form of the felt pressure, felt confidence, or felt anxiety**

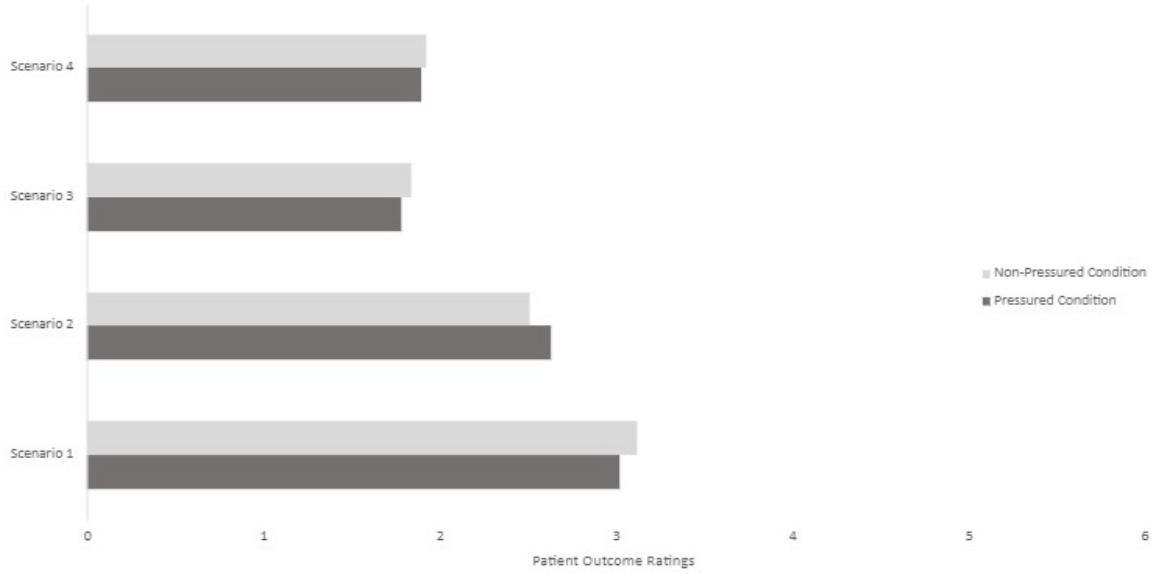

Figure 1. Patient Outcome Ratings per Scenario

Discussion

The first hypothesis is that participants in the pressure condition would take less time in making decisions within each scenario with less beneficial outcomes for patient care. The first hypothesis was not supported. Although the individuals in the pressure condition did take less time to complete the scenarios on average, there was not a significant difference within the individual scenarios. This suggests that participants may have rushed their decisions on the scenarios within the pressure condition. However, the impact of pressure on the decision-making process was not significant across the conditions despite there being a difference between the study completion timing. Potentially, the awareness of the time limit may have led to slightly shorter response times per participant in the pressurized scenarios but again, these were not significantly different from those responding to the no pressure scenarios. The time limit may have made a difference in the response times for scenarios, but it did not cause significant changes for the online study environment.

There was the expectation that participants in the pressure condition would have felt increased perceived time pressure due to the time limit and the written statement indicating the time limit. However, this was not supported in participants' responses to the pressure scale. On average, although not significantly different, those in the no pressure condition generally felt increased pressure in comparison to the pressure condition but still took longer time to complete the study, which was contrary to the expectation of the study. A potential explanation for this is that individuals in the pressure scenario were aware of the time limit, understanding that a decision needed to be made within this time while those in the no pressure condition had no framework for making the decision thus felt the need to rush and make a decision.

For the anxiety scale, there was also an expectation that there would be higher levels of anxiety about the decision within the pressure condition due to the time constraints. Interestingly, there was an even split between the two conditions with the first and third scenarios resulting in higher average anxiety levels for the no pressure condition while the second and fourth scenarios revealed higher anxiety levels for the pressure condition. The

confidence scale was expected to be lower in the pressure condition due to the time constraints. Although not significantly different for any specific scenario, the average confidence levels for participants in the pressure condition were lower that participants in the no pressure condition which was potentially due to the time constraints resulting in less confidence for each decision made.

The first hypothesis also investigated the patient care based responses per the scenario, assuming that there would be increased direct involvement in the patient care within all scenarios. With the exception of scenario 2, there were more direct involvement responses for participants in the no pressure condition; scenarios 3 and 4 displayed the most direct involvement. The responses for scenarios 3 and 4 laid between either directly involving the participant (as the assumed healthcare worker) in the patient care or directly involving an individual close to the patient/co-worker. For these reasons, the first hypothesis was supported within the patient outcome analysis for all scenarios except for scenario 2. However, it is important to note that none of the scenarios were significantly different from the other in the interaction-based responses. Another important note is that participants experienced all scenarios in a randomized order, thus the pattern of scenarios 3 and 4 having further increased interaction-based responses is not simply due to these two scenarios being last in order of responses read.

The second hypothesis investigated the overall timing of the pressure and no pressure conditions, having the expectation that those in the no pressure condition will take more time to complete the overall study. This hypothesis was supported in that individuals within the pressure condition on average took less time to complete the overall study as well as less time within all four scenarios. However, the difference in overall length between the two conditions is not significantly different, just that the average times per overall time length in each condition supports the hypothesis. This result suggests the time limit in the pressure condition may have had an influence on how long an individual took to read and respond to the ambiguous and stressful healthcare scenarios within the study.

Limitations

This study was designed with the intention of being an in-person study with higher ability to manipulate the pressure conditions through videos and auditory pressure. Due to Covid-19, this study took place online, decreasing the ability to manipulate pressure and to control for external factors impacting the results. The initial design of this study also included the utilization of an EEG to investigate the neural differences across the two conditions across all studies, however this could not occur due to the lack of an in-person study.

Future Research

In the future, an in-person replication of the study techniques would be helpful in influencing pressure. If possible, assessing visual and auditory pressure through a video or real-life healthcare simulation within a similar study may lead to stronger effects. Having the ability to investigate neural decision-making differences through EEG systems would also be an interesting aspect to add to decision-making studies to better understand how pressure can influence decision-making through activating different aspects of the brain. Based on the findings of this study the pressure featured in this study was not sufficient to clearly support previous medical research, but future similar studies could increase the strength of the pressure variable to find more realistic results that may support previous research.

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