

2016

# Using health mind maps to capture patient's explanatory models of illness

---

<https://hdl.handle.net/2144/19525>

*Boston University*

BOSTON UNIVERSITY  
SCHOOL OF PUBLIC HEALTH

Thesis

**USING HEALTH MIND MAPS TO CAPTURE PATIENT'S  
EXPLANATORY MODELS OF ILLNESS**

by

**PABLO BUITRÓN DE LA VEGA**

M.D., Pontificia Universidad Católica, 2009  
M.Sc., Boston University, 2016

Submitted in partial fulfillment of the  
requirements for the degree of  
Master of Science

2016

© 2016 by  
Pablo Buitrón De la Vega  
All rights reserved

Approved by

First Reader

---

Barbara G. Bokhour, Ph.D.  
Associate Professor of Health Law, Policy & Management

Second Reader

---

Michael K. Paasche-Orlow, M.D., M.A., M.P.H.  
Professor of Medicine

Third Reader

---

Jack A. Clark, Ph.D.  
Associate Professor of Health Law, Policy & Management

## **DEDICATION**

I would like to dedicate this work to all my patients, who during the past 6 years of clinical practice, inspired me to develop Health Mind Mapping.

I would also like to dedicate this work to my parents Ricardo Buitrón and Maria Eugenia De la Vega, to my sister Ana Maria Buitrón, my brother José Buitrón and my spouse Andrea Jaramillo for their continuous support and encouragement throughout my years of study.

## **ACKNOWLEDGMENTS**

I would first like to thank my thesis advisors Barbara Bokhour, Michael Paasche-Orlow and Jack Clark for their guidance throughout this project.

I would also like to thank the facilitators who were involved in the health mind mapping process: Katherine Waite, Jocelyn Hernandez, Eunice Barros, Yenealem Teklemarian. Also, I thank Briana Dukas and Lori Henault for supporting the facilitators and recruitment of patients during the project.

Additionally, I would like to thank Carol Pineiro for her work as an editor of the thesis.

I would also like to acknowledge Rodolfo Cabrera and Tom Kavanaugh for their input during the development of Health Mind Mapping.

Furthermore, I would like to express my gratitude to Christopher Coe, María José Sánchez and Emily Armstrong for their help transcribing, coding, and analyzing the data.

Finally, I would like to thank my spouse Andrea Jaramillo for all her input during the development of Health Mind Mapping and for her unfailing support throughout the process of writing this thesis.

**USING HEALTH MIND MAPS TO CAPTURE PATIENT'S  
EXPLANATORY MODELS OF ILLNESS**

**PABLO BUITRÓN DE LA VEGA**

**ABSTRACT**

**Background:**

Management of chronic diseases has become one of the major challenges for the health care community. Most of disease management relies on patient's self-management, influenced in part by their illness perspectives or explanatory models of illness (EMI). Unfortunately, assessing patient's EMI and using this information to engage patients in chronic illness self-management continues to be a challenge. This is due to time constraints, ambiguity in the design of EMI assessments, lack of motivation, and low health literacy. This study used 'mind mapping', a graphic representation of ideas, to develop a process that captures EMI. We will refer to this process as "Health Mind Mapping" (HMM). We explored patient's experiences using HMM and potential uses of this tool during their care.

**Methods:**

20 adult (>18 years old) English and Spanish patients with uncontrolled (HbA1c >7%) type 2 diabetes were recruited from a primary care clinic. Participants developed their health mind maps with the guide of a facilitator. Each participant also completed a semi-structured interview in which patients were asked about their experience with HMM. The HMM process and qualitative interviews were video and audio recorded. Transcriptions were analyzed using grounded

thematic analysis to identify how patients perceived and were impacted by the process.

**Results:**

Two domains regarding the HMM process were identified: patient's perceptions of the process itself and patient's reports of potential uses of HMM. Three main themes related to the process itself emerged: 1) Helps to develop insight about self and illness; 2) Catalyst for taking actions to improve their illness; 3) Opportunity to actively share illness. Four main themes related to potential uses of HMM were identified: 1) Communicating their illness to others in their social network; 2) Communicating with their providers; 3) Share to help others with diabetes; 4) Use to encourage ongoing engagement in diabetes self-care.

**Conclusions:**

HMM helped patients to develop new insight about their illness and represented a catalyst for taking control of their illness. Additional research is needed to determine how to use HMM to facilitate patient communication and better engage patients in collaborative goal setting to improve self-care in chronic illness.



## TABLE OF CONTENTS

DEDICATION .....	iv
ACKNOWLEDGMENTS .....	v
ABSTRACT .....	vi
LIST OF TABLES .....	x
LIST OF FIGURES .....	xi
LIST OF ABBREVIATIONS .....	xii
GLOSSARY.....	xiii
CHAPTER ONE.....	1
ROLE OF PATIENT CENTERED CARE ON THE MANAGEMENT OF CHRONIC DISEASES .....	1
CHAPTER TWO.....	4
PATIENT CENTERED COMMUNICATION.....	4
CHAPTER THREE .....	10
HEALTH MIND MAPPING (HMM).....	10
CHAPTER FOUR.....	14
METHODS.....	14
CHAPTER FIVE .....	20
RESULTS .....	20

CHAPTER SIX.....	31
DISCUSSION.....	31
APPENDIX 1 .....	41
Patient Health Mind Map Semi-Structured Interview Guide .....	41
BIBLIOGRAPHY.....	44
CURRICULUM VITAE.....	57

## LIST OF TABLES

Table 1. Basic Elements of a Mind Map.....	10
Table 2. Semi-Structured Sample Questions .....	18
Table 3. Participant Characteristics.....	21

## LIST OF FIGURES

Figure 1. Patient centered care model .....	2
Figure 2: Mind Map Structure .....	11
Figure 3. Patient Health Mind Map Example .....	12
Figure 4. Health Mind Map of an elderly female with diabetes.....	20
Figure 5. HMM of a middle-aged female with obesity and diabetes.....	23

## LIST OF ABBREVIATIONS

CEI.....	Clinical Ethnographic Interview
CFI.....	Cultural Formulation Interview
EMI .....	Explanatory Model of Illness
HMM.....	Health Mind Mapping
OCF .....	Outline of Cultural Formulation
PCCommunication .....	Patient Centered Communication
PI .....	Principal Investigator

## GLOSSARY

**Explanatory Models of Illness.** How patients, as well as physicians, explain different domains of health.

**Health Mind Mapping.** Process that captures patient's explanatory models of illness by asking questions using a semi-structured interview and organizing answers using mind mapping.

**Mind Mapping.** Visual, non-linear representation of ideas and their relationships.

**Patient Centered Care.** Care that is respectful of and responsive to individual patient preferences, needs, and values and ensures that patient values guide all clinical decisions.

**Patient Centered Communication.** Content, processes, and outcomes of exchanges between patients and clinicians.

## **CHAPTER ONE**

### **ROLE OF PATIENT CENTERED CARE IN THE MANAGEMENT OF CHRONIC DISEASES**

The increasing burden of chronic diseases is one of the greatest challenges for health systems globally. In 2010 the global status report on non-communicable diseases showed that leading chronic diseases (cardiovascular disease, cancer, chronic respiratory disease, and diabetes) accounted for nearly two-thirds of deaths worldwide.<sup>1</sup> Chronic diseases also account for most of health care expenditures and are the main cause of poor health and disability in the USA.<sup>2</sup> It is projected that the negative socioeconomic impact of chronic diseases will continue to increase.<sup>1</sup>

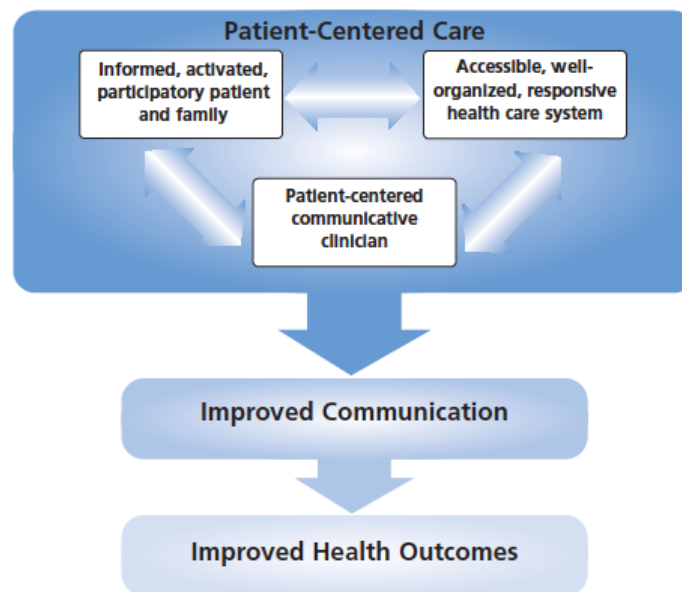
Chronic diseases are especially difficult to manage due to substantial self-management and coordination challenges that arise during the care of these conditions.<sup>3</sup> For example, many patients with diabetes mellitus need to effectively monitor their daily glucose levels, regulate their insulin regimens, exercise, and diet in the context of their work, home, and leisure routines.<sup>4</sup> At the same time, they also need to understand and process information from different care providers, making it even more challenging.<sup>5</sup> Despite available evidence based treatments shown to improve outcomes, many patients with chronic diseases continue to have suboptimal control of their illnesses.<sup>6</sup>

Patient centered care is essential to helping patients attain the skills needed to manage their chronic conditions.<sup>7,8</sup> This has been defined by the Institute of

Medicine as “care that is respectful of and responsive to individual patient preferences, needs, and values” and ensures that “patient values guide all clinical decisions.”<sup>9</sup> Patient centered care has its base in the following three core values:<sup>10</sup>

- 1) Considering patients’ needs, wants, perspectives and individual experiences
- 2) Offering patients opportunities to provide input into and participate in decision-making about their care
- 3) Enhancing partnership and understanding in the patient–physician relationship.<sup>10</sup>

Patient-centeredness is noted to be a quality that relates not only to individual providers but also to the health care system.<sup>9</sup> A conceptual model of patient centered care and how it relates to health outcomes is shown in Figure 1.



**Figure 1. Patient centered care model<sup>11</sup>**



This conceptual model shows how *activated, participatory patients* that have appropriate access to *health care systems* and experience *patient centered communication* can achieve patient centered care leading to positive health outcomes. Prior studies have shown how strategies developed to improve different areas of the patient centered care model could help to achieve better health outcomes including patient satisfaction,<sup>12</sup> treatment adherence<sup>13</sup> and functional status.<sup>4</sup> It is also important to note that deficits in any one area of the model can significantly impact the quality of patient care.<sup>11</sup>

In spite of being recognized by the Institute of Medicine as one of six key elements of high-quality care<sup>9</sup>, patient centered care implementation in clinical practice is limited. In the following sections, strategies that have shown to improve areas of *patient centered communication* as well as barriers to their implementation in the care of patients with chronic illnesses will be discussed.

## CHAPTER TWO

### PATIENT CENTERED COMMUNICATION

Patient centered communication (PCCommunication) is one of the critical elements of patient centered care.<sup>11</sup> PCCommunication involves the content, processes, and outcomes of exchanges between patients and clinicians and can be operationalized into 4 important areas:<sup>11, 14</sup>

1. Eliciting and understanding the patients' perspective, concerns, ideas, expectations, needs, feelings, and functioning.
2. Understanding the patient within his or her unique psychosocial context.
3. Reaching a shared understanding of the problem and its treatment with the patient that is concordant with the patient's values.
4. Helping patients to share power and responsibility by involving them in choices to the degree that they wish.

Studies have shown that achieving PCCommunication results in less patient anxiety,<sup>15</sup> higher quality of life in cancer patients,<sup>16</sup> better emotional health,<sup>17</sup> better blood glucose control,<sup>17</sup> higher patient activation,<sup>18</sup> higher patient satisfaction,<sup>19</sup> and higher functional health literacy.<sup>20</sup> Even though this evidence makes PCC appear like a very intuitive and inviting concept to be applied in patient regular care,<sup>21</sup> implementing elements of patient centered communication could have downsides. For example, a randomized study of patients' preferences showed that 31% of patients did not prefer a patient centered communication style having the potential to negatively affect their outcomes if they were exposed

to it.<sup>22</sup> Thus, providers should modify their communication style to try to match patient preferences.<sup>23</sup>

The relevance of PCCommunication and how this relates to improving health outcomes has been studied over the last decade. The anthropologist Arthur Kleinman has extensively studied the significance of understanding the patient's perspectives about their illness, the first and second area in the operational definition of PCCommunication. In 1980, Kleinman described how patients, as well as physicians, have their own "explanatory models of illness (EMI)" that attempt to explain different domains of health.<sup>24</sup> EMI reveals how people make sense of their illness and provides a framework for healthcare providers to engage with patients in understanding their lived illness experience.<sup>25</sup> Prior literature shows how eliciting and understanding the patient's perspective, a key component of PCCommunication, is associated with better health outcomes.<sup>26,28</sup> Providers that have an adequate understanding of their patient's perceptions about their illness could better personalize treatments, educate patients using language that they can understand, and validate their emotional states.<sup>29,30</sup> Unfortunately, providers frequently misjudge patients' perspectives regarding their preferences,<sup>31,32</sup> treatment adherence,<sup>33</sup> and health beliefs.<sup>25,34</sup> If the explanatory models of physicians and patients are not concordant, the physicians' recommendations may not make sense to the patients and this could greatly impact their satisfaction, adherence, and clinical outcomes.<sup>35,36</sup>

There are different processes and tools that have been developed to capture and understand patient's perspectives and psychosocial context. Kleinman proposed seven questions to elicit some of these domains:<sup>37</sup>

1. What do you call this problem?
2. What do you believe is the cause of this problem?
3. What course do you expect it to take? How serious is it?
4. What do you think this problem does inside your body?
5. How does it affect your body and your mind?
6. What do you most fear about this condition?
7. What do you most fear about the treatment?

These questions have been used to develop more structured individual assessments of patient's EMI. Some of the first developed standardized tools were the "Short Explanatory Model Interview",<sup>38</sup> the "Illness perception questionnaire"<sup>39</sup> and the "Explanatory Model Interview Catalogue".<sup>40</sup> Assessments of patient's explanatory models using these tools or variations of them have been done in a variety of health and illness states including tuberculosis, heart failure, fibromyalgia, chronic obstructive pulmonary disease and chronic venous disease.<sup>41-44</sup> Some of these studies have shown how emotional domains from the EMI could be significantly associated with distress and more consultations.<sup>45</sup> Others have shown how illness perceptions can independently predict physiological and behavioral outcomes and diabetes self-management.<sup>46</sup> These previously mentioned studies explored explanatory

models of illness and their association with some health outcomes but none of them have assessed if these assessments of EMI could be implemented in the daily care of patients with chronic diseases or the actual impact that implementing assessments of EMI could have on health outcomes.

Further studies regarding Kleinman's explanatory model of illness work led to the development of the outline of cultural formulation (OCF). The OCF organized clinical information in four domains: (1) cultural identity of the individual, (2) cultural explanations of illness, (3) cultural interpretation of psychosocial stressors, supports, and levels of functioning, and (4) cultural elements of the patient-clinician relationship.<sup>28</sup> The goal of the OCF was to help clinicians identify cultural and contextual factors relevant to diagnosis and treatment.<sup>28</sup> Clinicians have reported that using the OCF helped to improve communication and reduce diagnostic and treatment errors.<sup>28</sup> The OCF was operationalized using a semi-structured interview process in order to facilitate its implementation in the clinical practice and was called the Cultural Formulation Interview (CFI).<sup>28</sup>

Other strategies have been developed as alternative assessments of patient's perspective about their illness. One of them, the "McGill Illness Narrative Interview,"<sup>47</sup> was developed with the goal of assessing patient's perceptions in culturally diverse patients. This comprehensive interview is well designed for research, but concern has been raised that it may be too challenging for clinicians to use for routine practice.<sup>48</sup> Another assessment tool called "Clinical Ethnographic Interview (CEI)" was developed with the goal of creating a user-

friendly ethnographically appropriate instrument to gather clinically pertinent information in a short time.<sup>48</sup> However, significant implementation barriers exist, as the CEI takes an average of 60 minutes to complete and was conducted by trained researcher in patients' homes.<sup>48</sup>

Despite the known significance of understanding patient's explanatory models of illness and the tools available to assess a patients' EMI, this aspect of PCCommunication appears to be rarely explored and no evidence of systematic implementation in clinical care could be identified.<sup>49</sup> The factors that make it challenging to successfully implement the assessment of patient's EMI as part of their clinical care are related to characteristics of both providers and patients.<sup>50-52</sup> From the physicians' perspective, lack of conceptual relevance between the assessment tool and the patient's problem, questions irrelevant or eliciting repetitive content, severity of patient's illness, lack of buy-in due to perceptions of no added benefit to patient care, and extensive time needed to develop the interview were the most common reported barriers.<sup>53</sup> From the patients' perspective, a lack of differentiation from standard provider interviews, lack of motivation to answer because of feeling uncomfortable talking about past experiences and lack of clarity about the meaning of the questions were the most commonly reported barriers.<sup>53</sup>

Unsuccessful implementation of EMI assessment as part of regular patient care has important consequences. For example, reaching shared understanding of a Diabetes treatment plan would likely be unsuccessful if an adequate

understanding of the patient's EMI had not been initially achieved by the provider. Similarly, inviting this same patient to share power and responsibility regarding management of his/her illness would likely be unsuccessful if the patient did not have the opportunity to reflect on their own EMI. Thus, it is extremely important to develop a process integrated into routine patient care that can not only assess patient's EMI, but also create an opportunity for the patients to reflect and better understand their own EMI. Achieving this can help other areas of PCCommunication to unfold and as a consequence help in attaining patient centered care across health literacy levels. This study aims to examine a novel process developed to assess patient's EMI called Health Mind Mapping.

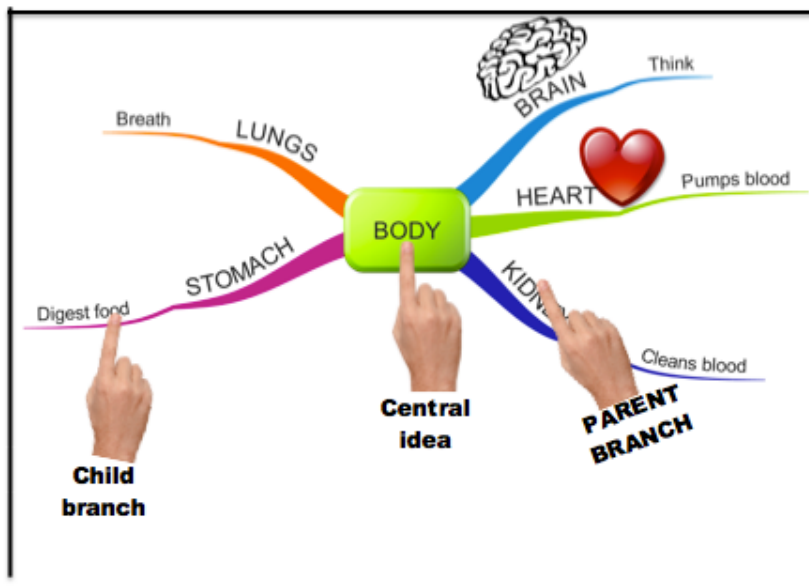
## CHAPTER THREE

### HEALTH MIND MAPPING (HMM)

HMM is a process that captures patient's explanatory models of illness by asking questions using a semi-structured interview and organizing answers by using a visual, non-linear representation of ideas and their relationships called mind mapping.<sup>54</sup> It is a simple technique that is easy to teach and helps people organize and represent their ideas. The structure of a mind map has 3 basic elements as illustrated in Table 1 and Figure 2.

Element	Starting point	Format	Color	Purpose
<b>1. Central idea</b>	Center of the page	Any shape or drawing	Any	Topic of the mind map
<b>2. MAIN BRANCHES/ PARENT BRANCHES</b>	Central idea	Line or box	Any	Keyword or Idea related to the central topic
<b>3.Sub-branches/Child branches</b>	Main branch or child branch	Line or box	Same color as the branch from where it starts	Key word or idea related to the MAIN BRANCH
<b>Table 1. Basic Elements of a Mind Map</b>				





**Figure 2: Mind Map Structure**

The central idea represents the main topic of the mind map; parent branches represent ideas related to the central idea, and child branches represent ideas related to the parent branches. Studies have shown that mind mapping can be learned and used by a broad spectrum of individuals including sixth graders,<sup>56</sup> eighth graders,<sup>55</sup> nurses,<sup>57</sup> and physicians<sup>58</sup>.

In HMM, a facilitator guides the patient to develop his/her own mind map about their EMI. The process starts with the patient drawing a representation of their body in the center of a blank sheet of paper. Drawing a representation of their body as the central idea aims to engage the patients in the process of sharing the perspectives of their illness. Prior research studies have shown that using body representations is a powerful tool for eliciting individual experiences.<sup>59</sup> After drawing the central idea is finished, the facilitator asks the patient non-structured interview questions to elicit their perspectives regarding their illness.

This semi-structured interview includes 12 items derived from both explanatory models of illness (EMI)<sup>37</sup> and CFI<sup>53</sup> questions. The 12-item interview is included in Appendix 1. In addition, three more items were added derived from a study that assessed patients' EMI about diabetes.<sup>60</sup> While the patient verbally answers the questions, the facilitator asks the patient to use the fewest words to write down the answers using the mind mapping technique. A sample of a HMM can be seen in Figure 3.



**Figure 3. Patient Health Mind Map Example**

HMM guides the patients to visually identify their EMI. This process incorporates some novel characteristics. Patients with different health literacy levels might be able to do it, as they can use their own words and explanations during the process without the need to use sophisticated language or appropriate

spelling. The end product from HMM process is a graphic depiction of the patients EMI that belongs to the patient and can be taken home. This is different from other EMI assessments where the end product belongs to the providers and is not available to the patient to see or reflect on after the interview. By making patients develop and keep the assessment, we aim to improve their motivation and buy-in into the process.

HMM is a novel process and has not been previously studied. Thus, qualitative methods were used to examine patients' perceptions after experiencing HMM. The aim of the study was to understand how patients engage with and experience HMM as well as to explore patient's perceptions about potential uses of HMM in their day-to-day lives.

## CHAPTER FOUR

### METHODS

#### **Study Design:**

Qualitative methods were used to explore patients' perceptions in regard to their experience developing a Health Mind Map and potential uses of Health Mind Mapping during their care.

#### **Participants and setting:**

Patients were recruited from primary care clinics at Boston Medical Center (BMC). BMC primary care is a safety net practice with an interdisciplinary approach where nurses, nurse practitioners, physicians, medical assistants and care coordinators collaborate in the management of patients' chronic diseases. Assessment of patient's perspectives about their illness has not been implemented or formally used in any of the primary care clinics at BMC.

*Inclusion criteria:* All adult patients (>18 years old) with uncontrolled diabetes type 2 (hemoglobin A1C >7), English and Spanish speaking were included.

Participants were also included if they self-reported ability to read and write.

During the recruitment process, only one participant interested in participating did not enter the study due to reporting not being able to read and write.

*Exclusion criteria:* Blind, cognitively impaired, speaking another language that is not English or Spanish and unable to consent.

#### **Recruitment:**

Primary care physicians in the internal medicine department identified

participants that met inclusion criteria in order to provide them with a flyer about our research project with the principal investigator contact information; they also asked them for permission to share their contact information with us in order to contact them about the study. Participants that contacted us and agreed to participate in the study scheduled a meeting to perform the informed consent process, the participant health mind map activity, and the qualitative interview. Before the scheduled meeting started, the study objectives were explained to the participants, who then confirmed their comprehension of the goals of the project and the fact that participation was voluntary – and to sign the consent form if they remained interested. Participants were explained that the main purpose of the study was to explore a novel process developed to assess their perceptions regarding their illness by writing down their thoughts and ideas on a piece of paper. Participants also completed a questionnaire to collect their socio-demographic characteristics. The principal investigator performed all the recruitment process.

**Intervention:**

After the consent process and socio-demographic questionnaire were completed, the facilitator privately met with the participants to guide them to develop their health mind map. As previously described, Health Mind Mapping is a process that captures participant's EMI by asking questions using a semi-structured interview and organizing answers by using mind mapping. Facilitators previously trained by the principal investigator (PI) guided the participants to

develop a health mind map. Five facilitators were recruited for the study: two medical assistants, one care coordinator, and one research assistant. Each one of the facilitators was individually trained in a single session by the lead investigator in how to guide research participants to develop a health mind map. The training time for each facilitator varied between 40–60 minutes and involved working through a training manual that had been prepared for this project. The training of facilitators was organized using the following steps:

1. Facilitators were introduced to the basic concepts of health mind mapping and the steps needed to develop a health mind map.
2. PI guided facilitators to develop their own health mind map by asking them to pretend to be a patient with diabetes. Subsequently, the facilitators and PI debriefed about the process, and the facilitators asked clarifying questions.
3. The PI simulated being a patient with diabetes, and the facilitator guided the PI to develop a Health Mind Map.
4. For further reference, each facilitator was given a copy of the training manual, which included a detailed guide of how to facilitate health mind mapping and a box of colored pencils.

Facilitators met privately with the participants to develop their health mind map. During the first facilitator-provider encounter, the PI stayed in the room and passively observed the interaction between facilitator and participant until the participant was able to develop his/her central idea and parent branch in the

health mind map and then left the room.

The facilitation of the process occurred as follows:

1. Facilitator Introduced the participant to Mind Mapping and the Health Mind Mapping process
2. Facilitator guided the participant to draw a health mind map:
  - a. **Demonstration:** At normal speed, the facilitator demonstrated the participant how to draw a regular mind map
  - b. **Deconstruction:** Facilitator demonstrated what was done while describing the steps
  - c. **Comprehension:** Participant described the steps that were taken to create the mind map
  - d. **Performance:** The participant drew his/her health mind map

This four-step approach was used in order to simplify the process of teaching how to do a health mind map and ensuring that the facilitators broke the process into manageable steps.<sup>61</sup> The process of developing the health mind map was videotaped and recorded. At the end of the process, the participant had the choice of taking the health mind map with them. A copy of the health mind map was made and retained for the research team as well.

**Data collection:**

**Qualitative interview:** After the participant finished developing their health mind map, they participated in a semi-structured qualitative interview with the principal investigator. Sample questions are provided in Table 2. The qualitative interview

was recorded and transcribed verbatim. The qualitative interview, which also included having the participant describe and share the health mind map already created, assessed 3 different areas:

1. Participant's experience during the health mind mapping process
2. Participant's perceptions regarding how they could use their health mind map during their care
3. Recommendations from the participants regarding how to improve the process

After the qualitative interview ended, participants were asked for permission to share their health mind map as part of the results of the study.

Topic	Participant Interview Guide
Experience of participation	What was it like for you to do the health map? How was it to think about your health and your diabetes using the health mind map?
Perception of what was meaningful about health mind mapping	Did you learn anything new about yourself and your diabetes from doing the health mind map?
Potential uses of health mind maps	Now that you have finished your health map: What do you think you might do with it in the future?
Sharing the Health Mind Map	Now that you completed the map, what important message would you like to share about it? What do you think about sharing your health map with somebody else?
<b>Table 2. Semi-Structured Sample Questions</b>	

### Data Analysis:

Interviews were transcribed verbatim. Transcriptions were uploaded to NVIVO software version 11. After data collection, all transcripts were analyzed



qualitatively using procedures modified from grounded theory methodology.

Transcripts were analyzed line by line, coding the text with labels that explained the meaning of the participants' ideas. Subsequently, codes that referred to similar content were grouped into concepts and then more broadly into categories. To increase validity, the principal investigator, and one other person independently read and coded two participant transcripts, then met to compare and discuss similarities and differences in definitions of codes. Afterwards, a third investigator reviewed the initial codes with their definitions and further discussed similarities and differences between them in order to synthesize codes into broader themes. The two investigators inductively coded five interviews concurrently to develop one master code list. Subsequently, all 20 interviews were independently coded (Principal investigator – 12 interviews; co-investigator – eight interviews). The coders met frequently to discuss coding progress and any disagreements. Coding disagreements were settled by discussions and consensus among the study team.

## CHAPTER FIVE

### RESULTS

The study included 20 participants who completed the health mind mapping process and the qualitative interview across primary care practices at BMC. Figure 4 is an example of a Health Mind Map developed by one participant.

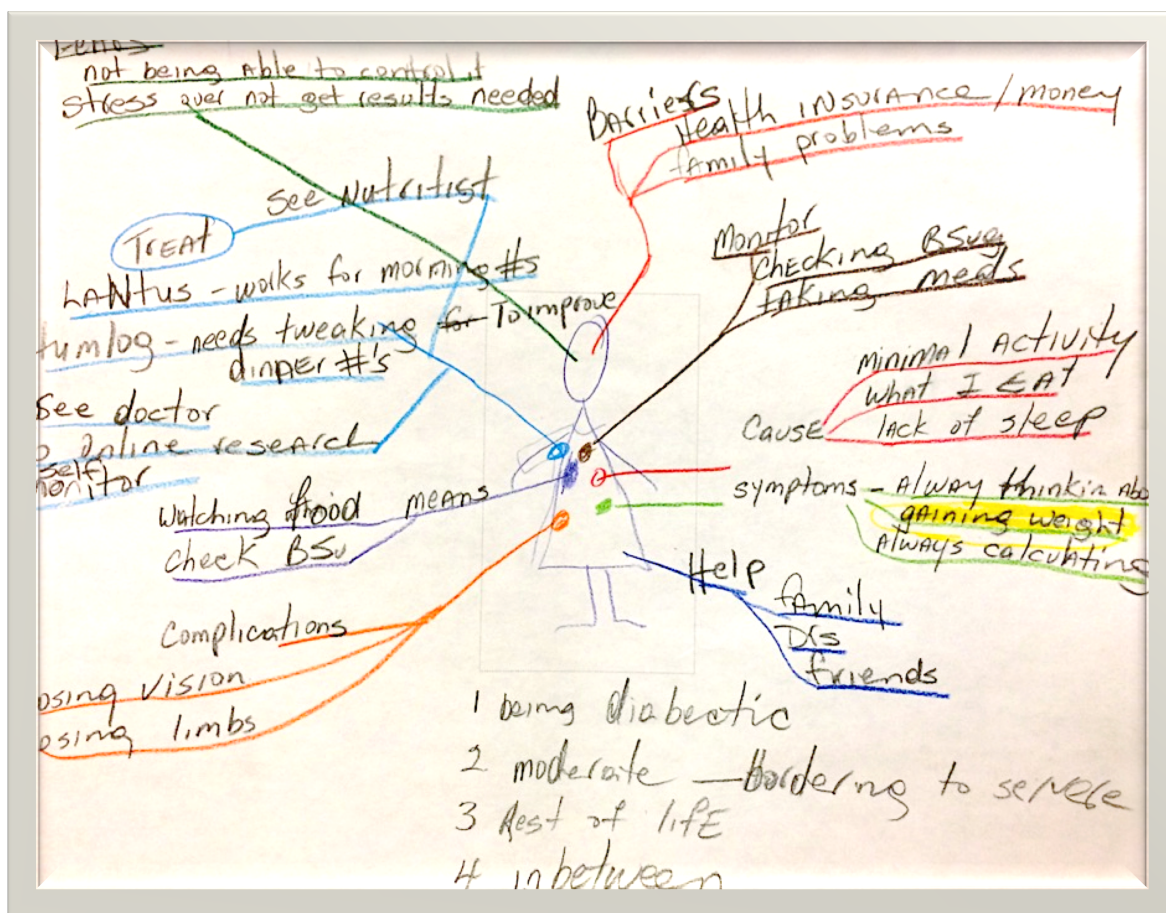


Figure 4. Health Mind Map of an elderly female with diabetes.

Her health mind map shows how family and income represent a barrier to improving control of her illness. It is important to note that by using EMI questions as prompts, this participant did not only depict domains of her EMI but also other domains that pertain to activities of her daily life.

From 20 participants, the majority were female (65%), aged 41–74 and had mixed levels of education. Characteristics of participants are displayed in Table 3.

<b>Table 3. Participant Characteristics</b>	
<i>Age</i>	
Range	41–74
Mean	59.25
<i>Sex</i>	
Male	7
Female	13
<i>Race</i>	
African American	16
White	2
Hispanic	2
<i>Educational Status</i> **	
Elementary school	1
Some high school	3
High school graduate	8
Some college / technical school	1
Completed college	4
Some graduate school	1
<i>Hemoglobin A1C</i>	
Range	7.1–12.2
Mean	8.9
** Data missing for 2 participants	

Twenty interviews were sufficient to achieve thematic saturation. We initially anticipated that this would be an effective process to help participants

capture their explanatory models of illness. However, in addition, it had a profound impact on participant's awareness about their illness potentially transforming their approach to managing their diabetes. Two major domains regarding the HMM process were identified: 1) participant perceptions of the process itself, and 2) participant reports of the potential use of HMM in the future.

**A. Participant perceptions about Health Mind Mapping (HMM) process:**

Three main themes emerged to illustrate how participants viewed the process of developing a health mind map: 1) Helps to develop insight about self and illness; 2) Catalyst for taking actions to improve their illness; 3) Opportunity to actively share illness.

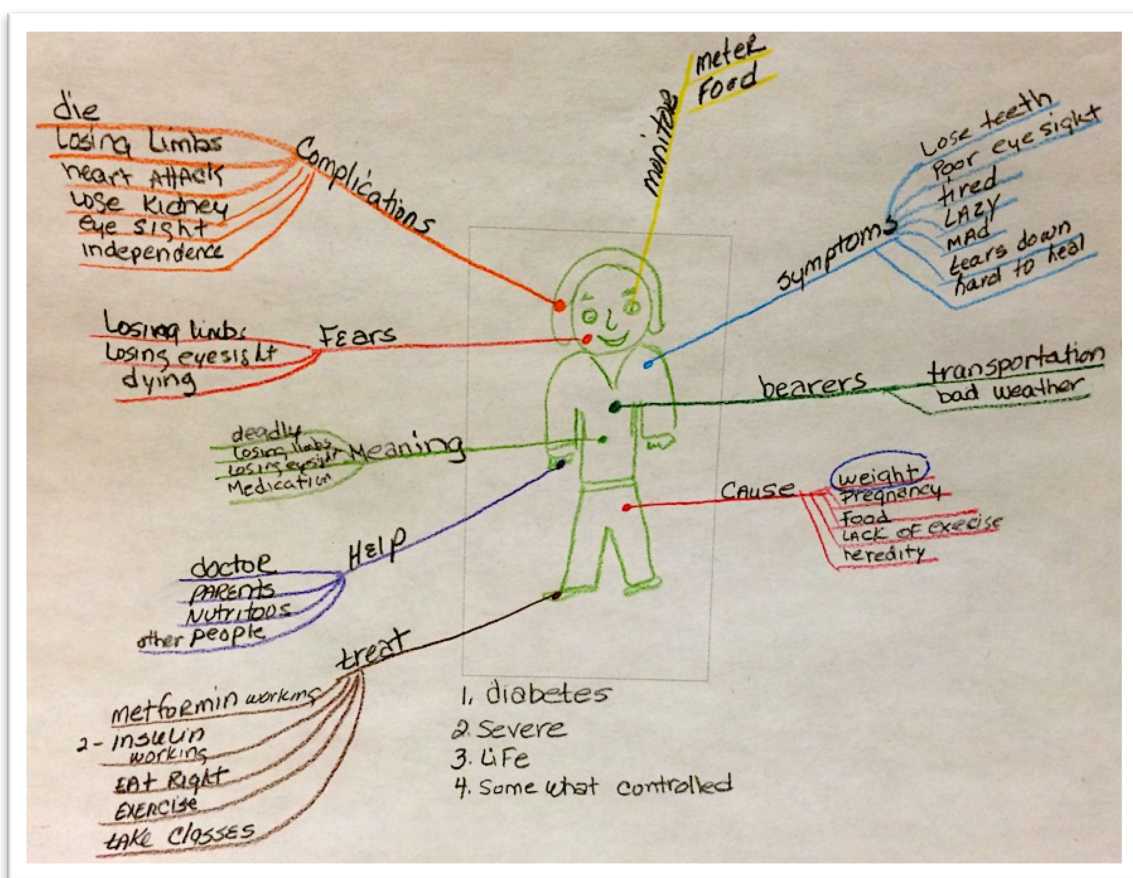
1. *HMM helps to develop insight about self and illness:*

*“Just brings things to the surface of this disease that’s all. Well, it externalizes it. So, that it is not just a thought, but it becomes like a way of looking at things. I probably learned about myself. It’s going to be a little bit more difficult than I thought, but also, with that in mind, there is an end goal, where it will become manageable.” (V2)*

*“I’ll have something to look at to be more focused on. I mean, this is like looking in a mirror, if you ask me. It’s like a mirror image, because you can’t see this if you look in the mirror, but if I put this on my mirror then I could see it, and I can read it.” (V10)*

Participants perceived that HMM made them externalize perspectives and knowledge regarding their diabetes that were in the back of their mind. The

participant from the last quote also expressed that seeing the finalized Health Mind Map (Figure 5) made her aware that her knowledge about diabetes was much more extensive than what she initially thought. By definition, mind mapping is a tool that externally reflects what is in your mind; health mind mapping seems to achieve that in these participants.



**Figure 5. HMM of a middle-aged female with obesity and diabetes**

Other participants expressed that besides externalizing perspectives and ideas it also helped them express feelings and fears about their illness:

*“No one has ever asked me these questions, so that enabled me to go as deep as I did, being honest and looking at it on paper. Inform them [referring to other patients that would like to do this process] that the person might have to do some soul searching.” (V2)*

By talking and writing about the meaning of her illness, HMM represented an opportunity not only to discuss the different areas of her EMI but also an opportunity to bring her feelings to the surface. During the interview, she expressed that she usually tries to hide feelings because she wants to be noticed as a strong woman by her social network. She became very emotional and cried while sharing her Health Mind Map with the interviewer. HMM helped this participant to expand her notion of what diabetes was and externalized her feelings regarding the illness.

2. *HMM a catalyst for taking actions to improve their illness:* Beyond gaining some insight into the meaning of their illness, participants went further to describe how the HMM process was seen as a catalyst to engaging in healthy behaviors. A number of participants expressed that the process of writing and discussing their diabetes empowered them to take control of their illness.

*“It was hard because I’m seeing myself writing this stuff down and—like when I’m at home, I don’t think about stuff like that. So for me to come here and sitting here, write this stuff down, now I get it, that I have to like take control of my diabetes. I can’t let diabetes control me.” (V9)*

*“These are the things that, you know, you really don’t think about too much until someone is sitting there asking you about them, you know. And actually to prevent, I’m going to start eating healthy, exercising.” (V4)*

Both participants expressed that they had not reflected on these areas before. It is important to note that through HMM, the participants did not only reflect about their illness by verbally answering questions but also by synthesizing and writing the information on the paper using the mind mapping technique. These two modes of reflective exercises regarding areas of the participant’s EMI seemed to engage participants towards taking action on their own behalf and led to an intention to change behaviors to achieve better control of their illness.

*3. Actively participating in the process:* The participants described that they felt more active in this process of talking about their diabetes, in contrast to other educational programs they had previously engaged in. They were actively talking, writing or synthesizing their perspectives about diabetes.

*“Because I had to write it. And it’s more meaningful to write it, instead of just hearing it, you know? Well, because it will make you more understanding to me. I mean, you know, it becomes more embedded-wise, because you can look at it. I mean, just if I’m in a classroom, and somebody is talking about it, you just sit in there. Your mind could be wandering somewhere else. Because they’re*

*speaking, you know? But this way, I had the chance to be active, because I had to put my mind to what I'm doing on paper.” (V10)*

Writing down her own ideas about his illness gave this participant a sense of being involved in a meaningful activity, and as a consequence, she was engaged in the process. Actively developing a visual tool about their understanding seems to help participants get more involved in the process of sharing their perspectives on their illness compared to other interviews or group visits where they seemed to feel like passive participants in the activity or mainly there to answer questions.

***B. Moving beyond the process – participant reports of the potential use of***

***HMM in the future:*** When asked about what they might do with their mind maps, four main themes emerged: 1) Communicate their illness to others in their social network; 2) Communicate about their illness to providers; 3) Share to help others with diabetes; 4) Use to encourage ongoing engagement in diabetes self-care.

1. *Using it to communicate their illness to others in their social network:* The majority of participants indicated that they would use their health mind map to share their illness with others in their social network, either to help them understand what they are going through or to elicit help from them.

*“I want them [friends with diabetes] to know, just how I sat here and talked with you all and learned a little more about diabetes, what it is really about, how it can affect me, you know.” (V3)*



*“Yeah, my husband [whom she would like to share the HMM with]. Just so that he’d be aware of what it is being diabetic and how I feel or how I was able to map it out. That way he might understand.”*  
(V6)

These two quotes reflect how important it is to the participants to make others aware about what they are going through because of their illness. These participants indicated that having a written document that depicts their perceptions about diabetes could help them have an outline that can facilitate the sharing process with others. The last quote reflects how a participant perceived that using her health mind map as a tool to bring awareness to her husband about what diabetes is to her, and that how she feels about it could result in making him better understand her illness.

2. *Communicating their illness to providers*: Other participants said that using the HMM would also facilitate sharing their understandings of diabetes with their providers.

*“They [providers] will get an understanding of where I’m at with my—with my diabetes, you know. Because I think maybe, you know, that I don’t care, or it’s just a game or something, you know. I do care. I like to—I like—I like the knowledge.”* (V14)

This participant valued the importance of having the provider understand her perceptions regarding diabetes. Besides making the provider aware of the different domains, this patient, as well as many others in our study, expressed

the importance of sharing their health mind maps with providers so that they can better understand how committed they are regarding the treatment plan. Many participants perceived that providers think they do not care about managing their illness or following the treatment plans. Participants indicated that they could use this tool to show providers an objective evaluation of these areas where there are potential misperceptions and to show them that they care and want to better manage their illness.

3. *Sharing to help others with diabetes:* A number of participants mentioned they would like to use their health mind maps to teach others in their social networks who have diabetes about managing their illness.

*“My brother has diabetes and I would tell them to take a look at that and see, ask them where they might be having problems. And tell them what I do about it when I have problems, the same problems.” (V13)*

*“Just to let them know, if they don’t know, if they are letting diabetes control them. Because I know this girl. She’s a diabetic and she doesn’t take her medicine like she is supposed to. So probably, maybe I can share this with her. And show her, don’t let diabetes control you. Take your medicine like you are supposed to.” (V9)*

Participants expressed their enthusiasm for using their Health Mind Map as a tool to transmit knowledge that they think is necessary to take action and

control diabetes. Participants felt the value of their experiences with diabetes self-care and how important it is to use this knowledge to help others better manage diabetes. HMM not only becomes a communication tool but also an education tool between diabetics.

4. *Empowering ongoing engagement in diabetes self-care*: Participants expressed that having this tool at home would help them engage with their daily self-management tasks related to their illness.

*“I’ll have it as a stepping stone, a learning tool, you know? I think – like I said, I think I’ll just put it on the refrigerator, so, you know, like I will see it all the time, every time I go in the refrigerator, I will be able to look at it.” (V1)*

*“I will probably hang it up on the wall so as to remind me that I am diabetic and, you know, I shouldn’t be eating certain types of food and stuff. It would remind me to stay in control of my numbers, right, my A1c and my finger, my daily numbers, you know. And to contact my doctor if my numbers are very, very high. You know, it’s good to have this because it just keeps your mind tuned to your disease.” (V13)*

Participant with diabetes express having a challenging time taking action and staying the course on their self-care activities. Participants thus saw the health mind map as a constant reminder of what they should and should not do to manage their diabetes. Achieving a state of constant awareness about their

illness could help participants to better engage with their self-care.

In contrast, other participants also saw this as a reminder of the insight they had gained during the process. They mentioned that by bringing awareness about the different areas of their diabetes, they could start thinking about new ideas that could help control their illness.

*“I would review it every now and then to see where I stand. I mean this is sort of like a paper where I can look and say, how am I doing in different departments? How am I doing in care? Do I need to get more help here? You know, I could look at all these things, the things that I wrote down and just go over them, you know, from time to time. So it’s kind of helped me out to be able to look at this and see where I need help the most” (V13)*

*“I’m going to think about it. Like when I put cause, hereditary, gene pool, well, there were other things, I think – cause is maybe I could monitor things so that I’m able to not have the full incapacitation of my gene pool. Maybe I can modify how my genes work to get them so that I don’t worry about it so much.” (V2)*

These participants expressed that having new perspectives about their illness or just being aware of all the domains can empower them to start developing new goals to better control their illness. Keeping the HMM where they can see it regularly could create a state of constant reflection so that participants can continue learning and getting more engaged in their care.

## CHAPTER SIX

### DISCUSSION

Patients spend important time with health providers, but these episodes are brief and intermittent. Consequently, most of disease management is self-management. Most health care is self-care. As people go about their lives, they are influenced by their own perspectives or explanatory models of illness (EMI). Designing interventions that can improve patient's self-management through patient centered communication requires consideration of patient's EMI and their daily-living experiences. Unfortunately, despite the known significance of understanding patient's EMI and the tools available to assess patient's perspectives, this aspect of patient centered care typically remains unstated and unexplored during patient care in the clinical setting.<sup>38</sup> We anticipated that HMM could represent a tool to help patients gain clarity about their illness perspectives but found that it could also be applied as a process to help patients develop a sense of responsibility for their own life and illness. Patients in our study expressed that HMM helped them to develop new insight into their illness and represented a catalyst for taking actions to improve their illness.

Participants in the study gained insight and described the meaning of their illness experience from engaging in the HMM process. Findings from our study are also consistent with prior research on expressive writing (writing done to explore one's innermost thoughts and feelings<sup>62</sup>) that showed how this activity helped patients in the process of self-understanding.<sup>63,64</sup> Visual representations

of illness have been previously used as a form of expressive writing, and it was found that these depictions also helped patients make sense of what they felt and created a space for reflection and even playfulness.<sup>48</sup> There is substantial evidence that the ability of patients to share their perspectives through narratives satisfies a basic human need for expression that could have its own effects on health outcomes.<sup>65-67</sup> Expressive writing has been associated with improvements in physical health, reductions in visits to physicians,<sup>68</sup> better immune system functioning<sup>69</sup> and improvements in other health and wellness measures.<sup>70</sup> Additionally, there is evidence on how confronting a stressful experience by expressive writing can help integrate these experiences into a coherent narrative, which may render the traumatic experience more meaningful.<sup>71</sup> A possible explanation for these phenomena is that drawing or writing about an experience increases self-awareness by enabling reflection and formulation of experience.<sup>64</sup> In addition, once an experience has structure and meaning, the emotional effects from it become more manageable.<sup>71</sup> This is especially relevant in diabetics as they have a high prevalence of mental health problems like depression.<sup>72</sup> It seems that Health Mind Mapping became a form of expressive writing for the participants enrolled in the study and helped them share deep emotions regarding their illness.

Expressive writing, in the way it has been previously studied and described, requires the participants to have the ability to create an actual written narrative. Many patients with low education and low health literacy (a measure of

a patient's ability to perform basic reading and numerical tasks required to function in the health care environment<sup>73</sup>) will not be able to perform these exercises. There are other challenges that patients with low health literacy face during their care that have significant implications for the way they express their ideas and communicate with providers. Patients with low functional health literacy have difficulties processing and integrating verbal communications.<sup>74</sup> Low health literacy has been associated with a poorer understanding of the disease process<sup>75</sup> and poorer ability to understand and follow medical advice.<sup>75</sup> Patients with lower health literacy are also less likely to seek additional information and their participation in shared decision making is reduced compared to patients with higher health literacy levels.<sup>76-79</sup> They usually report that physicians do not explain things clearly and do not elicit understanding of their explanations, either as a result of physicians not informing patients or informing them ineffectively.<sup>20</sup>

HMM does not require the patients to use a narrative approach but only to write words with no need of constructing sentences, which is why it has even been used as early as the first years of childhood education.<sup>80</sup> Thus, HMM could potentially be used across health literacy levels. In this study, we did not assess patient's health literacy but we had participants with a range of education levels who were able to engage and complete the HMM process, though educational attainment is normally associated with literacy.<sup>81</sup> Future studies that use HMM should aim to include broader health literacy levels in order to clearly understand if patients with lower levels of education or health literacy are able to perform this

process.

A number of participants expressed the fact that they would like to continue using HMM during their care as a tool to share their illness with their providers. No prior studies have considered giving the information from EMI assessments back to the patients. Thus, their perceptions of how they could use them in their future encounters have not been explored. Patient-provider interactions during the clinical encounter are usually asymmetric, as providers dominate the conversations and patients often don't have opportunity to reveal their perceptions about their illness.<sup>82</sup> A narrative-based approach that involves a provider that simultaneously attends to both the narrative from the biomedical perspective and the one from the patient's perspective is a valid approach to help improve the asymmetry of clinical encounters.<sup>83</sup> A narrative-based approach has been used in other studies with the goal of achieving efficient sharing of critical biomedical and patient specific information.<sup>84-86</sup>

Similarly, another study showed that visual representations of illness helped patients to communicate information to others in a format that suited their style.<sup>48</sup> Participants that engaged in HMM expressed the importance of not only sharing their illness with their providers but also making them understand that they cared about their illness. If the patients' willingness to share their health mind maps translates into actually sharing their illness with their providers, this could have an important impact on the typical information sharing dynamics between patients and providers by transforming it into a two-sided process.



Future studies are needed to look into the actual effects that HMM could have on the sharing dynamics, not only focused on patient-provider dynamics but also on dynamics between patients and their social network.

In our study, participants expressed that HMM functioned as a catalyst for taking actions to improve their illness. Prior studies have shown how expressive writing gave individuals a sense of control over their lives and improved attitudes and resilience towards their illness.<sup>71,87</sup> A study in breast cancer patients showed how the activity of writing thoughts and feelings about breast cancer served to clarify and pursue goals related to this illness.<sup>88</sup> Similarly, our participants expressed that HMM could help them accomplishing their goals and to develop new goals related to their illness. A possible explanation of this potential effect is that participants going through HMM have the opportunity to reflect on their illness and goals differently by developing a graphic depiction that mirrors their thought process. Participants mentioned that this health mind map could also help them to stay on track towards their goals by becoming an actual reminder of self-care activities.

Participants in our study expressed that HMM made them want to take action to improve their illness and also gave them a sense of being able to not letting their illness control them by gaining motivation to follow their treatment plans. This effect could have resulted as a consequence of the participants gaining clarity about their goals, values, and motivation throughout the HMM process. Some of these potential HMM effects described by the participants

share some similarities to what has been defined as patient empowerment, or “the capacity building whereby individuals increase their belief that they play an active role in their care, participate in decision-making and manage their care to achieve a greater measure of control over their health and their health care process.”<sup>89</sup> Higher levels of empowerment have been associated with better performance of self-care activities, better person-centered outcomes, higher satisfaction with diabetes treatment and better physical functioning and psychological well-being.<sup>90</sup> Different approaches have been previously developed to help patients feel empowered to self-manage their diabetes. These approaches differ by setting (individual or group), medium (written, oral, video, computer-based), or duration.<sup>90</sup> Some of them include self-management education, support groups, problem-solving approaches and cognitive behavior therapies.<sup>91</sup> Future research is needed to assess if the sense of empowerment that our patients reported they achieved through HMM will persist over time. It will also be important to understand if this sense of empowerment in our participants will translate into changes in their behavior. We are not able to evaluate that as our results are only based on participant’s self-reported perceptions.

It is important to note that many interventions that have been previously developed with the goal of improving communication or empowerment require a significant amount of resources in order to be adequately implemented. This becomes an important barrier when trying to implement these interventions in

health centers that lack resources. As part of this study, it was relevant to understand if facilitators could become proficient in guiding participants to develop their health mind maps. The training of the facilitators in the study did not require more than a 1-hour session and one practice encounter to develop proficient facilitators of the process. Thus, implementing HMM will likely require significantly fewer resources as non-medical personnel can facilitate the process with minimal training and the only materials needed are colored pencils or markers and a piece of paper. Many of our participants developed their Health Mind Maps during their regular care but further studies are needed to test if HMM is a feasible process that could be implemented in the regular care of patients with chronic diseases.

It is important to mention that none of the participants mentioned disadvantages that could be related to the HMM process. During the analysis of the recordings and videos, it was noticed that the participants had some trouble initially understanding what health mind mapping was and how to start the drawing. By the end of the process, however, participants seemed to have acquired the skills to continue drawing their health mind maps independently. Some of the participants did mention recommendations to make the process better. They recommended that the facilitator be able to provide resources based on what is being found in their Health Mind Maps. Others suggested making the paper bigger to be able to include more information.

There are also several limitations to our study. The principal investigator

was the one in charge of getting the consent for the study and subsequently interviewing the participants. This could have biased the participants' answers towards reporting positive perceptions regarding HMM during the interview, as they were aware that the principal investigator doing the interviews was part of the study. Despite attempts to recruit more Spanish-speaking participants, we were only able to recruit two. Spanish-speaking patients and patients who speak other languages may have different views of the process. Being that our goal was to develop a process that could give a voice to patients across health literacy levels, it might seem contradictory that we excluded participants who self-reported that they could read and write. Due to the novelty of this process, we wanted to start piloting with participants who know how to read and write so that we could better understand some of the challenges they faced and improve the process so that it could also be further piloted in patients who didn't know how to read and write. It is important to note that some of the participants in the study were observed to have trouble spelling words that they wanted to write on their health mind map. When this happened, the facilitator instructed them that it did not matter if words were spelled correctly or not. This helped participants to continue engaging in the process and depicting their ideas even if words were not spelled or organized in a specific pattern. The simplicity of the organic structure of a mind map could also allow them to use symbols or pictures instead of words when this process is facilitated among patients with lower health literacy and lower education levels. Another limitation was the fact that our analysis of

the HMM process was mainly based on participant's perceptions and not in intermediate or health outcomes. In the current research design, we couldn't differentiate between the effects of developing a health mind map and the effects of sharing it as participant's perceptions reflect the entire process. It would be valuable to understand the individual effects, but it wouldn't be recommended to separate either as an intervention, as the reflective process of drawing the health mind map could be what empowers patients to share their illness. Our findings do not show how the patient-facilitator interaction could have impacted the results. Facilitators had to respond to many different questions from participant about how to draw, write or organize the health mind map, and thus, their answers could potentially affect what the participant wrote or shared. To avoid the facilitator having an effect on what the participant did, the participant was encouraged to write words without thinking about the spelling and draw the branches on the map in any pattern. Participants were also encouraged to write anything on their health mind map that they felt was important, even if it had nothing to do with their EMI.

Diabetics who are established in their care were the main focus of our study. Future studies are needed to understand the impact of HMM on other chronic illnesses and on patients who have not established care and are initially presenting to establish it. Also, future explorations using HMM should consider evaluating participant's health belief models to better understand how that could impact their engagement with a process like HMM.

Even though participants stated that they would like to continue using HMM during their care, we did not follow up with them to ask how and why they ended up using or not using it. It is also unclear if the empowerment gained at the end of the process will persist when the participants get back to their lives.

This exploratory study of Health Mind Mapping has important future implications. We believe that HMM could represent a standard structured process that collects important information about the patient's explanatory model of illness while helping patients to gain insight into their illness and empowering them to follow and improve their self-management skills. It could also represent a tool to aid in the sharing dynamics with providers and the social network of patients by engaging them in a different way compared to other communication aids. It could potentially give patients the opportunity not only to be catalysts for improving their own health but also help others to do the same.

## APPENDIX 1

### Patient Health Mind Map Semi-Structured Interview Guide

**- Title:**

*What do you call this illness?*

**- Severity of diabetes:**

*How severe is your diabetes? (Mild, moderate, severe)*

**- Chronicity of diabetes:**

*For how long do you think you will have diabetes?*

**- Perception of control:**

*Do you feel your diabetes is controlled or uncontrolled?*

**- Definition: (MEANS)**

*What is Diabetes for you? How would you describe your diabetes?*

**- Cause: (CAUSE/WHY)**

*Can you tell me what you think caused your diabetes? Why do you think this is happening to you?*

**-Symptoms and limitations: (SYMPTOMS)**

*How do you think diabetes affects your body? Your mind? Your spirit?*

*Limitations: How has your diabetes affected your ability to perform the daily activities that are most important to you?*

**- Course of illness (COMPLICATIONS)**

*What usually happens to people who have diabetes? In your own case, what do you think is likely to happen? What is the worse that could happen?*

**-Monitoring of diabetes: (MONITOR)**

*How do you or your health care provider monitor your diabetes?*

*OR How can you tell if your diabetes is getting better or worse?*

**-Treatment of diabetes: (TREAT)**

*What medications are you taking for diabetes?*

*What do you think about them?*

*Are there any side effects from these medications?*

*How do you think these medications are working?*

*What other things do you do to treat your diabetes?*

*What do you think is the best way to deal with diabetes?*

*What have you done on your own to cope with your diabetes?*

**- Social network (HELP)**

*Are there any kinds of support that make your diabetes better, such as support from family, friends, or others?*

**- Stressors and Barriers (BARRIERS):**

*Are there any kinds of stresses that make your diabetes worse, such as difficulties with money, or family problems? Has anything prevented you from getting the help you need?*

**- Fears (FEARS)**

*What troubles you most about your diabetes?*

*What do you fear the most about diabetes?*



***-Preferences and partnership with physician:***

*From all that we have discussed today, can you identify one area in your health mind map that you would like to work on? **(Circle the area to work on)** What kinds of help do you think would be most useful to you at this time to improve this area of your health mind map? How would you like your health care provider to help you with this area?*

## BIBLIOGRAPHY

1. Alwan A. *Global status report on noncommunicable diseases 2010*. World Health Organization; 2011.
2. Bauer UE, Briss PA, Goodman RA, Bowman BA. Prevention of chronic disease in the 21st century: Elimination of the leading preventable causes of premature death and disability in the USA. *The Lancet*. 2014;384(9937):45–52.
3. Zulman DM, Jenchura EC, Cohen DM, Lewis ET, Houston TK, Asch SM. How can eHealth technology address challenges related to multimorbidity? perspectives from patients with multiple chronic conditions. *Journal of General Internal Medicine*. 2015;30(8):1063–1070.
4. Greenfield S, Kaplan SH, Ware JE, Jr, Yano EM, Frank HJ. Patients' participation in medical care: Effects on blood sugar control and quality of life in diabetes. *Journal of General Internal Medicine*. 1988;3(5):448–457.
5. Haverhals LM, Lee CA, Siek KA, et al. Older adults with multi-morbidity: Medication management processes and design implications for personal health applications. *Journal of Medical Internet Research*. 2011;13(2):e44.
6. Harris MI. Health care and health status and outcomes for patients with type 2 diabetes. *Diabetes Care*. 2000;23(6):754–758.
7. Von Korff M, Gruman J, Schaefer J, Curry SJ, Wagner EH. Collaborative management of chronic illness. *Annals of Internal Medicine*. 1997;127(12):1097–1102.

8. Corrigan JM. Crossing the quality chasm. *Building a Better Delivery System*. 2005.
9. Institute of Medicine (US). Committee on Quality of Health Care in America. *Crossing the quality chasm: A new health system for the 21st century*. National Academy Press; 2001.
10. McWhinney IR. Why we need a new clinical method. *Scandinavian Journal of Primary Health Care*. 1993;11(1):3–7.
11. Epstein R, Street RL. *Patient-centered communication in cancer care: Promoting healing and reducing suffering*. National Cancer Institute, US Department of Health and Human Services, National Institutes of Health Bethesda, MD: National Institutes of Health; 2007.
12. Evans BJ, Kiellerup F, Stanley R, Burrows GD, Sweet B. A communication skills programme for increasing patients' satisfaction with general practice consultations. *British Journal of Medical Psychology*. 1987;60(4):373–378.
13. Roter DL. Patient participation in the patient-provider interaction: The effects of patient question asking on the quality of interaction, satisfaction and compliance. *Health Education & Behavior*. 1977;5(4):281–315.
14. Epstein RM, Franks P, Fiscella K, et al. Measuring patient-centered communication in patient-physician consultations: Theoretical and practical issues. *Social Science and Medicine*. 2005;61(7):1516–1528. doi: S0277-9536(05)00083-3 [pii].

15. Fogarty LA, Curbow BA, Wingard JR, McDonnell K, Somerfield MR. Can 40 seconds of compassion reduce patient anxiety? *Journal of Clinical Oncology*. 1999;17(1):371–379.
16. Street RL, Jr, Voigt B. Patient participation in deciding breast cancer treatment and subsequent quality of life. *Medical Decisions Making*. 1997;17(3):298–306.
17. Stewart MA. Effective physician-patient communication and health outcomes: A review. *CMAJ: Canadian Medical Association Journal*. 1995;152(9):1423–1433.
18. Deen D, Lu WH, Rothstein D, Santana L, Gold MR. Asking questions: The effect of a brief intervention in community health centers on patient activation. *Patient Education and Counseling*. 2011;84(2):257–260. doi: 10.1016/j.pec.2010.07.026 [doi].
19. Boissy A, Windover AK, Bokar D, et al. Communication skills training for physicians improves patient satisfaction. *Journal of General Internal Medicine*. 31(7):755–761. doi: 10.1007/s11606-016-3597-2.
20. Schillinger D, Bindman A, Wang F, Stewart A, Piette J. Functional health literacy and the quality of physician–patient communication among diabetes patients. *Patient Education and Counseling*. 2004;52(3):315–323. doi: 10.1016/S0738-3991(03)00107-1.
21. Dubbin LA, Chang JS, Shim JK. Cultural health capital and the interactional dynamics of patient-centered care. *Social Science & Medicine*. 2013;93:113–20.

22. Swenson SL, Buell S, Zettler P, White M, Ruston DC, Lo B. Patient-centered communication: Do patients really prefer it? *Journal of General Internal Medicine*. 2004;19(11):1069–1079. doi: JGI30384 [pii].
23. Swenson SL, Zettler P, Lo B. ‘She gave it her best shot right away’: Patient experiences of biomedical and patient-centered communication. *Patient Education and Counseling*. 2006;61(2):200–211.
24. Topley M, Kleinman A. Patients and healers in the context of culture: An exploration of the borderland between anthropology, medicine, and psychiatry. *Journal of Asian Studies*. 1981;40(2):332. doi: 10.2307/2054870.
25. Kleinman A. *Patients and healers in the context of culture: An exploration of the borderland between anthropology, medicine, and psychiatry*. Vol 3. Univ of California Press; 1980.
26. Kaplan SH, Greenfield S, Ware J. Impact of the doctor-patient relationship on the outcomes of chronic disease. In: Stewart M, Roter D, (eds.) *Communicating with Medical Patients*. Newbury Park, CA: Sage Publications; 1989. pp. 228–245.
27. Orth JE, Stiles WB, Scherwitz L, Hennrikus D, Vallbona C. Patient exposition and provider explanation in routine interviews and hypertensive patients' blood pressure control. *Health Psychology*. 1987;6(1):29.
28. Lewis-Fernandez R, Aggarwal NK, Baarnhielm S, et al. Culture and psychiatric evaluation: Operationalizing cultural formulation for DSM-5. *Psychiatry*. 2014;77(2):130–154. doi: 10.1521/psyc.2014.77.2.130 [doi].

29. Roter D, Hall JA. *Doctors talking with patients/patients talking with doctors: Improving communication in medical visits*. Greenwood Publishing Group; 2006.
30. Marvel MK, Epstein RM, Flowers K, Beckman HB. Soliciting the patient's agenda: Have we improved? *JAMA: The Journal of the American Medical Association*. 1999;281(3):283–287.
31. Bruera E, Willey JS, Lynn Palmer J, Rosales M. Treatment decisions for breast carcinoma. *Cancer*. 2002;94(7):2076–2080.
32. Rothwell PM, McDowell Z, Wong CK, Dorman PJ. Doctors and patients don't agree: Cross sectional study of patients' and doctors' perceptions and assessments of disability in multiple sclerosis. *BMJ: British Medical Journal*. 1997;314(7094):1580–1583.
33. Huizinga MM, Bleich SN, Beach MC, Clark JM, Cooper LA. Disparity in physician perception of patients' adherence to medications by obesity status. *Obesity*. 2010;18(10):1932–1937.
34. Heisler M, Vijan S, Anderson RM, Ubel PA, Bernstein SJ, Hofer TP. When do patients and their physicians agree on diabetes treatment goals and strategies, and what difference does it make? *Journal of General Internal Medicine*. 2003;18(11):893–902.
35. Brown V. *The association of concordance between physician and patient medical concepts and patient satisfaction, compliance and medical outcomes*. Doctoral Dissertation–University of Hawai'i at Manoa; 1993.

36. Waitzkin H. Doctor-patient communication. *JAMA: The Journal of the American Medical Association*. 1984;252(17):2441. doi: 10.1001/jama.1984.03350170043017.
37. Kleinman A. *The illness narratives: Suffering, healing, and the human condition*. Basic Books; 1988.
38. Lloyd KR, Jacob K, Patel V, Louis LS, Bhugra D, Mann A. The development of the short explanatory model interview (SEMI) and its use among primary-care attenders with common mental disorders. *Psychological Medicine*. 1998;28(5):1231–1237.
39. Weinman J, Petrie KJ, Moss-Morris R, Horne R. The illness perception questionnaire: A new method for assessing the cognitive representation of illness. *Psychology and Health*. 1996;11(3):431–445.
40. Weiss M. Explanatory model interview catalogue (EMIC): Framework for comparative study of illness. *Transcultural Psychiatry*. 1997;34(2):235–263.
41. Nunnelee JD, Spaner SD. Explanatory model of chronic venous disease in the rural midwest—a factor analysis. *Journal of Vascular Nursing*. 2000;18(1):6–10.
42. McEwen MM. Mexican immigrants' explanatory model of latent tuberculosis infection. *Journal of Transcultural Nursing*. 2005;16(4):347–355. doi: 16/4/347 [pii].

43. Lempp HK, Hatch SL, Carville SF, Choy EH. Patients' experiences of living with and receiving treatment for fibromyalgia syndrome: A qualitative study. *BMC Musculoskeletal Disorders*. 2009;10(1):1.
44. Russell CK, Geraci T, Hooper A, Shull L, Gregory DM. Patients' explanatory models for heart failure and COPD exacerbations. *Clinical Nursing Research*. 1998;7(2):164–188.
45. Sumathipala A, Siribaddana S, Hewege S, Sumathipala K, Prince M, Mann A. Understanding the explanatory model of the patient on their medically unexplained symptoms and its implication on treatment development research: A Sri Lanka study. *BMC Psychiatry*. 2008;8(1):1.
46. Griva K, Myers LB, Newman S. Illness perceptions and self efficacy beliefs in adolescents and young adults with insulin dependent diabetes mellitus. *Psychology and Health*. 2000;15(6):733–750.
47. Groleau D, Young A, Kirmayer LJ. The McGill illness narrative interview (MINI): An interview schedule to elicit meanings and modes of reasoning related to illness experience. *Transcultural Psychiatry*. 2006;43(4):671–691. doi: 43/4/671 [pii].
48. Saint Arnault D, Shimabukuro S. The clinical ethnographic interview: A user-friendly guide to the cultural formulation of distress and help seeking. *Transcultural Psychiatry*. 2012;49(2):302–322. doi: 10.1177/1363461511425877 [doi].



49. Lang F, Floyd MR, Beine KL, Buck P. Sequenced questioning to elicit the patient's perspective on illness: Effects on information disclosure, patient satisfaction, and time expenditure. *Family Medicines*. 2002;34(5):325–330.
50. Barry CA, Bradley CP, Britten N, Stevenson FA, Barber N. Patients' unvoiced agendas in general practice consultations: Qualitative study. *BMJ: British Medical Journal*. 2000;320(7244):1246–1250.
51. Britten N, Stevenson F, Barry C, Barber N, Bradley C. Misunderstandings in prescribing decisions in general practice: Qualitative study. *British Medical Journal*. 2000;320(7233):484–488. doi: 10.1136/bmj.320.7233.484.
52. Law SA, Britten N. Factors that influence the patient centredness of a consultation. *British Journal of General Practice*. 1995;45(399):520–524.
53. Aggarwal NK, Nicasio AV, DeSilva R, Boiler M, Lewis-Fernández R. Barriers to implementing the DSM-5 cultural formulation interview: A qualitative study. *Culture, Medicine, and Psychiatry*. 2013;37(3):505–533.
54. Buzan T, Buzan B. *The mind map book*. London: BBCBooks; 1997.
55. Novarina N. Implementing mind mapping strategy to improve the writing ability in recount text of the eighth graders of SMPN 9 malang. *SKRIPSI Jurusan Sastra Inggris-Fakultas Sastra UM*. 2011. Abstract available from <http://karya-ilmiah.um.ac.id/index.php/sastra-inggris/article/view/15938>
56. Goodnough K, Woods R. Student and teacher perceptions of mind mapping: A middle school case study. 2002. ERIC document: ED470970. Available from <http://eric.ed.gov/?id=ED470970>

57. Mueller A, Johnston M, Bligh D, Wilkinson J. Joining mind mapping and care planning to enhance student critical thinking and achieve holistic nursing care. *International Journal of Nursing Terminologies and Classifications*. 2002;13(1):24–27.
58. D'Antoni AV, Zipp GP, Olson VG, Cahill TF. Does the mind map learning strategy facilitate information retrieval and critical thinking in medical students? *BMC Medical Education*. 2010;10(1):1.
59. de Jager A, Tewson A, Ludlow B, Boydell K. Embodied ways of storying the self: A systematic review of body-mapping. *Forum, Qualitative Social Research*. 2016;17(2).
60. Cohen MZ, Tripp-Reimer T, Smith C, Sorofman B, Lively S. Explanatory models of diabetes: Patient practitioner variation. *Social Science & Medicine*. 1994;38(1):59–66.
61. Lake FR, Hamdorf JM. Teaching on the run tips 5: Teaching a skill. *Medical Journal of Australia*. 2004;181:327–328.
62. Pennebaker JW, Beall SK. Confronting a traumatic event: Toward an understanding of inhibition and disease. *Journal of Abnormal Psychology*. 1986;95(3):274.
63. Horowitz S. Evidence-based health outcomes of expressive writing. *Alternative and Complementary Therapies*. 2008;14(4):194–198.
64. Sakalys JA. Restoring the patient's voice. the therapeutics of illness narratives. *Journal of Holistic Nursing*. 2003;21(3):228–241.

65. Fisher WR. *Human communication as narration: Toward a philosophy of reason, value, and action*. Columbia: University of South Carolina Press; 1987.
66. Sharf BF, Vanderford ML, Thompson TL, Dorsey A, Miller KI, Parrott R. Illness narratives and the social construction of health. *Handbook of health communication*. 2003:9–34.
67. Frank AW. *The wounded storyteller: Body, illness, and ethics*. University of Chicago Press; 2013.
68. Esterling BA, L'Abate L, Murray EJ, Pennebaker JW. Empirical foundations for writing in prevention and psychotherapy: Mental and physical health outcomes. *Clinical Psychology Review*. 1999;19(1):79–96.
69. McArdle S, Byrt R. Fiction, poetry and mental health: Expressive and therapeutic uses of literature. *Journal of Psychiatric and Mental Health Nursing*. 2001;8(6):517–524.
70. Stuckey HL, Nobel J. The connection between art, healing, and public health: A review of current literature. *American Journal of Public Health*. 2010;100(2):254–263.
71. Pennebaker JW, Seagal JD. Forming a story: The health benefits of narrative. *Journal of Clinical Psychology*. 1999;55(10):1243–1254. doi: 10.1002/(SICI)1097-4679(199910)55:103.0.CO;2-N [doi].
72. Ali S, Stone M, Peters J, Davies M, Khunti K. The prevalence of co-morbid depression in adults with type 2 diabetes: A systematic review and meta-analysis. *Diabetic Medicine*. 2006;23(11):1165–1173.

73. Parker RM, Williams MV, Weiss BD, et al. Health literacy-report of the council on scientific affairs. *JAMA: The Journal of the American Medical Association*. 1999;281(6):552–557.
74. Doak CC, Doak LG, Root JH. Teaching patients with low literacy skills. *AJN: The American Journal of Nursing*. 1996;96(12):16M.
75. Berkman ND, Sheridan SL, Donahue KE, Halpern DJ, Crotty K. Low health literacy and health outcomes: An updated systematic review. *Annals of Internal Medicine*. 2011;155(2):97–107.
76. Katz MG, Jacobson TA, Veledar E, Kripalani S. Patient literacy and question-asking behavior during the medical encounter: A mixed-methods analysis. *Journal of General Internal Medicine*. 2007;22(6):782–786.
77. Mancuso CA, Rincon M. Asthma patients' assessments of health care and medical decision making: The role of health literacy. *Journal of Asthma*. 2006;43(1):41–44.
78. Barragan M, Hicks G, Williams MV, Franco-Paredes C, Duffus W, Del Rio C. Low health literacy is associated with HIV test acceptance. *Journal of General Internal Medicine*. 2005;20(5):422–425.
79. Aboumatar HJ, Carson KA, Beach MC, Roter DL, Cooper LA. The impact of health literacy on desire for participation in healthcare, medical visit communication, and patient reported outcomes among patients with hypertension. *Journal of General Internal Medicine*. 2013;28(11):1469–1476.

80. Birbili M. Mapping knowledge: Concept maps in early childhood education. *Early Childhood Research and Practice*. 2006;8(2).
81. Wallace LS, Rogers ES, Roskos SE, Holiday DB, Weiss BD. Brief report: Screening items to identify patients with limited health literacy skills. *Journal of General Internal Medicine*. 2006;21(8):874–877.
82. Pilnick A, Dingwall R. On the remarkable persistence of asymmetry in doctor/patient interaction: A critical review. *Social Science & Medicine*. 2011; 72(8):1374–1382.
83. Haidet P, Paterniti DA. Building a history rather than taking one: A perspective on information sharing during the medical interview. *Archives of Internal Medicine*. 2003;163(10):1134–1140.
84. Sharf BF. Physician-patient communication as interpersonal rhetoric: A narrative approach. *Health Communication*. 1990;2(4):217–231.
85. Greenhalgh T, Hurwitz B. Narrative based medicine: Why study narrative? *BMJ: British Medical Journal*. 1999;318(7175):48–50.
86. Greenhalgh T. Narrative based medicine: Narrative based medicine in an evidence based world. *BMJ: British Medical Journal*. 1999;318(7179):323–325.
87. DeSalvo LA. *Writing as a way of healing: How telling our stories transforms our lives*. Beacon Press; 1999.
88. Stanton AL, Danoff-Burg S, Sworowski LA, et al. Randomized, controlled trial of written emotional expression and benefit finding in breast cancer patients. *Journal of Clinical Oncology*. 2002;20(20):4160–4168.

89. Alegria M, Polo A, Gao S, et al. Evaluation of a patient activation and empowerment intervention in mental health care. *Medical Care*. 2008;46(3):247–256. doi: 10.1097/MLR.0b013e318158af52 [doi].
90. Rossi MC, Lucisano G, Funnell M, et al. Interplay among patient empowerment and clinical and person-centered outcomes in type 2 diabetes. the BENCH-D study. *Patient Education and Counseling*. 2015;98(9):1142–1149.
91. Thorpe CT, Fahey LE, Johnson H, Deshpande M, Thorpe JM, Fisher EB. Facilitating healthy coping in patients with diabetes: A systematic review. *Diabetes Educator*. 2013;39(1):33–52. doi: 10.1177/0145721712464400 [doi].

## CURRICULUM VITAE

Pablo Buitrón De la Vega, M.D.  
801 Massachusetts Ave Crosstown Center • Boston MA 02118  
Phone: 6179019745 • E-mail: [pbuitro1@bu.edu](mailto:pbuitro1@bu.edu)

### Academic Training:

11/2009 M.D. Pontificia Universidad Católica del Ecuador, Quito, Ecuador  
9/2016 M.Sc. Boston University, Boston, MA

### Additional Training:

6/2011–7/2014 Internal Medicine Residency. Henry Ford Hospital/ Wayne State University, Detroit, MI  
1/2015–5/2015 Program for Educators in the Health Professions. Harvard Macy Institute, Boston, MA  
10/2015 Technology in Health Care Education. Harvard Macy Institute, Boston, MA  
7/2014–Present General Internal Medicine Fellowship / Preventive Medicine Residency. Boston Medical Center/ Boston University, Boston, MA

### Honors:

3/2014 Henry Ford Hospital Dr. Jan Rival Award (Medical Education Award. Department of Internal Medicine), Detroit, MI  
10/2012 Michigan State Medical Society Foundation (Clinical Medicine and Vignettes Poster Competition: Second Place). Troy, MI  
9/2009 Graduated in the Top 10 Percent of the 2009 Medical School Class  
12/2002 Denison University (Awarded Academic and Athletic Scholarship). Granville, OH

### Licenses and Certification:

2013 Mind Mapping Instructor Certification  
2014 American Board of Internal Medicine  
2014 Massachusetts, Limited license, #260421  
2015 ACLS  
2015 BLS  
2016 Massachusetts, Full license, # 266025

### Teaching Experience and Responsibilities:

1/2015–7/2016 Instructor. Introduction to Clinical Medicine, Boston University School of Medicine, Boston, MA

- 4/2016–Present Resident Coach. Professional development coaching program for residents, Boston University Internal Medicine Residency Program, Boston, MA
- 6/2011–7/2014 Instructor. Evaluation and teaching clinical skills for 3<sup>rd</sup> and 4<sup>th</sup> year medical students, Wayne State University Medical School, Detroit, MI
- 1/2010–12/2010 Medical Advisor. Kaplan Medical Group. Developed seminars for USMLE preparation and coached students on efficient study techniques, Washington, DC
- 6/2010–11/2010 USMLE Step 1 Small Group Study Leader and Facilitator. Kaplan Medical Group, developed curriculum used in focus group study, Washington, DC

#### **Other Professional Activities:**

- 7/2015–8/2015 **Office of Community Health Workers**  
Department of Public Health (Boston, MA)
- Collaborated in the development of the “Community Health Worker Program Development Toolbox” (web-based aid for the integration of Community Health Workers into care teams)
    - o Assessed physicians’ perceptions about integration of Community Health Workers into care teams using qualitative interviews
    - o Drafted and edited the “Integration of Community Health Workers into Care Teams” section of the toolbox
- 11/2009–Present **United States Medical Licensing Examination (USMLE) MIND MAP**
- Co-founded “USMLEMINDMAP,” a medical education organization that uses mind mapping to help students prepare for the USMLEs
  - Developed online learning modules curriculum of “Cardiovascular System for the USMLE” and “Respiratory System for the USMLE”

#### **Professional Societies: Memberships, Offices, and Committee**

##### **Assignments:**

- 2014–Present American College of Preventive Medicine, member
- 2014–Present Massachusetts Medical Society, member
- 2013–Present Society of General Internal Medicine, member



2011–Present American College of Physicians, member

**Editorial Boards:**

20014–Present Reviewer, The Clinical Teacher

**Major Committee Assignments:**

5/2016–Present BMC Preventive Medicine Residency Program ACMGE Self Study Committee Member. Preventive Medicine Residency Program, Boston University, Boston, MA

4/2016–Present Education Curriculum Committee, member General Internal Medicine Fellowship, Boston University, Boston, MA

1/2016–3/2016 Abstract Review Committee, member Society of General Internal Medicine

9/2007–9/2008 Student Representative on the Medical School Board, Pontificia Universidad Católica del Ecuador, Quito, Ecuador

**Invited Lectures and Conference Presentations:**

**Regional/Local:**

*Oral*

5/2016 “Using Mind Maps as a Teaching and Learning Tool,” Program for Educators in the Health Professions at Harvard Macy Institute, Boston, MA [*Workshop*]

3/2015 “Improving Your Learning Skills With Mind Mapping,” Harvard Medical School, Boston, MA [*Invited lecture for medical students*]

1/2016 “Cognitive Science Based Medical Mind Maps,” Program for Educators in the Health Professions at Harvard Macy Institute, Boston, MA [*Invited lecture*]

10/2015 “Using Technology To Develop Cognitive Learning Theory Based Mind Maps,” Taking the New Curriculum to the Clinical Realm, Harvard Medical School, Boston, MA [*Technology demonstration*]

10/2015 “Converting Traditional Educational Material into Digital Mind Maps,” Become a Digital Citizen at Harvard Macy Institute, Boston, MA [*Workshop*]

10/2015 “Taking Your Mind Maps Into Moodle,” Become a Digital Citizen at Harvard Macy Institute, Boston, MA [*Workshop*]

1/2012 Hassan S, Qureshi W, Donthireddy V, **Buitrón de la Vega P**, Kuriakose P. “Congenital Von Willebrand Disease and Hypothyroidism,” Henry Ford Hospital Research Forum, Detroit, MI [*Oral presentation*]

- 11/2009 **Buitrón de la Vega P**, Arregui R. "Presence of Diabetes Mellitus Type 2 in Patients with Diagnosis of Symptomatic Coronary Heart Disease," Pontificia Universidad Católica del Ecuador. *[Medical school thesis dissertation]*
- Poster*  
11/2012 **Buitrón de la Vega P**, Qureshi W, Tandon P, Hassan S, Mittal C, Jayaprakash R, Abrencillo R, Ananthasubramaniam K, Ramesh M, Zervos M. "Simplified Criteria to Risk Stratify for the Mode of Echocardiography in Patients with MRSA Bacteremia at Low Risk of Infective Endocarditis." Clinical medicine and vignettes poster competition, Michigan State Medical Society Foundation, Troy, MI *[Poster presentation]*
- 10/2012 Patel J, **Buitrón de la Vega P**, Kumar S, Macabga G, Kieca A, Johnson L, Samuel L, Alangaden G. "Clinical Impact of the Direct Sputum Nucleic Acid Amplification Test (NAAT) for the Diagnosis of Tuberculosis," Infectious Disease Week, San Diego, CA *[Poster presentation]*
- 1/2012 Pindolia VK, Nowak SN, Renner E, Drake S, Scher K, Briden L, Schollenberg H, Testy J, Nmanty, Krol G, **Buitrón de la Vega P**, Grover K, Vasko S, Morris M, Qureshi N. "Value of Adding an Ambulatory Clinical Pharmacist to a Primary Care Team." Henry Ford Research Forum, Detroit, MI *[Poster presentation]*
- National:**  
*Oral*  
3/2016 **Buitron de la Vega P**. "Mind Maps For The Doctors Of Tomorrow," 7th Biggerplate Unplugged Conference, New York, NY *[Invited lecture]*
- Poster*  
5/2016 **Buitrón de la Vega P**, Paasche-Orlow M, Bokhour Barbara. "Helping Patients to Share Their Illness Perceptions Using Health Maps," Society of General Internal Medicine National Meeting, Hollywood, Florida *[Poster presentation]*
- 11/2015 **Buitrón de la Vega P**, Paasche-Orlow M, Bokhour Barbara. "Helping Patients to Share Their Illness Perceptions Using Health Maps," Health Literacy Annual Conference, Washington, DC *[Poster presentation]*
- 4/2015 **Buitrón de la Vega P**, Chie C, Kressin N. "Patients' Feelings of Being Understood by Their Physician Mediates the Association Between Health Beliefs and Medication

- Adherence,” Society of General Internal Medicine National Meeting, Toronto, Canada [*Poster presentation*]
- 3/2015 Zainah H, **Buitrón de la Vega P**, Ramesh M. “Analysis after Implementation of Enhanced Infection Control Practices in Patients with Left Ventricular Assist Device (LVAD),” Society of Hospital Medicine Conference, Maryland [*Poster presentation*]
- 4/2014 **Buitrón de la Vega P**, Qureshi W, Barboza J, Hayek S, Ambulgekar N. “Pre-discharge Assessment of Patients Hospitalized for Heart Failure– A Prospective Study,” Translational Science 2014 Annual Meeting, Washington, DC [*Poster presentation*]
- 4/2013 **Buitrón de la Vega P**, Qureshi W, Tandon P, Hassan S, Mittal C, Jayaprakash R, Abrencillo R, Ramesh M, Zervos M. “Vancomycin MIC as a Predictor of Infective Endocarditis in Patients with MRSA Bacteremia,” American College of Physicians Associates Research Poster Competition, San Francisco, CA [*Poster presentation*]
- 11/2012 **Buitrón de la Vega P**, Qureshi W, Tandon P, Hassan S, Mittal C, Jayaprakash R, Abrencillo R, Ananthasubramaniam K, Ramesh M, Zervos M. “Simplified Criteria to Risk Stratify for the Mode of Echocardiography in Patients with MRSA Bacteremia at Low Risk of Infective Endocarditis,” American Heart Association Scientific Sessions, Los Angeles, CA [*Poster presentation*]
- 11/2012 El Atrache M, Vekaria M, **Buitrón de la Vega P**, Saikumar J, Scher E, Umanath K. “Plasmacytoma Masquerading as Acute Kidney Injury With Hematuria,” ASN Kidney Week Annual Meeting, San Diego, CA [*Poster presentation*]
- 5/2012 Maida G, Angulo D, Grover K, **Buitrón de la Vega P**, Alirhayim Z, Kaatz S. “Phone and Web-Based Interventions in Hypertensive Patients with Atrial Fibrillation,” Thrombosis and Hemostasis Summit of North America, Chicago, IL [*Poster presentation*]

### **Bibliography:**

#### **Original, Peer Reviewed Articles:**

1. Zainah Hadeel, Karthikeyan Aarthee, **Buitrón Pablo**, et al. “The Efficacy of Acticoat-Silver Dressing in Preventing Left-Ventricle-Assisted Device Infections,” *Immunochem Immunopathol.* 2016;2(122):2.
2. **Buitrón de la Vega P**, Tandon P, Qureshi W, Nasr Y, Jayaprakash R, Arshad S, Moreno D, Jacobsen G, Ananthasubramaniam K, Ramesh M, Zervos M. “Simplified Risk Stratification Criteria For Identification Of Patients With MRSA Bacteremia At Low Risk Of Infective Endocarditis:

Implications For Avoiding Routine Transesophageal Echocardiography In MRSA Bacteremia.” *European Journal of Clinical Microbiology & Infectious Diseases*. 2015 Dec 16:1–8.

**Case Reports, Reviews, Chapters, and Editorials:**

**Proceedings of Meetings and Invited Papers:**

1. Community Health Worker Program Development Toolbox (Department of Public Health, Boston MA). Aid To Help With The Integration Of Community Health Workers Into Care Teams. In Press.

**Mind Maps Published In Medical Journals**

1. Yee J. “Uric Acid: a clearer focus. *Advances in Chronic Kidney Disease*.” 2012 Nov;19(6):353–5. (**Buitrón de la Vega P**, Summary Mind Map Diagram)
2. Yee J. “Treatment of Nephrotic Syndrome: Retrospection. *Advances in Chronic Kidney Disease*.” 2014 March: 21(2): 115–118. (**Buitrón de la Vega P**, Summary Mind Map Diagram)