

## **Stroke Guideline Recommendations: Comprehension and Intention**

**How Do Therapists Understand and Intend to Implement  
Practice Guideline Recommendations for Rehabilitation of  
the Upper Limb Following Stroke?**

By

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**CONTRIBUTIONS:**

This thesis follows a manuscript thesis style. It consists of two separate papers: the first was accepted for publication in *Critical Reviews™* in Physical and Rehabilitation Medicine. As the papers are coauthored by other researchers, I, Ahmad Sahely (AS), am the first author for the two journal papers and the other chapters of the thesis. I co-designed the project, performed the data collection in two countries, conducted the data analysis, and drafted and revised the manuscripts. Joy C. MacDermid (JM) co-designed the project, advised on analysis and revised manuscripts. Tara Packham (TP) assisted with data collection and manuscript revision. Vanina Dal Bello-Haas, Jackie Bosch, assisted with revising the manuscripts/thesis. Jeremy Joo assisted with interview transcripts.

## Abstract

Stroke rehabilitation interventions must be evidence-based and applicable to a range of stroke subtypes and severity of disabilities to obtain the optimal outcomes. Clinical practice guidelines assist clinicians to implement rehabilitation plans based on research evidence. Evaluations of clinicians' practices suggest that therapists may not be following guidelines, which may explain why patient outcomes are less than expected.

To increase therapists' adherence to guidelines, it would help to understand their understanding, barriers and facilitators to implementing a clinical guideline. The purpose of this thesis was to demonstrate how rehabilitation therapists understand and interpret specific clinical guideline recommendations for upper limb rehabilitation post-stroke, and to identify perceived implementation barriers and facilitators.

This thesis has two elements. The first demonstrates the application of the Theory of Planned Behaviour as a conceptual framework for understanding rehabilitation professionals' intention toward implementation of clinical guidelines in rehabilitation of persons following stroke. The second part illustrates how physiotherapists and occupational therapists understand the individual recommendations for rehabilitation of upper extremity after stroke from the Canadian Best Practice Recommendations for Stroke Care. It also characterizes the barriers and facilitators that influence therapists' uptake of these recommendations. The data for second manuscript were collected from therapists in two different countries (Canada and Saudi Arabia) to explore the global issues of clinical guidelines implementation.

The review of the Theory of Planned Behaviour informed the study design and thinking about barriers and facilitators; but thematic analyses were driven by the data, not by theory. The similarities across health systems in the two countries were more

striking than the differences, highlighting common challenges for guideline implementation. The findings of this thesis highlight the need for clearer communication of the specific actions intended by the CPG, and education of therapists to ensure they know how to implement interventions utilizing these specific actions.

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## **Acronyms**

CPGs: Clinical Practice Guidelines

CBPRSC: Canadian Best Practice Recommendations for Stroke Care

EBP: Evidence Based Practice

KT: Knowledge Translation

TPB: Theory of Planned Behaviour

PBC: Perceived Behavioural Control

OTs: Occupational Therapists

PTs: Physiotherapists

UE: Upper Extremity

GP: General Principles

GRASP: Graded Repetitive Arm Supplementary Program

MI: Mental Imagery

FES: Functional Electrical Stimulation

CIMT: Constraint-induced Movement Therapy

ROM: Range of Motion

ADs: Adaptive Devices

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**Chapter 1:**  
**Introduction and Literature Review**

## **Introduction**

Stroke is one of the primary causes of morbidity and mortality in adults in the developed world, and a leading cause of disability in all countries.<sup>1</sup> The World Health Organization (WHO) has defined stroke as “rapidly developing clinical signs of focal (or global) disturbance of cerebral function, with symptoms lasting 24 hours or longer or leading to death, with no apparent cause other than of vascular origin (p.108).”<sup>2</sup> Every year, it is estimated nine million new stroke events occur globally and an additional 30.7 million individuals survive the event with ongoing effects of stroke.<sup>1</sup> Although approximately two thirds of persons survive the initial stroke, about 50% incur physical disabilities as a result.<sup>3</sup> Physical disabilities after stroke vary from mild weakness in one limb or part of a limb, to more severe weakness including paralysis of multiple limbs: all of which affect the person’s participation and independence.<sup>4</sup> For stroke survivors, this physical disability may be compounded by pre-morbid or concurrent sensorimotor, musculoskeletal, perceptual, and cognitive system deficits.<sup>4</sup>

Beside the serious impact of stroke on the person’s quality of life, the resultant impairments after stroke lead to considerable costs for health and social services. For example, the annual national cost of stroke in Canada is approximately \$3.6 billion, including healthcare costs and losses in economic productivity.<sup>5</sup> The current costs and service utilization rates are expected to increase along with the changing demographics of an aging population.<sup>6</sup> At the same time, there has also been an increase in strokes among people under 65 and an increase in all stroke risk factors for younger adults.<sup>7</sup> As a response to the enormous impact of stroke, there has been growing support in the literature emphasizing the importance of effective health management plans encompassing the areas of stroke prevention, acute treatment and rehabilitation.<sup>6</sup>

### **Importance of Stroke Rehabilitation**

Rehabilitation after stroke helps patients to regain their function and independence, especially during the post-acute period of stroke, which extends from 6 weeks to 6 months after the onset of stroke [as defined by the Canadian Stroke Network].<sup>8</sup> It may be most beneficial for persons to start rehabilitation early after stroke<sup>9-11</sup>; however, the recovery journey for stroke-related impairments can continue for months or years. Stroke recovery is mediated by a variety of primary and secondary factors which influence the nature and degree of neurological impairments.<sup>12,13</sup> More than 50% of stroke survivors still experience upper extremity (UE) functional problems within the 6 months after stroke;<sup>16</sup> while in contrast, 80% can walk at that time.<sup>17</sup> During the rehabilitation period, it has been identified that patients post- stroke often feel that treatment for UE impairment has a lower priority than for lower extremities.<sup>14,15</sup> When treating persons with stroke, rehabilitation therapists such as Physiotherapists (PTs) and Occupational Therapists (OTs) may have difficulty prioritizing goals and choosing the most effective interventions when developing optimal patient care plans.

Clinical Practice Guidelines (CPGs) are systematically developed statements to assist clinician and patient decisions about appropriate treatment plans, based on the best research evidence for the practice context.<sup>18</sup> Within the last two decades, there have been great efforts in the development of CPGs for stroke care across many countries worldwide.<sup>19</sup> While it might be assumed that CPG are derived from a single, global evidence-base and therefore should apply across contexts, it is often true that different countries or professions may develop their own CPG, perhaps to ensure they fit their unique context. For example, the World Stroke Organization (WSO) has over 60 versions of national clinical stroke guidelines including updates, on their website from a variety of different countries.<sup>19</sup>



## **Stroke Rehabilitation CPGs**

Clinical practice guidelines for stroke rehabilitation are designed to provide scientific evidence to support clinical evaluations and interventions to achieve maximum functional independence and to improve patient quality of life.<sup>33</sup> The appropriate use of stroke rehabilitation CPGs may improve patient health outcomes in several contexts.<sup>8</sup> For example, Duncan and colleagues found that greater adherence to post-acute stroke rehabilitation guidelines was associated with improved patient outcomes and suggested that “...compliance with guidelines may be viewed as a quality of care indicator with which to evaluate new organizational and funding changes involving post-acute stroke rehabilitation.(p.167)”.<sup>20</sup>

Unfortunately, there is often a significant gap between clinical guideline recommendations and actual practice patterns.<sup>21</sup> It is evident that the best health outcomes are not achieved when findings are not implemented effectively.<sup>21</sup> Evaluations of multi-disciplinary stroke clinicians’ practices indicate CPGs are not implemented in daily practice.<sup>25-28</sup> There are various reasons for the slow implementation of stroke guidelines, which need to be addressed at different levels within health care system.<sup>8</sup> Previous studies have discussed general barriers for implementation of stroke CPGs, but didn’t focus specifically on rehabilitation therapists or specific recommendations.<sup>32,34</sup> Therefore, examination of recommendations specific to promoting upper extremity recovery could explore the contributions of guideline non-adherence given 85% of stroke survivors have upper limb impairments and approximately 50% of them live with some degree of motor impairment or are at least partly dependent in activities of daily living.<sup>22-24</sup> Further, previous studies have not explored how individuals interpret the meaning of specific recommendations. Since it is critical to understand why rehabilitation therapists are not

fully implementing the research evidence when treating their stroke clients, it is important that these issues be explored. Understanding knowledge gaps or perceived barriers may provide targets for future knowledge translation interventions.

### **Knowledge Translation**

Knowledge translation (KT), which can be simply interpreted as moving evidence into practice, is paramount in developing strategies that help to ensure the translation of knowledge into real action. KT is defined as a "...dynamic and iterative process that includes synthesis, dissemination, exchange and ethically sound application of knowledge to improve the health of Canadians, provide more effective health services and products and strengthen the health care system (para. 4)."<sup>29</sup> Graham and colleagues describe the Knowledge to Action (KTA: see Figure 1) process framework as a complex and dynamic conceptual framework that helps stakeholders to ensure the implementation of evidence knowledge into practice.<sup>30</sup>

The KTA framework has two components: knowledge creation and the action cycle. The knowledge creation component consists of knowledge inquiry, knowledge synthesis, and creation of knowledge tools / products. CPG are knowledge products that result from synthesis of knowledge from individual research studies. The KTA cycle emphasizes the need for research knowledge to be increasingly synthesized in order to maximize stakeholders' ability to utilize this research knowledge. Reflecting efforts to address these needs, the Canadian Best Practice Recommendations for Stroke Care were created in 2006 in order to synthesize the increasing evidence in this area and to help healthcare professionals make decisions based on the highest quality and most recent evidence.<sup>31</sup>

This thesis focuses on the outer circle of the KTA, the action cycle. Specifically, the goal of this thesis is to assess barriers to knowledge use to better understand the mechanisms required for knowledge translation, and support implementation of the synthesized knowledge contained in evidence-based CPGs. The action cycle has 7 interacting stages that guide the application of created knowledge for use in particular contexts (Figure 1).<sup>30</sup> The first stage is identifying, reviewing and selecting knowledge. The aim of this stage is to identify the problem, then select the appropriate evidence from the knowledge creation funnel to address this problem. The second stage involves adapting knowledge to the local context. The third stage is to assess barriers to knowledge use. The fourth stage is selecting, tailoring and implementing interventions. This stage focuses on choosing specific KT strategies and adapting those strategies to specific contexts based on barriers, facilitators and preferences of a specific practice context. The fifth, sixth and seventh stages include monitoring, evaluating and sustaining knowledge use. The main goal of all stages is to ensure the KT strategies selected are meeting the needs of knowledge users, and to identify the importance of adjusting strategies as needs change.<sup>30</sup> Previous studies have discussed many KT strategies that are used by healthcare professionals to increase the application of knowledge into practice. Examples of some commonly used strategies are: 1) distribution of educational material, 2) educational meetings, 3) educational outreach visits, 4) audit and feedback, and 5) use of knowledge brokers.<sup>67-69</sup> These studies suggested that there is no specific KT strategy that is more effective than the others in all circumstances.<sup>70</sup>

The current literature demonstrates there are many barriers and facilitators to translating best evidence into practice.<sup>32,33</sup> For successful implementation of CPGs, there is a need for understanding the complexity of altering clinical practice and

particularly the problems that relate to professional attitudes and experiences with implementation of CPGs in the health care context.<sup>34</sup> Jette et al., (2003) found that although there are numerous studies on changing the behaviour of patients/clients, studies related to changing clinicians' behaviour are relatively limited.<sup>35</sup>

### **Theory of Planned Behaviour as a KT framework**

To assess the barriers for implementing knowledge into practice, theory can be used to categorize or explain variations seen in implementation and adherence to best practice evidence in various contexts, including clinical practice guidelines. The Theory of Planned Behaviour (TPB), proposed in 1985 by Icek Ajzen, is one of several well-established cognitive theories related to understanding and changing an individual's behaviour.<sup>36</sup> The TPB hinges on the assumption that *behavioural intention* is the central determinant of human behaviour. Ajzen defines behavioural intention as the amount of effort one is willing to exert to attain a goal.<sup>36</sup> The strength of intention is influenced by three forms of determinants (see Figure 2). The first determinant, the *attitude toward the behaviour* is defined as the person's evaluation of the effects of performing a particular behaviour of interest. The second determinant, the *subjective norm*, is composed of individual normative beliefs and social pressure to perform the behaviour or not. The third determinant, the *perceived behavioural control* (PBC), constitutes individual beliefs concerning capability and the controllability of performing the behaviour. The PBC can also be directly associated with the behaviour.<sup>37</sup>

### **Identification of Facilitators and Barriers to Guideline Use**

Cognitive interviewing<sup>39</sup> is a structured "qualitative" method to understand the cognitive process used by respondents to understand and respond to items on a survey

or outcome measure. In this thesis, the method was adapted to determine how people understand and respond to recommendations found within clinical practice guidelines. Qualitative interviews generate rich data about perceptions, feelings, experiences, motives, attitudes and knowledge among individuals: factors that can influence how people respond to questions or statements.<sup>38</sup> This depth of insights in comprehension and judgements is ideal for the identification of potential facilitators and barriers from the TPB lens. While often used to understand how respondents interpret and answer questionnaires,<sup>39</sup> cognitive interviewing has been used in many contexts to glean a better understanding of an issue by eliciting direct responses from the participants about their understanding, intention and attitude with regard to a particular question or construct.<sup>40</sup>

### **Literature Review of the Barriers and Facilitators for Guideline Use**

This thesis focuses on the scope of barriers and facilitators that have implicit or explicit impacts on therapists' practice, particularly in the field of UE rehabilitation post-stroke. The purpose of this literature review was to generate a clearer picture about the implementation issues identified in previous studies. There has been a substantial number of studies that have identified the implementation issues of CPGs at different levels (i.e. health professionals, patients, policy makers, and other stakeholders).<sup>41</sup> Currently, the available research shows that although guidelines play an essential role in healthcare quality improvement, they are not consistently translated into practice.<sup>42-</sup><sup>44</sup> This might reflect the challenge of modifying practitioners' behaviour to apply a CPG, either individually or at group level.<sup>45</sup> From another perspective, a systematic review of guideline applicability found one of the key barriers for a guideline implementation is the lack of implementation tools targeting the incorporation of clinical guidelines into daily practice.<sup>46</sup> Further, the number of studies investigating changing clinicians'

behaviour are relatively few in comparison to the large number of studies on changing the behaviour of patients and clients.<sup>47</sup>

Previous studies have found multiple barriers that influence the application of the guidelines; and barriers might be influenced by a wide range of factors, including a) individual factors, b) economics, c) political factors, and, d) organizational perspectives.<sup>56</sup> Examples of the clinician barriers described in previous studies are lack of practitioners' awareness about CPGs, self-efficacy, professional agreement, and disinterest as a result of previous experience using CPGs (Table 1).<sup>57</sup> Other barriers include the validity of the guidelines, agreement between the clinicians and contextual factors (for example, time restraints, insufficient staff and cost expenditure).<sup>18</sup> McKenna and colleagues reviewed studies on barriers to evidence-based practice for health professionals and found that potential contextual barriers must be recognized specifically in relation to the work environment prior to evaluating the effectiveness of CPG implementation within that environment.<sup>58</sup> Sometimes, the CPGs themselves might be a barrier, if they are contradictory to current practice and therefore they might be rejected for guidelines that are consistent with current practice.<sup>59</sup> On the other hand, Grol and colleagues (1998) found CPGs with clear and evidence-based recommendations have a greater chance of being implemented than guidelines with recommendations that are not clear or are based on clinicians' opinion.<sup>60</sup>

Specific to the implementation of physical therapy guidelines, Jette and colleagues (2003) found the major barrier for implementing evidence-based practice reported by physiotherapists was lack of time.<sup>47</sup> Regarding stroke-specific clinical practice guidelines, there are several recent studies that address barriers experienced by rehabilitation professionals. For example, a broad study of 1800 Canadian stroke rehabilitation clinicians found they were not routinely applying the best practices when

treating persons with stroke.<sup>25-28</sup> A pilot study completed by Bayley and colleagues (2012) found that in Canada, “The most commonly noted barrier to implementation was lack of time followed by staffing issues, training/education, therapy selection and prioritization, equipment availability and team functioning/communication. There was variation in perceptions of barriers across stakeholders. Nurses noted more training and staffing issues and managers perceived fewer barriers than frontline clinicians (p. 1635).”<sup>32</sup> These findings were based on a sample that included nurses, occupational therapists, physical therapists, physicians and hospital managers from multiple inpatient stroke care centers.

A theory-based approach might be useful in exploring the determinants of clinicians’ behaviour.<sup>18,48</sup> There are a variety of socio-cognitive theories that can be used to explain the implementation and adherence to best practice evidence in different contexts, including clinical practice guidelines. Examples of well-established cognitive theories related to changing an individual’s behaviour are: the Social Cognitive Theory,<sup>49</sup> the Theory of Reasoned Action,<sup>50</sup> the Theory of Planned Behaviour (TPB),<sup>36</sup> and the Health Belief Model.<sup>51</sup> The TPB is widely known and used as a theoretical framework for understanding human social and health behaviour in various circumstances.<sup>36,52</sup> The TPB has informed the development of other theories to help understand and change health related behaviours related to patients and clinicians.<sup>53</sup> A systematic review completed by Godin and colleagues, addressed factors influencing health professionals’ behaviours based on social cognitive theories, and found the TPB was the most used theory across different studies.<sup>54</sup> Moreover, the TPB has been used effectively to inform clinical practice or research that requires adoption of a new behaviour, and for the retrospective analysis of health behaviours.<sup>53,55</sup> Therefore, there is strong support to suggest the TBP has the potential to provide a useful structure for

exploring barriers to the implementation of CPGs for rehabilitation professionals.

Despite the existing barriers, many therapists recognize the importance of evidence-based practice (EBP) and have a desire to improve their current knowledge and practice.<sup>61-63</sup> The literature also identifies facilitators to EBP use, such as: the academic degree attained, involvement in research projects, membership in a specialized inter-professional team, supportive facilities, involvement in student supervision, and previous education about EBP and EBP skills.<sup>63,64</sup> For example, Jette and colleagues (2003) reported 90% of participants agreed that evidence based practice is necessary, 79% believed it improves the quality of patient care, and 84% agreed they needed to increase their adherence to evidence in their daily practice.<sup>47</sup> Taken together with the findings of evidence-practice gaps, these findings suggest positive attitudes exist, but attitudes alone may not ensure adherence. Further, there is compelling evidence that it is challenging to change practitioners' behaviour, either individually or at group level.<sup>45</sup> As a result, guideline implementation in some cases is suboptimal or may be dismissed.<sup>65</sup>

A further limitation to understanding the challenges and opportunities for improving guideline implementation is that most evidence on implementation has been generated examining only the Western health care context.<sup>66</sup> There is a need and opportunity to examine the issues of CPG implementation from a more global perspective, and to determine similarities and differences within dissimilar health systems and contexts. This thesis work therefore collected data from two different countries, Canada and Saudi Arabia, in order to explore the issues around implementation of CPGs for rehabilitation of the upper extremity after stroke from an international lens.



## **Thesis Objectives**

The overall goal of this thesis was to better understand how occupational therapists and physiotherapists understand and intend to apply recommendations for UE rehabilitation from the CBPRSC. The approach taken to achieve this goal was conducted over two manuscripts that addressed two separate research objectives.

The first manuscript/objective explored the potential for the Theory of Planned Behaviour to inform our understanding of therapists' intentions and behavior in the application of CPG to the rehabilitation of the upper extremity following stroke.

A second manuscript/objective was to understand how specific recommendations were understood by therapists, and what barriers and facilitators they experience in actual or intended implementation of these recommendations.

## **Thesis Outline**

My thesis is composed of the following four chapters: Chapter 1: Introduction and Literature Review; Chapter 2: Application of the TPB to Therapists' Intention to Implement CPGs for Stroke Rehabilitation: A Narrative Review; Chapter 3: Therapists' Understanding of the Canadian Best Practice Recommendations for Upper Extremity Rehabilitation after Stroke: and Barriers and Facilitators for their Implementation; Chapter 4: Discussion and Conclusion.

Chapter one explains the background of my thesis topic "stroke rehabilitation" and the role of evidence based practice in improving clinical outcomes for stroke survivors in terms of upper extremity rehabilitation post stroke. It summarizes the

studies that have been addressed the barriers and facilitators of implementing clinical practice guidelines. This chapter ends with the research goal and objectives.

Chapter two is a narrative review that demonstrates the application of the Theory of Planned Behavior as a conceptual framework for understanding rehabilitation professionals' intention toward implementation of clinical guidelines in rehabilitation of persons following stroke. It summarizes the literature that has addressed barriers and facilitators to implementation of practice guidelines using the Theory of Planned Behaviour lens.

Chapter three describes a descriptive qualitative study that investigates how physiotherapists and occupational therapists understand the individual recommendations for rehabilitation of upper extremity after stroke from the Canadian Stroke Best Practice Recommendations. This study draws on principles of cognitive interviewing to explore the understanding of the individual recommendations, and a descriptive thematic analysis approach to understand the barriers and facilitators that influence therapists intend to follow the recommendations.

Chapter four is the final chapter of this thesis that discusses the implications of this work in the field of rehabilitation science and implications for other investigators and persons seeking to support CPG implementation. This chapter also provides direction for future research to build on this thesis work.

Table 1: Examples of the Barriers to Clinicians' Adherence to Clinical Practice Guidelines

Theme	Examples of Barriers
Knowledge	Lack of Awareness Lack of Familiarity Volume of Information Time Needed to Stay Informed Guideline Accessibility
Guideline Factors	Guideline Characteristics Presence of Contradictory Guidelines
Environmental Factors	Lack of Time Lack of Resources Organizational Constraints Lack of Reimbursement Perceived Increase in Malpractice Liability
Attitudes	Lack of Outcome Expectancy Lack of Self-Efficacy Lack of Motivation/
External Barriers	Patient Factors Inability to Reconcile Patient Preferences With Guideline Recommendations

**Extracted from:** Cabana MD, Rand CS, Powe NR, Wu AW, Wilson MH, Abboud PA, Rubin HR: Why don't physicians follow clinical practice guidelines? A framework for improvement. JAMA 1999, 282(15):1458-1465.

Figure1: A diagram of the KTA Process Framework (Graham et al., 2006).

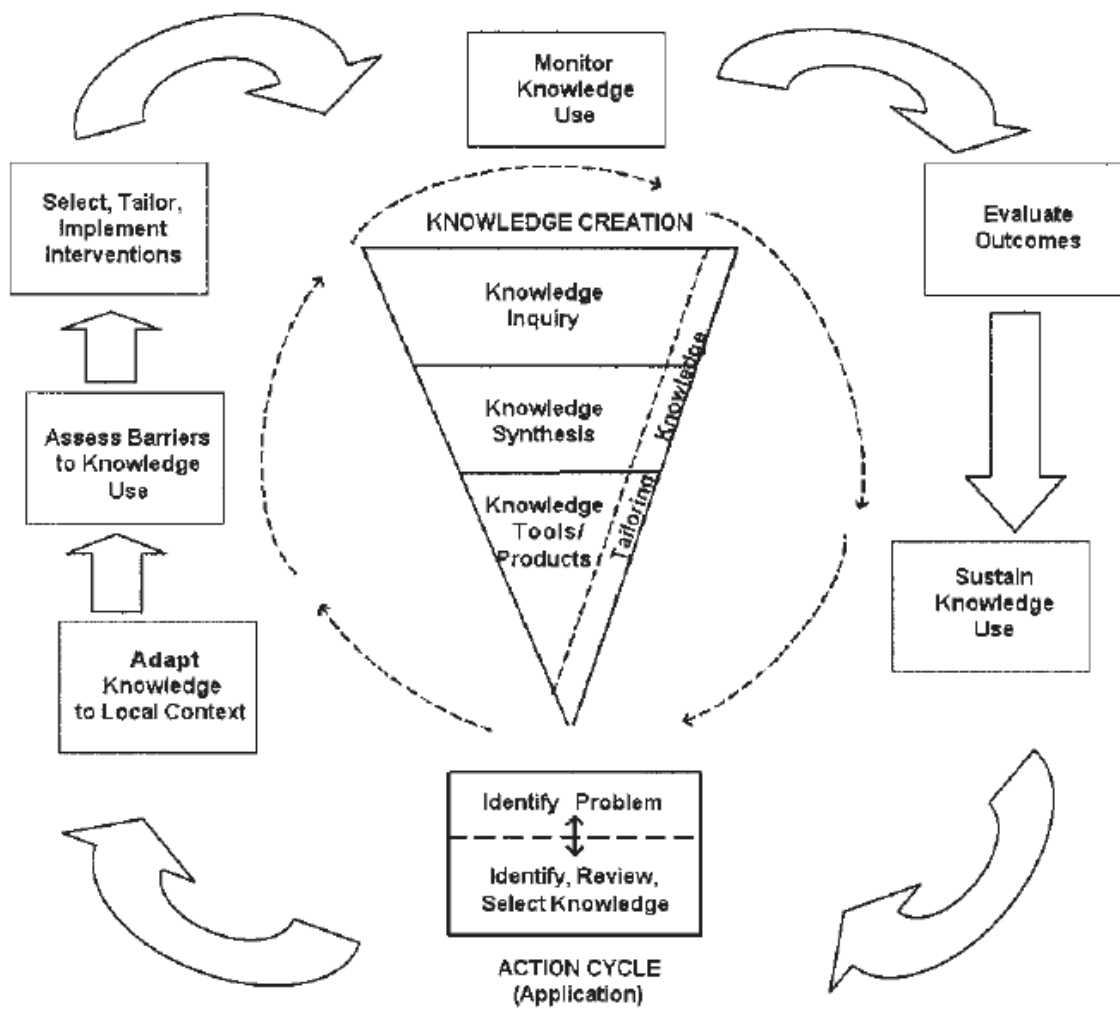
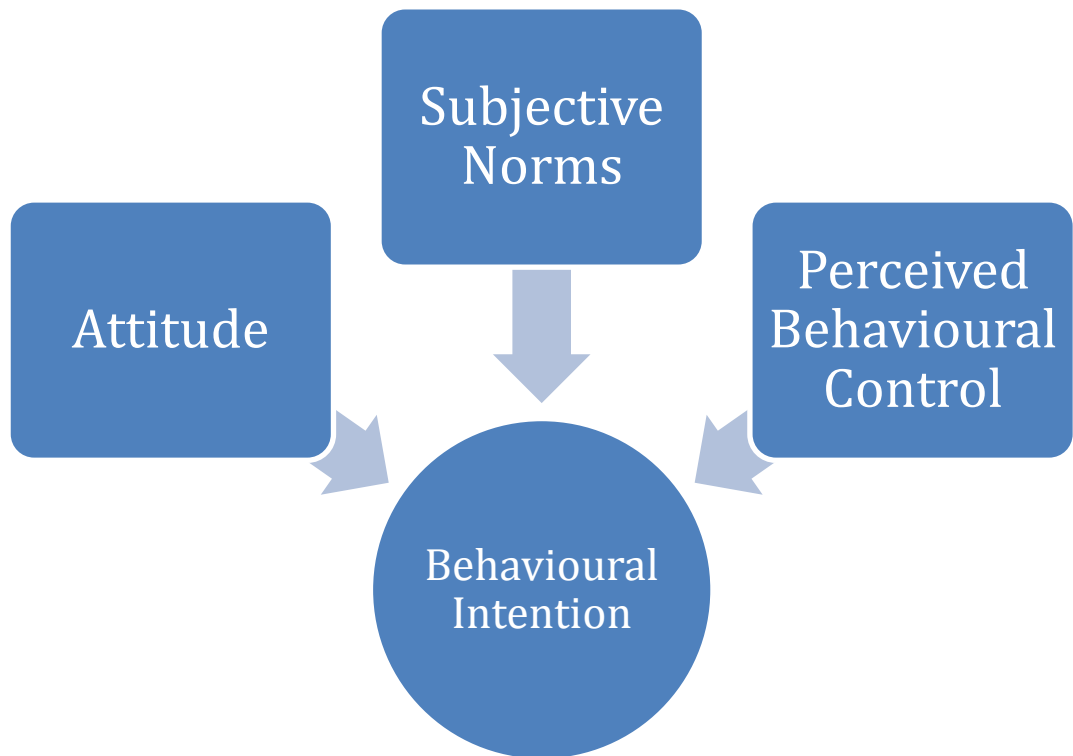


Figure2: The Determinants of Behavioural Intention



Adapted from: Ajzen, I. The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes*, 1991, 50 (2), 179-211.

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**CHAPTER 2: MANUSCRIPT # ONE**

Application of the TPB to Therapists' Intention to Implement CPGs for Stroke  
Rehabilitation

## **Intention toward Implementation of Stroke Rehabilitation Clinical Practice**

### **Guidelines: An Application of the Theory of Planned Behaviour**

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**ABSTRACT:** Stroke is one of the leading causes of disability. Physical rehabilitation must be evidence-based and address a range of clinical subtypes and severity of disabilities. Clinical practice guidelines provide a useful mechanism for implementing rehabilitation plans based on research evidence. To increase adherence to guideline use, there is a need to understand attitudes and intentions toward guideline implementation. The purpose of this paper is to demonstrate how theory can be applied to understand therapists' intention toward implementation of rehabilitation clinical practice guidelines to provide a mechanism for improving use of stroke guidelines in practice.

**KEY WORDS:** rehabilitation therapist, barriers, theoretical framework, evidence based practice.



## **I. Introduction**

Stroke is one of the principal causes of morbidity and mortality in adults in the developed world and the leading cause of disability in all industrialized countries. According to the World Health Organization (WHO), stroke is defined as “rapidly developing clinical signs of focal (or global) disturbance of cerebral function, with symptoms lasting 24 hours or longer or leading to death, with no apparent cause other than of vascular origin.”<sup>1</sup> Every year an estimated 9 million new stroke events occur globally and an additional 30.7 million individuals live with the ongoing effects of stroke.<sup>2</sup> The resultant impairments after stroke have a serious impact on a patient's life and considerable costs of health and social services. For example, 85% of stroke survivors have upper limb impairments and approximately 50% of them live with some degree of motor impairment or are at least partly dependent in daily living activities.<sup>3,4,5</sup>

Rehabilitation after stroke helps patients to regain their independence, especially during the post-acute period of stroke, which extends from 6 weeks to 6 months after the onset of stroke, as defined by the Canadian Stroke Network.<sup>6</sup> Interventions used vary on the basis of the nature and degree of impairments after stroke; and also based on therapist practice patterns. During rehabilitation, there is an array of possible interventions to select from when developing optimal patient care plans.

Clinical Practice Guidelines (CPGs) are “systematically developed statements based on evidence to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances.”<sup>7</sup> CPGs can play an important role in improving the quality of rehabilitation and it has been evident the best health outcomes are not achieved when research findings are not implemented effectively.<sup>8</sup> Several studies confirmed the considerable gap between the clinical guidelines recommendations and the actual practice patterns.<sup>9</sup> For example, Hammond and colleagues studied adherence

to physical therapy specific recommendations of the National Clinical Guidelines for Stroke in the UK and concluded physiotherapists are not fully complying with the national standards for stroke care.<sup>10</sup>

As there is no single effective strategy to ensure that guidelines are applied in clinical practice, Feder and colleagues suggest the use of multifaceted methods to disseminate and implement guidelines.<sup>11</sup> Methods are chosen based on available resources, potential barriers to care, and research evidence about the effectiveness and efficiency of different methods.<sup>12</sup> For successful implementation of CPGs, there is a need for understanding the complexity of changing clinical practice and particularly the problems relating to health professional attitudes and experiences with implementation of CPGs in the health care context.<sup>13</sup> Jette and colleagues found while a very large number of studies on changing the behaviour of patients and clients, studies related to changing clinicians' behaviour are relatively limited.<sup>14</sup>

A theory-based approach may be useful in exploring the determinants of professionals' behaviour.<sup>7,15,16</sup> A theory is a "coherent and non-contradictory set of statements, concepts or ideas that organizes, predicts and explains phenomena, events, behaviour, etc."<sup>17(p.2)</sup> There are various socio-cognitive theories that can be used to explain the implementation and adherence to best practice evidence in various contexts, including clinical practice guidelines. Well established cognitive theories related to changing an individual's behaviour include the Social Cognitive Theory,<sup>18</sup> the Theory of Reasoned Action,<sup>19</sup> the Theory of Planned Behaviour (TPB),<sup>20</sup> and the Health Belief Model.<sup>21,22</sup> The Theory of Planned Behaviour (TPB) has gained traction as a theoretical framework for understanding human social and health behaviour in different circumstances.<sup>20, 23</sup> There is evidence the TPB can be used to predict health related behaviour to a greater effect when compared to the Health Belief Model, which has

been criticized for lacking consistency.<sup>24</sup> For example, Blanchard (2008) found the TPB was a promising theoretical framework to explain exercise intentions and behaviour during the home-based cardiac rehabilitation programs.<sup>25</sup> Moreover, this theory has been used successfully to inform clinical practice or research requiring adoption of a new behaviour and for the retrospective analysis of health behaviours.<sup>21, 24</sup>

## **II. OBJECTIVE**

The objective of this paper is to demonstrate the application of the Theory of Planned Behaviours as a conceptual framework for understanding rehabilitation professionals' intention toward implementation of clinical guidelines in rehabilitation of persons following stroke.

## **III. Importance of CPG Implementation**

Implementation is defined as "a planned process and systematic introduction of innovations or changes of proven value; the aim being that these are given a structural place in professional practice, in the functioning of organizations or in the health care structure."<sup>26</sup>

The primary goal of rehabilitation after stroke is to reduce impairments, maximize function and prevent secondary complications. CPGs enable rehabilitation practitioners to systematically apply scientific evidence in clinical practice to increase equality and efficiency and to reduce variation in professional practice.<sup>6,7, 27-29,30</sup> Duncan and colleagues found that greater adherence to post-acute stroke rehabilitation guidelines was associated with improved patient outcomes and suggested guideline compliance functioned as a quality of care indicator useful for policy, evaluation and funding decisions in post-acute stroke rehabilitation programs.<sup>31</sup> To achieve these benefits, a high level of guideline implementation is required.<sup>32</sup> Although much is known about the effectiveness of implementation strategies to date, no review has been published

addressing the latest standards of adherence with clinical practice guidelines in physical therapy or even with non-evidence based statements, protocols or treatment methods.<sup>33</sup>

One of the effective implementation strategies is the identification of barriers to the use of guidelines. There are diverse barriers influencing the application of guidelines and these barriers may be influenced by a wide range of factors, spanning individual preferences as well as economic, political, and organizational perspectives.<sup>34</sup> Examples of barriers cited in previous studies include lack of practitioners' awareness about CPGs, professional agreement, self-efficacy, and disinterest in using CPGs.<sup>13</sup> Other barriers include concerns about the validity of the guidelines and contextual factors (for example, insufficient staff, time restraints and cost expenditure).<sup>7</sup> McKenna and colleagues analyzed studies of barriers to evidence-based practice in health professionals, finding potential barriers to a target behaviour have to be identified specifically in relation to the work environment prior to evaluation of the effectiveness of CPGs implementation.<sup>35</sup> The CPGs themselves could be another barrier to implementation: for example, guidelines contradictory with current practice may be rejected more than guidelines that are consistent with current practice.<sup>36</sup> From another aspect, Grol and colleagues found guidelines with clear and evidence-based recommendations were more likely to be followed than guidelines with recommendations that were not clear, were controversial, or based on professionals' opinion.<sup>32</sup> Jette and colleagues' 2003 study found the major barrier for implementing evidence-based practice reported by members of the American Physical Therapy Association (APTA) was lack of time.<sup>14</sup> They reported 90% of participants agreed evidence based practice is necessary, 79% believed it improves the quality of patient care, and yet 84% admitted they needed to increase their adherence to evidence in their daily practice.<sup>14</sup> This suggests that positive attitudes exist, but may not insure

adherence. However, there is substantial evidence that it is challenging to change practitioners' behaviour, either individually or at group level.<sup>37</sup> As a result, a guideline implementation is suboptimal and even dismissed in some cases.<sup>38</sup>

#### **IV. THE THEORY OF PLANNED BEHAVIOUR**

The TPB was proposed in 1985 by Icek Ajzen, an Emeritus Professor of Psychology at the University of Massachusetts, through his article “From intentions to actions: A theory of planned behaviour.”<sup>39</sup> The TPB is an extension of the Theory of Reasoned Action, which was formulated in 1967 to examine the relationship between attitudes and behaviour.<sup>40</sup>

The TPB hinges on the assumption that behavioural intention is the central determinant of human behaviour. Behavioural intention is defined as the amount of effort one is willing to exert to attain a goal.<sup>20</sup> The strength of intention is determined by three kinds of determinants (Fig. 1). The first determinant, the attitude toward the behaviour is defined as the person’s evaluation of performing a particular behaviour of interest. The second determinant, the subjective norm, is composed of individual normative beliefs and social pressure to perform the behaviour or not. The third determinant, the Perceived Behavioural Control (PBC), is composed of individual beliefs concerning capability and the controllability of performing the behaviour. Perceived behavioural control can also be directly associated with the behaviour, reflecting the individual’s actual control over behavioural performance.<sup>41</sup> Each of the three determinants of intention reflects a set of fundamental beliefs. There are behavioural beliefs (beliefs about the advantages and disadvantages of performing a behaviour), normative beliefs (beliefs about the normative expectations of others), and control beliefs (beliefs about the facilitators and barriers of performing a behaviour).<sup>25</sup>

The strength of each determinant is dependent on the context in which TPB is

applied. For example; Kinket and colleagues (1992) found attitudes were the strongest predictor of general practitioners' intentions to give their patients information about the nature of their illnesses and treatment methods. However, social norms and behavioural control did not increase the predictive power of the model.<sup>42</sup> In contrast, Gaither and colleagues (1996) demonstrated social norms were the predominant determinant of behaviour described by physicians in health maintenance organizations.<sup>43</sup> Bunce and Birdi (1998) found social norms to be the strongest predictor of doctors' intention to request hospital autopsies.<sup>44</sup> In another study, Millstein (1996) considered overall perceived behavioural control to be the strongest predictor of a primary care physician's intention to educate adolescents about sexually transmitted diseases.<sup>45</sup> A moderate correlation ( $r=0.52$ ) between *intention* and *perceived behavioural control* was found in Armitage and colleagues meta-analysis,<sup>23</sup> echoing earlier correlations of  $r=0.45$  (Randall & Wolff, 1994) and  $r=0.44$  (Sheeran & Orbell, 1998) study.<sup>23</sup> Therefore, PBC influences behaviour that states the need for PBC in addition to the TPB determinants. Since intention seems to be a valid proxy measure for behaviour,<sup>17</sup> this validates the use of the theory of planned behaviour to identify which theoretical constructs predict health care professionals' use of guidelines in clinical practice.<sup>21,34</sup> A number of studies have also used TPB to define adherence to best practice in different contexts. For example, the TPB was successfully used to assess guideline adherence by physiotherapists in the Netherlands in 2006.<sup>32</sup> Moreover, the TPB components were used to compare the outcomes obtained by adherence to the National Clinical Guidelines for Stroke (NCGS) in the UK with standard practice.<sup>10</sup>

The merits of the theory of planned behaviour include:

1. Along with The Theory of Reasoned Action, it provides a framework to identify key behavioural, normative, and control beliefs affecting behaviours.<sup>46</sup>

2. It demonstrates explanatory power for a variety of health behaviours, including exercise, smoking and drug use, HIV/STD-prevention behaviours, mammography use, clinicians' recommendation of provision of health promotion services, and oral hygiene behaviours.<sup>46</sup>
3. It provides a specific social-cognitive context to interpret individual actions by identifying, measuring, and combining beliefs relevant to individuals or groups, allowing us to understand their unique reasons that motivate the behaviour of interest.<sup>46</sup>
4. It identifies potential intervention targets for behaviour modification.

Conner and Armitage (2006) proposed extending the TPB by incorporating it in a dual-process model of attitude-behaviour relationships. Also, it has been suggested that such a model might include the volitional process helping to determine how goal intentions may guide goal achievement.<sup>23</sup>

## **V. APPLICATION OF THE TPB IN THE IMPLEMENTATION OF STROKE CLINICAL GUIDELINES**

### **A. To Understand Therapists' Intention:**

The TPB has been used successfully to understand the interconnected concepts, definitions and assumptions that describe various clinicians' behaviours toward using of CPGs in daily practice. Eccles and colleagues<sup>38</sup> found intention was a valid surrogate measure of behaviour among clinicians (including physicians, nurses, pharmacists, other health workers) toward implementing of clinical research findings into routine clinical practice.<sup>47</sup> Korteisto and colleagues did a cross sectional study to explore determinants of various professionals' behaviour in different hospitals, finding all components of the TPB were significantly associated with professionals' intention to use CPGs. Moreover, some studies have suggested the theory of planned behaviour as

a suitable theoretical basis for implementing clinical guidelines in healthcare practices.<sup>13</sup> Godin and Kok concluded the TPB was efficient for explaining the attitude, intention, and perceived behavioural control across health-related behaviour categories.<sup>48</sup> A systematic review by Godin and colleagues addressed factors influencing health professionals' behaviours based on social cognitive theories, and found planned behaviour was the most used theory across different studies.<sup>34</sup>

As the TPB has been successfully used to describe clinicians' behaviour under certain circumstances, it is also likely to be able to explain therapists' intention toward implementation of stroke clinical guidelines. In the area of stroke rehabilitation, it has been proposed to explore the intention of different professionals, including physical and occupational therapists, toward implementing the upper limb rehabilitation recommendations released within the Canadian Best Practice Recommendations for Stroke Care. The behavioural intention of therapists, defined as the cognitive representation of the PTs readiness to implement a particular CPG, will be elicited qualitatively through interviews and questionnaires. The three determinants of the behavioural intention will be defined as 1) personal attitudes, represented by the positive or negative evaluation of the guidelines by therapists; 2) subjective norms, as the individual's perception of the opinion of experienced peers toward the CPG; and 3) perceived behavioural control, the therapist's perception of the difficulty or ease with which the CPG can be implemented.

### **B. To Detect the Barriers to CPGS Implementation:**

Although the Canadian Stroke Best Practice Recommendations provide recommendations for effective rehabilitation of persons after stroke, the current lack of optimal care suggests the presence of barriers influencing implementation of the



recommendations by therapists. The TPB can be used to define the barriers for implementation of an individual Clinical Practice Guidelines. For example, barriers for the implementation of CPGs previously identified in the literature can be classified into the domains of the TPB.<sup>21</sup> Moreover, applying the components of the TPB to understand the implementation of practice guidelines can help define specific barriers to each recommendation that have not been defined in previous literature. For example, if a clinician states he/she has not implemented any of the recommendations because he/she feels individually unable to follow a recommendation, this will fall under the PBC component. If he or she decided not to use a guideline recommendation in the response to a senior therapist's behaviour that convinced him/her not to use it, this will fall under the subjective norms category.

### **C. To Increase Their Adherence and Uptake:**

The developed model and specific details about the nature of the TPB domains that describe how therapists form an intention to use CPG recommendations can be used in the design of future knowledge translation interventions directed towards the uptake of CPG as shown in Figure2. The model is adapted from the TPB model by Ajzen 1991 to incorporate the need to consider behavioural control. The effectiveness of theory-informed interventions for improving therapists' behaviour towards implementation of CPGs could be tested in a randomized controlled trial. This should determine whether KT promotes the use of CPG as a component of effective post-acute stroke rehabilitation. One potential KT intervention might be use of a Knowledge Broker (KB). A KB is a research intermediary who helps to bridge the gap between research findings and clinical practice. An effective KB has the ability to tailor key messages from research evidence to the local perspective, incorporating best practices into existing routines.<sup>49</sup> Knowledge brokers could address all the domains of the TPB as

they can be from the normative reference group, affect beliefs and provide strategies that would change perceived behavioural control. Another KT intervention is audit and feedback where a systematic program to monitor and improve adherence to the guidelines for rehabilitation, as has been observed with the Dutch physical therapy guidelines for low back pain.<sup>50</sup> Finally, there is a need for pre and post evaluation of implementation for CPGs to assess the outcomes of the interventions. In addition, the suggested studies should analyse the determinants of therapists' behaviour as described in the TPB. This step will improve knowledge about the ability of various interventions to affect behaviour and/or the determinants of this behaviour like intention, attitude, subjective norm and perceived behavioural control.

## **VI. LIMITATIONS**

- A. The first limitation is that intention determinants may not be limited to attitudes, subjective norms, and perceived behavioural control.<sup>20</sup> Empirical studies showed that only 40% of the variance of behaviour could be explained using TRA or TPB.<sup>20,51</sup> The other determinants that may influence behaviour could arise beyond cognitive processes, since emotional and unconscious behaviour are not considered in this model.
- B. The second limitation is there may be a substantial gap of time between assessment of behavioural intention and the actual behaviour of interest.<sup>51</sup> In that time gap, the intention of an individual might change.
- C. The third limitation is that both TRA and TPB are predictive models of individual action based on certain criteria. However, individuals do not always behave as predicted by those criteria.<sup>51</sup> There are other variables that factor into behavioural intention, such as fear, threat, mood, and environmental barriers/facilitators or economic factors that may influence the intention.<sup>52</sup>

- D. Although the addition of perceived behavioural control was an important step, this theory does not explicitly address actual control over behaviour.<sup>52</sup>
- E. There are still some concerns about the correspondence between an intention and a future behaviour, particularly in health care professional practice. People do not always behave as they intend; and circumstances are often in flux between when intentions are formed and action is taken. The exploration of how clinicians form intentions and commit to implement evidence-based recommendations may contribute to changes in their future behaviours.<sup>47</sup>

## **VII. CONCLUSION**

Rehabilitation professionals are often challenged to adhere to stroke clinical practice guidelines. Ongoing research is needed to increase our understanding of the gap between evidence and practice that is evident when implementation of CPGs is low and to design knowledge translation interventions to improve CPGs implementation by therapists. The Theory of Planned Behaviour has utility for understanding and changing human behaviour in various contexts, including clinicians' behaviour in making decisions regarding patient care. As with any other theoretical framework, the TPB has limitations which nonetheless can be addressed by careful planning and execution of the proposed research.

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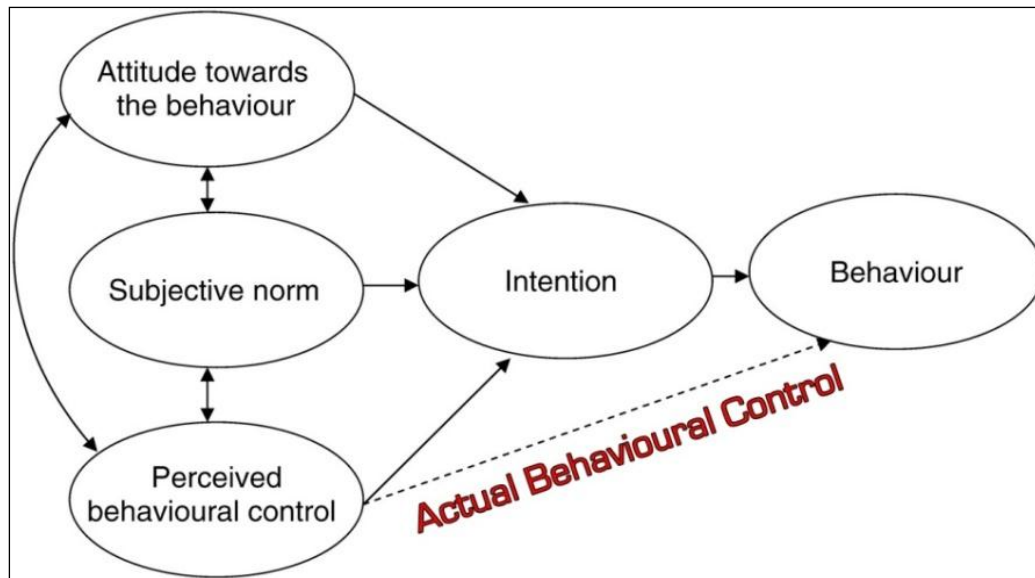
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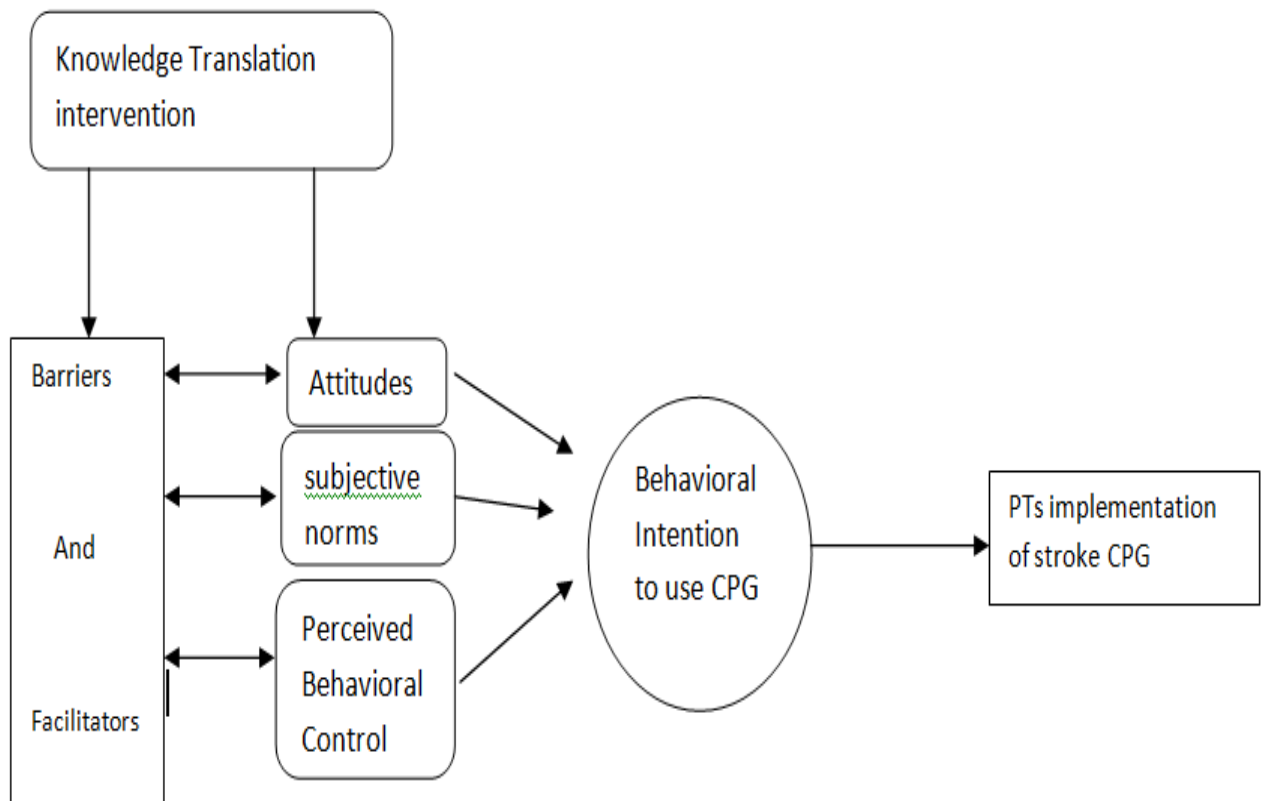
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**FIG.1:** Ajzen, I. Perceived behavioral control, self-efficacy, locus of control, and the theory of planned behavior. *Journal of Applied Social Psychology*, 2002, 32, 665-683.



**FIG.2:** The developed model of the TPB for proposed study. Adapted from; Ajzen, I. The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes*, 1991, 50(2), 179-211.

## **Chapter 3: Manuscript # 2**

Therapists' Understanding of the Canadian Best Practice Recommendations for Upper  
Extremity Rehabilitation after Stroke; and Barriers and Facilitators for their  
Implementation

Target journal: Topics in Stroke Rehabilitation

### **Abstract**

**Background:** Rehabilitation after stroke helps to reduce the resultant disability and to restore participation in functional activities and life roles that were impacted by stroke. Clinical practice guidelines provide health care plans based on evidence to achieve the ultimate goals of rehabilitation. The Canadian Best Practice Recommendations for Stroke Care were initially developed and disseminated in 2006. However, evaluation of current practice shows a gap between clinical practice patterns and what has been described as best practices based on evidence. **Purpose:** The primary purpose of this study was to determine how physiotherapists and occupational therapists understand the individual recommendations for rehabilitation of upper extremity after stroke from the Canadian Best Practice Recommendations for Stroke Care (CBPRSC). The second purpose was to understand the barriers and facilitators that influence therapists' uptake of the CBPRSC recommendations. **Methods:** Cognitive interviews were carried out with occupational therapists and physiotherapists recruited from stroke care facilities in two countries (Canada and Saudi Arabia) to understand how therapists interpreted eight selected recommendations from the CBPRSC. Within these semi-structured interviews, barriers and facilitators to implementation were also explored. Content and thematic analysis followed an interpretative description approach where the theory of planned behaviour and knowledge to action models were used to inform an initial scaffold, and the final themes derived from the data were developed by two researchers. **Findings:** Therapists reported the CBPRSC contained terminology that lacked clear definition, and led to uncertainty about implementation. The six identified themes that affected implementation included: Patient and Family Factors, Role of Therapist Experience, Context Influences, Resources, Inter-professional Roles, and Perceptions of Guidelines. Analysis of the data from both Canada and Saudi Arabia therapists

generated remarkably similar themes. **Conclusion:** CPG implementation requires that the guideline recommendations be clearer about what specific actions are intended so that intentions will be appropriately targeted; therapists require training on how to execute these specific actions to insure fidelity of implementation.

**Key Words:** stroke rehabilitation, clinical practice guidelines, barriers, upper extremity, evidence-based practice, knowledge translation.

## **Introduction**

Stroke can affect both mind and body: it is the leading cause of adult disability in Canada and one of the leading causes of disability in the majority of countries. Each year, about 9 million new stroke events occur globally, adding to the 30.7 million survivors living with the ongoing effects of stroke.<sup>1</sup> In Canada, an estimated 62,000 strokes occur each year and consequently, there are 300,000 Canadians living with the effects of stroke. About 60% of Canadian stroke survivors need additional support to live safely at home or a residence.<sup>2</sup> The annual cost of stroke in Canada is approximately \$3.6 billion, including healthcare costs and losses in economic productivity.<sup>2</sup> The current costs and demand for services are anticipated to increase in the coming years as the aged population has been increasing and accelerating stroke prevalence in young ages has been noted.<sup>3</sup> In Saudi Arabia, previous studies have indicated that the issue of stroke burden is similar, with increasing number of stroke new events and rapidly increasing cost of stroke sequelae, but there are no official statistics to encompass the exact numbers.<sup>4</sup>

Stroke rehabilitation helps to reduce the impact of stroke on persons' quality of life and independence. Stroke rehabilitation has been defined as a "...progressive, dynamic, goal oriented process aimed at enabling a person with impairment to reach their optimal physical, cognitive, emotional, communicative and social functional level

(p. 460)” according to the Canadian Stroke Network.<sup>5</sup> As there has been an explosion of studies evaluating interventions, rehabilitation therapists may be faced with a problem of choosing from various options when making the optimal care plan for people with stroke.

Clinical Practice Guidelines (CPGs) are systematically developed statements to assist clinician and patient decisions about appropriate treatment plans based on research evidence.<sup>6</sup> Therapists’ adherence to stroke CPGs has been associated with improved patient outcomes in several studies.<sup>7,24</sup> Knowledge translation has been known to increase use of evidence in clinical practice.<sup>8</sup> One framework developed to support knowledge translation which has come into widespread use in health contexts is the Knowledge to Action (KTA) model.<sup>8</sup> A systematic review investigated the practical application of the KTA Framework in health care found that the framework is being successfully used to provide a practical guide to implementation activities of research findings.<sup>38</sup> This model has two main components: knowledge creation and the action cycle. The action cycle provides a mechanism that suggests multiple iterative steps through which the mobilization of knowledge into practice can be ensured and evaluated.<sup>8</sup>

Canadian Best Practice Recommendations for Stroke Care (CBPRSC) were established in 2006 in response to the public pressure to provide the most effective care plans for stroke survivors.<sup>9-11</sup> The recommendations address stroke prevention, medical management and rehabilitation. The recommendations have been updated every two years since 2006 to ensure the inclusion of the highest level of contemporary evidence and clinical professionals’ consensus. The rehabilitation chapter within the CBPRSC provides recommendations for the rehabilitation of the UE as well as LE.<sup>5</sup> There have been a large number of overlapping reviews related to the effectiveness of rehabilitation



interventions to improve UE function after stroke.<sup>34</sup> Most of the interventions included in the CBPRSC for UE rehabilitation during the early stage of stroke rehabilitation (less than 6 months post stroke) are level A evidence<sup>5</sup> (strongly supported findings from multiple trials and/or evidence syntheses;<sup>35</sup> see Figure 1 for summary). However, the current literature shows barriers and facilitators still influence the translation of best evidence into practice.<sup>7,12</sup>

Although knowledge has been created and disseminated for 10 years within the context of the Canadian Best Practice Recommendations for Stroke Rehabilitation, there is a gap between the guidelines and the current practice of stroke clinicians. Many studies confirm that the best health outcomes are not achieved because the research findings are not implemented adequately.<sup>13-16</sup> A Canada-wide study including 1,800 stroke rehabilitation clinicians found best practices are not routinely applied in the rehabilitation of persons with stroke.<sup>13-16</sup> Moreover, the Canadian Stroke Network released a report about the quality of stroke care in Canada in 2011 and indicated that only 37% of stroke survivors who required further rehabilitation meet the best practice recommendation of discharge from acute hospital care to a stroke-specific rehabilitation facility.<sup>17</sup>

To address the issues around implementation of best practices for stroke rehabilitation, there is a need for understanding clinicians' behaviours toward using a particular CPG and for identifying the perceived barriers and facilitators that affect the implementation process. Previous studies confirm that most of the studies about knowledge translation (KT) interventions have involved physicians and nurses and the effectiveness of KT interventions aimed specifically at rehabilitation clinicians have not been well studied.<sup>18-23</sup>

A recent systematic review conducted on clinicians' adherence to implementing stroke guidelines found adherence is varied and suggested the need to understand and improve the adherence behaviours of stroke clinicians from a variety of disciplines towards recommended guidelines.<sup>24</sup> This review also indicated there were no studies reporting stakeholders' and clinicians' feedback regarding the implementation of stroke CPGs from a qualitative perspective. A recent pilot study conducted by Bayley and colleagues discussed the general barriers of using best practices by stroke rehabilitation professionals (nurses, PTs, OTs and managers). This study found the most commonly noted barrier to implementation of the stroke rehabilitation evidence in Canada was lack of time, followed by staffing issues, training/education, therapy selection and prioritization, equipment availability and team functioning/communication.<sup>12</sup> However, there may be additional benefits to addressing the contextual issues around the implementation of each individual recommendation.<sup>12,24</sup> Compared to the LE, the UE is given less priority when treating persons with stroke.<sup>25,26</sup> Considering in light of the information already outlined here, this elucidates a need to examine how CPGs for post-stroke rehabilitation of the UE are understood and implemented by occupational and physiotherapists.

Therefore, the purposes of this study were:

1. To understand how occupational therapists and physiotherapists understand individual upper extremity recommendations from the Canadian Best Practice Recommendations for Stroke Care.
2. To identify and describe the barriers and facilitators for implementing these particular recommendations in clinical practice.

## **Methods**

### **Research design**

This qualitative study used a semi-structured cognitive interview<sup>29</sup> to elicit therapists' understanding and interpretation of particular recommendations, and interpretive description<sup>30</sup> to analyze therapists' insights into the barriers and facilitators for implementing the selected recommendations. Qualitative research methodology helps to collect rich data about perceptions, feelings, experiences, motives, attitudes and knowledge among individuals.<sup>27</sup> Cognitive interviewing has been shown to be effective in several contexts to glean a better understanding of an issue by eliciting direct responses from the participants about their understanding, intention and attitude in regard to a particular question or construct.<sup>28,29</sup> Descriptive content analysis was informed by interpretive description methodology,<sup>30,33</sup> with a focus on the generation of themes intended to inform future knowledge translation strategies.

### **Ethics and Consent**

In Canada, ethical approval was received from the local responsible agency (Hamilton Integrated Research Ethics Board, HiREB # 14-816-S). In Saudi Arabia, it was required to obtain ethical approval from two different ethics boards, each of which related to different settings from which data were collected. Approval was obtained from the Institutional Review Board at King Fahad Medical City, Riyadh KSA and from the research and ethics committee of the Sultan Bin Abdul-Aziz Humanitarian City, Saudi Arabia. Therapists were contacted according to the approved recruitment plan and written informed consent was obtained from each participant prior to conducting the interviews.

### **Participants and Sample Size**

The original sample size estimate for purposes of ethical approval was 40 participants in total, with considerations to stop data collection if it appeared saturation had been obtained. The target population for this study was physiotherapists and occupational therapists who have clinical experience with acute or post-acute stroke rehabilitation. Participants were recruited to the study to include at least 10 participants per group and to achieve saturation (defined as when 2 successive interviews failed to generate new information).<sup>39</sup> The recruitment of participants was stopped at 22 participants from the two countries (10 Canadian and 12 Saudi Arabian). (See Table 1 for participants' demographics).

#### *Inclusion and Exclusion Criteria*

Participants were included if they:

- 1- were a licensed physical or occupational therapist
- 2- had clinical experience or currently working in acute or post-acute stroke rehabilitation for upper limb.
- 3- were fluent in English.

Participants were excluded if they had participated in previous studies on a similar topic.

#### *Sampling and Recruitment Plan*

Electronic notices about the study were sent to professional associations and alumni of the School of Rehabilitation Sciences at McMaster University through professional networks and list-servs (list of followers or contacts). These included: Ontario Central South Regional Stroke Program, the Canadian Society for Hand Therapists (Hamilton, London and Toronto chapters), the Ontario Society of Occupational Therapists, the

Ontario Physiotherapy Association, and the School of Rehabilitation Sciences graduate students at McMaster University. In Saudi Arabia, emails were sent to the Stroke Rehabilitation Programs at King Fahad Medical City and Sultan Bin Abdulaziz Humanitarian City. We received a request from these facilities to give a presentation about the study to the target therapists; this was provided in October 2015. Also, emails were sent to some other general hospitals in the Southern region of Saudi Arabia and these facilities were asked to send the email invitation to their therapists. Participants who completed interviews were also encouraged to invite their colleagues to participate (a strategy known as snowball sampling). Further, a poster presentation was given at the national meeting of the Canadian Society for Hand Therapists, with eligible attendees who met the study criteria invited to participate.

Informal invitations were also extended during networking opportunities at local rehabilitation facilities in the Hamilton area and in Saudi Arabia, with formal documents forwarded electronically to persons expressing interest. Sampling was purposive with the aim of recruiting physiotherapists and occupational therapists from diverse practice settings and a range of practice experiences. Interviews were conducted in both countries in a period from October 2015 through February 2016.

### **The Guideline Sampled**

The CBPRSC rehabilitation chapter on the management of the Arm and Hand following stroke (updated 2013) is organized into three categories, which are; General Principles, Specific Therapies, and Adaptive Devices. There are a total of 15 recommendations contained in this chapter. The CPBRSC indicates the level of evidence for each recommendation according to the chronological stage of stroke recovery. The early stage is defined as patients who are less than 6 months post stroke, and 'late' is defined as more than 6 months from index stroke event.<sup>5</sup> Based on the

study criteria, the interviewers only discussed the recommendations addressing the early stage of rehabilitation. Also, given our intent to conduct in-depth analysis of individual recommendations, we selected eight from the 15 recommendations, ensuring each of the three categories was represented (See Appendix A). These eight recommendations were chosen to represent the spectrum of care and the diversity of roles for occupational and physiotherapists, while permitting in-depth exploration of the content during interviews intended to be conducted within a one-hour time frame.

### **Interview Process**

The interview had 2 components. The first component was focused on how therapists understood the individual recommendations and used a cognitive interview approach. This included having therapists use a “talk out loud approach” explain what they understood each statement meant.<sup>29</sup> This was followed by probes to explore further if there words or terms that were unclear, or if any aspect of the action recommended was unclear to the reader. This was done separately for each of the eight recommendations. The second component of the interview aimed at identifying barriers and facilitators. This was conducted using a semi-structured interview where the Theory of Planned Behaviour<sup>40</sup> and principles of KT informed the creation of the interview guide. Probes were used to further explore issues raised. (See Appendix B for the Interview Guide and the potential probes that used during the interview)

A copy of the CBPRSC addressing upper limb rehabilitation for stroke patients was provided to each study participant a week before the date of the interview. In Canada, interviews were conducted by an occupational therapist experienced in cognitive interviewing and upper limb rehabilitation (TP), but not stroke rehabilitation. All interviews were observed by a second researcher who made field notes (AS) and were audio recorded. The data from the Saudi Arabian participants were collected by

the second researcher (AS) who travelled to Saudi Arabia and completed the interviews face-to-face; these were also audio-recorded. Both the Canadian and Saudi interviews used the same interview guide that was prepared collaboratively by both interviewers, and the thesis supervisor. The sampling strategy and interview guide were approved in advance by the ethics committees. Participants were encouraged to share their opinions freely, and were reminded that the purpose of the interview process was not to test their knowledge or adherence, but to understand the complex factors that influenced their use of guidelines in clinical practice.

Informed by constructs from the Theory of Planned Behaviour<sup>31,32</sup> and KT principles, the interview questions were structured to obtain the specific attitudes, normative beliefs, and behavioural control beliefs around CPGs in general and about the specific eight selected recommendations. Follow-up probes were used to elicit more detail on issues raised by the participants, and to iteratively explore ideas raised by previous participants.

## **Analysis**

The interview audio recordings were transcribed by a trained assistant and then independently reviewed by two researchers.

The cognitive interview data was analyzed by describing how each recommendation was understood by different therapists. This was organized into themes to summarize findings.

For the barriers and facilitators, an initial conceptual scaffold of content categories including the three determinants of behavioural intention (attitudes, subjective norms and perceived behavioural control) was developed, but this scaffold was re-structured to fit the data<sup>37</sup> as individual barriers and facilitators were coded (see Table 2 for coding guide). Individual codes were identified for each response and a

code book listing the codes and providing definitions of each code was developed to support trustworthiness. After independent review of the first transcript, the research team (consisting of 3 investigators) met for discussion and expanded the codebook with new codes that had emerged from the data; this process continued throughout the coding process using a secure shared drive for storage of the ‘master codebook’. Independent coding followed by consensus building was completed by AS, TP and JM for the first transcript, and by AS and TP for an additional two transcripts. The remainder of the coding was completed by AS, with weekly team meetings to review and discuss each of the coded transcripts. All codes were aligned with an *a priori* category reflecting the theoretical constructs, with an “other” category included to capture ideas outside of this framework. During this process, potential themes identified were recorded as memos and set aside until coding was complete. Finally, AS and TP worked collaboratively to remove the theoretical scaffolding that was developed initially, and to rearrange the codes as directed by the data and in keeping with the intention of interpretative description to derive clinically useful information.

## **Findings**

### **- Cognitive Interviews**

As described above, the interviews addressed eight recommendations selected to represent the three categories of the CBPRSC for early stage rehabilitation after stroke. A summary of the findings relative to each recommendation addressed is outlined below.

#### Recommendation #1: General Principles (GP)

Most participants understood this recommendation as it is more of a general statement to direct the stroke rehabilitation treatment plan. The words ‘meaningful, task specific,



goal oriented and progressively adapted' have strong acceptance by therapists as they cover the whole spectrum of rehabilitation goals. Therapists reflected that this general principle should be followed even in other areas of rehabilitation for other impairments. One of the participants said "*it is funny that the GP recommendation is in the UE chapter and it doesn't mention UE explicitly*", [Canadian PT]. Occupational therapists in particular commented that the task specific focus was concordant with their theoretical lens of occupation and function "*I think that's very reflective of the type of therapy that occupational therapy is going to engage in*" [Canadian OT].

#### Recommendation #2: Supplementary Training Programs between Therapy Sessions:

From the participants' perspectives, this recommendation is mainly used by OTs between the therapy sessions. Despite the fact that most of therapists agreed with the concept of using these kind of programs, they feel that there is no single program that matches the goals for each patient. Also, from an OT perspective, therapists tend to use functional activities instead of doing exercises. An OT participant explained that "*we see higher improvement or better improvement of the UL when you actually engage the person in a... functional task, instead of doing a repetitive, like picking up a cone or repetitive squeezing a ball*" [Canadian OT].

#### Recommendation #3: Graded Repetitive Arm Supplementary Program (GRASP)

As GRASP is a Canadian innovation, most of the Canadian therapists are trained and educated about the program regardless of their adherence to it in their daily practice. In Saudi, most of the participants mentioned that they are using the same concept of GRASP, although they were not familiar with GRASP as a term "*This is the 1<sup>st</sup> time I hear about GRASP but I use it as a concept every day*" [Saudi OT]. The main issue with GRASP is that the protocol is intensive and difficult to follow as it suggests implementing the program for one hour/day and six days/ week. OTs participants from

both countries commonly responded that they probably can't see the patient for an hour for the whole UE session per day hence it is not applicable. A participant said in regard to the GRASP protocol *"I think most people will laugh and go "ah, an hour per day, ha-ha, in a perfect world" [Canadian PT].*

In regard to the outcome measurements included in this recommendation (Chedoke McMaster Stroke Assessment and Fugl-Meyer Scale), all the Canadian participants were familiar with measures and were frequently using them. However, two of the Canadian OTs questioned whether these measures were ideal for cognitive and functional assessment for stroke patients considering a rehabilitation perspective. One of them said *"For heaven's sake, we're looking to use a MoCA as a screen. Why? When we can use... I don't know, all of us are trained in what's called the AI which measures the functional performance and reflects the cognitive perceptual ability in a very standardized way or we could look at something like the AMPS (Assessment of Motor and Process Skills) to look at the occupational performance and how that's changed."* [Canadian OT]. Also, the majority of the Saudi therapists were unfamiliar with the outcome measures mentioned in CBPRSC, and used other measures.

#### Recommendation #4: Mental Imagery (MI)

Most of participants felt they did not know enough about MI or had not heard about MI. This recommendation was clearly the least understood; participants felt they needed education and training to be able to use MI in clinical practice. Several participants struggled to define what this concept encompassed, or were not confident in their understanding, even if their understanding was concordant with the guidelines and supporting literature. This lack of familiarity expressed by multiple therapists was simply stated by one as *"I don't know much about it, to be honest."* [Canadian OT].

Despite a lack of awareness on the technical aspects of how to implement MI,

many had heard of it or supported the recommendation. Most of the participants agreed to the effectiveness of using MI with persons after stroke unless there are cognitive or mental issues. Also, it was not used as a separate intervention; therapists typically integrated it with other interventions. Conversely, some participants who indicated they were familiar with MI, appeared to be misinterpreting the recommendation, or confused it with other recommendations like mirror box therapy. Interestingly, some of the participants described “looking in a mirror” as an MI modality, some described the use of video and photos, or verbal cuing to explain movements to their patients. Therapists looked for reassurance from the researchers that what they were doing was indeed part of MI ... *“I just—maybe I'm misinterpreting what mental imagery is as well but I was taught that if, you know, someone is picturing the movement, it helps in the recovery process, [Canadian OT].”*

#### Recommendation #5: Functional Electrical Stimulation (FES)

This recommendation was mainly used by PTs, which reflected their exposure to this modality in their entry-level training. There was variation in the participants' understanding of the FES in both countries, with some participants even unsure of what FES meant: *“Now, functional electrical stim; what does the "functional" mean? I know it's not part but are we talking, like, some sort of a TENS device?” [Canadian OT].* Also, another participant said *“I think if I am not wrong, FES should be used for 5 or 6 hours per day and it is useful for reducing pain” [Saudi OT].*

Conversely, other therapists said they had learned about and were trained with FES equipment and wanted to use it. Therapists who were using FES indicated that they usually integrate FES with other interventions such as mental imagery and they saw positive results. Although few participants were actually using FES because of barriers discussed later in this paper, many of them demonstrated the readiness to use

FES, and felt this modality had good utility. *“Actually, it's easy to set someone up and I can set someone up on that for 15 mins and still have another patient in the gym that I'm treating” [Canadian PT].*

A Canadian PT illustrated the advantage of belonging to a regional stroke network, as she reported attending a free workshop about FES by which she became comfortable to use it regularly with her patient. She said about her implementation for FES *“...that was because it was made available to us through the network. So, we attended that course, and I found it very helpful; I'm using it right now on someone” [Canadian PT].* Therapists who do not use FES frequently attributed it to ineligible patients (lacking sufficient recovery), limited equipment availability, or the therapist was not trained or didn't have time to use it. Three Saudi PTs reported they used FES more frequently for lower limbs *“As a PT we just use it for the LL not for the UL” [Saudi PT].*

#### Recommendation #6: Constraint Induced Movement Therapy (CIMT)

Although, every participant knew about the effectiveness and the high level of evidence of CIMT as an effective intervention, no one used the traditional CIMT because of the intensive training for patient that is required during this intervention. Modified CIMT has been shown to be more liberal in terms of duration and intensity of treatment, but few therapists use it because of a lack of their awareness about the modified CIMT *“I don't know exactly the difference between the traditional and the modified CIMT” [Saudi PT],* or because they don't have patients eligible for the intervention. Also, some participants had doubts about the evidence and instead used bilateral training. None of the therapists expressed concerns about the ethics of using CIMT; further, they did not report any concerns from other team members or families when it had been used. However, they did note concern about the potential increase in frustration and short-

term loss of function for the constrained individual, since their functional arm was immobilized.

#### Recommendation #7: Range of Motion (ROM)

The common perspective of therapists was that ROM reflects a general understanding of this as a basic concept. However, a number expressed that this was a vague recommendation and thus they did not understand what was intended as a specific action based on this statement. Many of the participants suggested that a standardized definition of ‘appropriate and safe positions’ for ROM would have been more specific, and would like to have more information about training positions and patterns of exercise to clarify the recommendation. For example; a participant said *"the recommendation should include all these variants like close chain, open chain, active, passive, weight bearing..."* [Saudi PT]. The most knowledge gaps identified by participants were: a) what are appropriate and safe positions; b) what kinds of exercise were recommended (passive versus active or active versus active assisted), and c) how exercise should be adapted for patients who don't have a normal visual field.

#### Recommendation #8: Adaptive Devices (ADs)

This recommendation was mainly used by OTs. The basic understanding of this item was clear to most of the participants. However, it was unclear when this recommendation should be applied, and when it might not be best for the patient. Therapists' opinions about using ADs varied, as some believe not using ADs is the best for patients, e.g., patients are challenged to regain functional ability and to become independent, and would only consider ADs if the patient was unlikely to achieve the function ...*"if I use it for them to substitute the loss of function, then they're never going to get that function back"* [Canadian OT]. On the other hand, a number of OTs who

focused more on maximizing the functional ability of patient in the short-term tended to use the ADs as much as the patient needed to promote early independence and self-efficacy. A challenge identified for this recommendation was providing the equipment itself and patient education on how to use the ADs. These were not addressed by the guideline.

### **-Thematic Analysis of Barriers and Facilitators**

The main themes to emerge from the cognitive interviews with PTs and OTs from different settings are summarized in Table 3.

**Patient and Family:** This theme includes all the factors associated with patient and family, and the effect modifiers at the person and family level. Patient factors were essential for CPG implementation as they were identified and coded across many different categories of the original theoretical scaffold. These factors could be barriers to implement some recommendations if they don't have a value to the patient or are less of a priority. For instance, one participant said *"there is mismatch between what might be a realistic recovery and what their goal is. Unfortunately..."* [Canadian OT]. On the other hand, if the patient knows about a specific recommendation and wants to use it as a part of the care plan that might facilitate a therapist's uptake of that recommendation. A patient's post-stroke status in term of clinical stability, comorbidities, stroke sequelae (i.e. pain, fatigue, tone, and aphasia), and cognition are important effect modifiers which might affect implementation of recommendations for an individual patient. A patient's primary language was also mentioned by a participant as a barrier in communicating with patient and family in regard to using recommendations outside therapy sessions. In addition, financial inability to provide

equipment for carry-over of programs at home was a barrier for use of some of the recommendations.

Family can have a bi-directional effect in increasing or reducing recommendation uptake. For example, family availability and readiness to follow the recommendations with their family member were facilitators for most of recommendations, especially outside of therapy time, because all therapists reported insufficient time to supervise many patients. Examples of common issues with family identified by participants included inconsistent contact and accountability, and family expectations, values and priorities. Finally, patients may have unrealistic expectations for the rate and achievements of recovery.

**Role of Therapist Experience:** This theme was defined as the clinical experience of individual therapists and how this influences decision making and guideline implementation. It also encompasses level and extent of education and training. Training and educational opportunities were facilitators for most participants, especially through the stroke regional networks. It was very obvious that therapists who had adequate education and training were more comfortable to use recommendations such as FES, MI, or CIMT. On the other hand, therapists who had limited knowledge or training about the recommendations tend to avoid them, although they may have heard about them or seen the positive outcomes with referred patients. Therapists with more years of experience believed that their experience helps them to make clinical judgments on the modification or calibration of recommendations, especially those that were critiqued for not having enough details about the right recommendation for right patient ... *“sometimes you still need your clinical sense to judge patients with different age groups and degree of severity” [Saudi OT]*. The participants believed new

therapists may struggle with the recommendations because she or he won't be able to judge when to make adjustments.

From another perspective, participants with more years of experience had many doubts about some of the recommendations and this may be as a result of their reliance on previous knowledge, or because they are really at a level where they are able to evaluate the new knowledge better than other therapists. Lack of awareness from other staff about the recommendations was a barrier for some therapists to continuing the same level of treatment plan when the therapists are not on duty. Four Canadian participants wondered why the recommendations didn't include Neurodevelopmental Therapy (NDT) as an effective intervention, as they had been trained in NDT and were proud to be able to use it. One of the interesting points was that participants came to realize some of their practices were part of the recommendations even though they hadn't read about the recommendations. *"I do feel like I do this; I'm glad it's a part of best practice to look at them"* [Canadian PT]. The idea of using iPads for the GRASP program instead of using the paper version was an example of using therapist's clinical experience to provide modalities which are easier for stroke patients. The participant who mentioned this idea said she started doing this as part of a study, but was eager to continue.

**Contextual Influences:** This theme demonstrates the role of the physical and practice environment, management/policy/setting, acute vs. post-acute setting, etcetera. There is a wide scope of barriers when comparing acute or post-acute settings. For example, patients meeting the eligibility criteria for specific guideline implementation might be more commonly found in one setting compared to another. Moreover, in some settings, there is "Home First" discharge focus which means rehabilitation of the LE is more prioritized over the UE, as one participant noted ... *"The boiling issue that comes out*



*in terms of barriers for UE rehab is that "I don't get enough therapy for my arm and hand." I can tell you that every patient that I see says that." [Canadian PT].*

Under this theme, the length of stay and discharge location were considered as effect modifiers that play essential roles in implementing specific recommendations. Different setting may have contextual issues that influence the feasibility of implementation. For example, transferring patients to another facility can be a barrier because staffing levels or normative expectations can change. In some cases, the recommendations within CBPRSC were based on recent evidence; however, the intention to implement them was low because therapists felt that their facility had a similar, more innovative, or contradictory intervention. For example, one therapist noted that they used a hemiplegic arm protocol to protect the shoulder and to prevent the shoulder pain and she thought that protocol could be a barrier to implement the GRASP protocol.

Saudi Arabian participants considered the local accreditation processes for their rehabilitation programs as a facilitator that increased guideline use, as the rating systems for facilities address whether they are using quality standards. There were no other barriers or facilitators related to the policy or organization except at one site in Saudi Arabia where therapists were only able to implement CIMT if directed to do so by a physician, which removed the behavioural control from their domain.

**Resources:** The need to conduct best practices within the constraints of resources was reflected as: "...we do our best" by participants. The most commonly reported barrier by all participants was the lack of time for implementation of the recommendations. Specifically, the participants alluded to a lack of time to a) read the recommendations, b) learn about the specific interventions, c) participate in additional training and d) to follow protocols exactly as described in the guideline.

Staffing issues seemed to affect the implementation process from multiple aspects. For example, staffing ratios were a common barrier, reported by 75 % of participants. Also, staff turnover was identified as another issue which impacted use of recommendations. Having an assistant for the OT or PT was key for making decisions on whether or not to use some of the recommendations, in particular those that needed direct patient supervision or equipment application. Financial resources were a barrier to increase the staffing levels in some settings and were also a barrier to acquire the required equipment for some recommendations. Although most participants agreed that they have equipment available, other issues such as coordinating the use of the equipment, training on how to use the different equipment, and access to equipment were common concerns.

**Inter-professional Roles:** This theme relates to the role of PT versus OT for collaboration and guideline implementation. Although the role overlap between OT and PT was very obvious across different practice and geographic settings, collaboration with each other was found to be helpful to achieve optimal care. Collaboration between professionals was reported as reduced when other team members were not familiar with the recommendations. Also, the role overlap was noted to be more problematic when there were staff shortages, part-time therapists or case load pressures. We found that OTs were more likely to focus on UE functional activities while PTs gave greater consideration to exercise or enhancing a particular movement. Moreover, therapists' priorities in terms of focusing on LE versus UE rehabilitation was a common issue between PTs and OTs. During the interviews we heard the statement "not my role" from both PTs and OTs, even when they were using the recommendations. In cases where they assumed that others were implementing the recommendation, this might result in partial implementation. A final barrier mentioned by participants was the lack

of mentorship and this reflects the need for contextual KT interventions to ensure the implementation of a guideline.

**Perceptions about Guidelines:** This theme is defined as the positive and negative perceptions of the actual CPG recommendations. This theme was one of the richest with many codes detailing issues raised from the participants. The reason for this might be the lack of knowledge about the evidence revealed in the guideline or the contextual issues that make the implementation of such recommendations a challenge for therapists. A general perception from the majority of the participants was that the selected recommendations for UE rehabilitation start with a very general recommendation that they agreed should be directing rehabilitation goals. The rest of recommendations were considered to be very specific, particularly the ones that have eligibility criteria. In these cases, the therapist criticized the recommendations for not giving options for other patients who are not eligible for that specific type of therapy or intervention.

Participants acknowledged the guidelines were impacted by the homogeneity of the original research, which often excluded participants with multiple co-morbidities, or focused on subjects at a specific stage of recovery. Also, some participants felt that the recommendations were not realistic to their practice context; nor did all recommendations have equal value to them. The participants appreciated the commitment to regular updates of the guidelines, but were concerned that one of the weaknesses the guidelines was the inability to provide feedback about the guideline. Participants were appreciative of this study as a mechanism for obtaining their concerns. Lack of clarity of the terminology in some recommendations was reported, such as MI and the meaning of 'suitable candidate' for MI ... *"they're not being specific about what is a suitable candidate"* [Saudi OT]. Another example related to

the ROM recommendation and the meaning of ‘appropriate and safe positions’... *“It’s not really recommending anything specific. It’s not saying which joint, or you know... It’s just kind of putting it out there for you to decide what is an appropriate and safe position” [Canadian PT]*. Further, one of the weaknesses from an OT lens is that this guideline doesn’t include outcome measures for quality of life, doesn’t address perception and sensation, and doesn’t address the spectrum of recovery and function, specifically the unique needs of persons with cognitive issues or aphasia.

Several very experienced therapists raised the concern that the guidelines promoted a component-based, segmented view of the person and failed to address the overall functional abilities of the client ... *“they’re looking at components instead of looking at a person’s overall function ”[Canadian OT]*. Participants questioned the rationale for the exclusion of interventions they felt had sufficient evidence to be used in clinical practice. They also noted that some emerging treatments seemed disconnected from the pragmatic realities of clinical practice with respect to the dose and duration recommendations or the equipment required.

## **Discussion**

This study informs our understanding of why specific guidelines for upper extremity rehabilitation after stroke might not be fully implemented since issues with the clarity of the recommendations and multiple barriers to implementation were identified. Key issues raised include: 1) gaps in understanding and implementing guidelines’ specific recommendations where specific concepts (i.e. mental imagery) were poorly understood or where specific client subgroups (i.e. persons with cognitive impairments) were not addressed; 2) that barriers and facilitators crossed multiple domains and were mostly similar in the Canadian and Saudi Arabian participants and 3) most of the themes demonstrated a bi-directional nature such that

the factor might act as a barrier in some contexts and facilitator in others. Our results also suggested that the barriers in the acute stage of stroke are different from barriers in the post-acute stage.

Our respondents were enthusiastic about expressing the barriers and facilitators, as they felt that there were few opportunities for them to provide specific feedback in regard to the contextual issues they experienced in implementing the best practice recommendations. This suggests that team-based discussions of barriers and facilitators might enhance implementation. The role of experience seems to impact the level of concern about the recommendations as most of the strongest criticisms were raised by therapists with substantial clinical experience. This may reflect a lack of comfort with CPG in older clinicians, or that clinical experience has helped them to better identify gaps in the recommendations themselves. On the other hand, one of the barriers mentioned by younger participants was the lack of mentorship and this reflects the need for contextual KT interventions to include mentorship to ensure the implementation of a guideline.

The single cultural difference noted was that accreditation was mentioned as a facilitator that leads to increased therapists' uptake of clinical guidelines by Saudi Arabian participants and this was not voiced by any Canadian participants. It is not clear if this was specific to the individuals in our study, or if therapists in Saudi Arabia are more aware of accreditation standards or that accreditation processes that deal with CPG are more explicit in Saudi. The extent to which having CPG implementation explicitly considered in accreditation as a means of increasing implementation is an area where further research might be informative.

Although we considered the Theory of Planned Behaviour in devising our initial scaffold, we found the evolving, data driven themes became a better way to communicate the findings. Thus, although some issues might fit into a specific element of the TPB, e.g. normative values for what constitutes OT and PT practice, we felt it was more representative of the data to summarize the findings using the themes as indicated above. The TPB has been used in many KT studies and many studies of guideline implementation, and was useful in considering factors that might influence implementation. However, in keeping with the goal of interpretive description to provide clinically useful information, we think the themes derived are more clinically useful than forcing data into TPB categories.

### ***Limitations***

This study has focused on understanding of and intentions towards implementation of recommendations for early rehabilitation of stroke survivors, six months or less after symptom onset. It may be that the issues for implementation are different in different caseloads such as chronic care rehabilitation facilities, or community based programs. Unfortunately, the sample was from a single province in Canada, and may not reflect either a national perspective in Canada or the Saudi context. These participants may over-represent the issues and organizational culture of the local health integration networks which might not apply beyond these networks. Also, the objective of this study was to explore the issues of implementation for particular recommendations for UE rehabilitation after stroke, and not to explore the geographical influences on practice. Thus we may have missed some cultural differences between countries by not probing on such issues. We recognize that the guidelines may have been more familiar to the Canadian participants than the Saudi

participants. Since the Canadian CPG is used internationally and there were no similar CPG from Saudi this was a practical decision.

An important philosophical and practical consideration in qualitative research is the balance of sample size and saturation.<sup>36,37</sup> We initially proposed a larger sample size to insure we had the ability to achieve saturation. We expected wide variations due to differences in practice setting and experience. However, recruitment was closed after conducting 22 interviews. This was in part a reflection of the emerging homogeneity of responses that suggested saturation at the macro level of broad themes, and the pragmatic considerations of a) handling the volume of rich data already generated in the form of audio files and transcripts, and b) timing constraints dictated by data collection in 2 countries in the expected timeframe for completion of a graduate degree.

Finally, while this study measured perceived barriers and facilitators, we were unable to triangulate this data with participants to determine whether our findings reflected the real issues and challenges. However, we have triangulated our findings using other forms of validity checking rather than feeding findings back to participants. These included comparisons to theory as a form of triangulation, comparing our findings to Bayley's study results<sup>12</sup>, and comparing the findings from Saudi participants to Canadian participants. Defining interventions for some of the issues identified would be challenging.

Finally, while the TPB was used to develop the interview guide and create the original scaffolding for analysis, this is not the only theoretical lens that could be used to examine guideline implementation. A different perspective may have influenced how we approached the questions and analysis, and could have resulting in different data, codes and themes.

## **Conclusion**

This study has explored current practice patterns in term of using clinical guidelines for upper limb rehabilitation after stroke, and has summarized implementation issues under six main themes: patient and family, role of experience, inter-professional roles, resources, contextual influences, and perceptions of guidelines. Future research is needed to tailor and address knowledge translation interventions that will support increasing of therapists' uptake of guidelines by improving the clarity of the recommendations and providing training on the specific actions for appropriate implementation.



**Table1: Summary of Participants' Demographics**

Participants Number	Country	PT/OT	Male/ Female	Educational Level	Years of Experience	Familiarity & Comfort with CPGs (1=low to 5=high scale)
1	Canada	OT	F	B	29	3
2	Canada	OT	F	M	15	4
3	Canada	OT	F	M	5	4
4	Canada	OT	F	M	4	4
5	Canada	OT	F	M	14	4
6	Canada	PT	M	B	1	4
7	Canada	PT	F	M	16	4
8	Canada	PT	F	M	12	3
9	Canada	PT	F	B	2	3
10	Canada	PT	F	B	3	3
11	Saudi	PT	M	B	12	4
12	Saudi	PT	M	B	10	4
13	Saudi	PT	F	B	11	4
14	Saudi	PT	F	B	13	4
15	Saudi	PT	F	D	12	1
16	Saudi	PT	F	D	12	2
17	Saudi	OT	M	M	13	3
18	Saudi	OT	M	M	8	3
19	Saudi	OT	F	M	11	3
20	Saudi	OT	F	B	2.5	3
21	Saudi	OT	F	M	4	3
22	Saudi	OT	F	B	5	3

Table 2: The Coding Book

Scaffold	Categories	Codes
KT <sup>1</sup> Component	Barriers	\$/resources, staffing, facility/setting, time, training, education, patient factors, space, equipment, accessibility of info/evidence/resources/ guideline uncleanliness or missing issues
KT Component	Facilitators	As above, regional network, accreditation, positive outcomes/ perceived benefit
Cog. Interview Component to understand behaviour	Interpretation & Understanding	Guideline adaptation/enhancement, relevance
TPB <sup>2</sup> component	Attitudes	Beliefs (positive or negative), implicit or explicit
TPB component	Subjective norms	expectations from the individual, organization, profession, society
TPB component	PBC	Self-efficacy, training, resources, expectations, skills, intention, % use
Other issues that come up	Other	Solutions to overcome barriers, important general statements, suggestions, questions, effect modifiers, recommendation substitution,

---

<sup>1</sup> Knowledge Translation

<sup>2</sup> Theory of Planned Behaviour

Table 3: The Iterative Themes

Themes	Codes
<p>Patient and family <i>All factors associated with patient and family, effect modifier at the person and family level</i></p>	<p>Cognition, patient adherence, language, patient can't afford equipment when d/c<sup>3</sup>, recovery of UE<sup>4</sup> is slower than LE<sup>5</sup> so get discouraged, stroke sequelae (pain, tone, fatigue), family availability, pain as an effect modifier, pt<sup>6</sup> values and priorities, co-morbidities, d/c location, family values and priorities, therapeutic alliance, effect modifiers (rehab is a dynamic process, aphasia) length of stay as EM<sup>7</sup>, family expectations</p>
<p>Role of experience <i>Clinical experience of individual therapists and how this influences decision making and guideline implementation; also education and training</i></p>	<p>Expertise and experience (facil<sup>8</sup> and barrier), clinical judgment, solutions to overcome barriers, awareness without understanding or experience, self-efficacy, Therapist use of NDT<sup>9</sup>, no one talked to me about it in practice, training, competency, education, lack of awareness from other staff, positive outcomes, familiarity, recommendations are part of treatment plan without knowing part of CPG<sup>10</sup></p>
<p>Context influences <i>Role of the physical and practice environment, management/policy/setting, acute vs sub-acute, etc</i></p>	<p>Setting, familiarity with outcome measures, 'Home first' discharge focus means LE is prioritized, discharge location as EM, length of stay, changing health care system, core treatment vs adjunct (prioritizing), focus on here and now (not forward planning), regional stroke network, standards/accreditation, hemi arm protocol already part of practice,</p>
<p>Resources <i>"we do our best", staffing and equipment</i></p>	<p>Access to info, time, opportunity for education, equipment, \$, availability and accessibility of equipment (ie FES<sup>11</sup>), coordinating equipment use, staffing ratios, having an assistant,</p>

<sup>3</sup> Discharge

<sup>4</sup> Upper Extremity

<sup>5</sup> Lower Extremity

<sup>6</sup> Patient

<sup>7</sup> Effect Modifier

<sup>8</sup> Facilitator

<sup>9</sup> Neurodevelopmental Training

<sup>10</sup> Clinical Practice Guideline

<sup>11</sup> Functional Electrical Stimulation

	scheduling and w/e <sup>12</sup> coverage, staff turnover, time, “we do our best”
Inter-professional roles <i>Role of PT vs. OT for guidelines application and implementation, collaboration</i>	Role overlap, unfamiliarity of other teams with CPGs, OT focus on functional activity more than exercise, collaboration with other staff, Not my role (ie FES), lack of mentorship, therapist priorities (UE < LE), use of outcome measures
Perceptions of guidelines <i>Positive and negative perceptions about the actual CPG recommendations</i>	Very general, not able to give feedback (no mechanism), omissions in guidelines, taxonomy unclear (ie mental imagery), clarity of guidelines, helpful, guidelines not rules, unrealistic to practice context, not all recommendations have equal value, set a necessary standard, biased towards specific modalities, some recommendations are too specific (what about other patients?), more detail needed, included new details (i.e. thinking about visual field during ROM <sup>13</sup> ), functional stuff needs more details, some are vague (like ROM for safe and appropriate positions), not using OT lens, lack of outcome measures for QoL <sup>14</sup> focus, lack of common sense to integrate to context, specificity to staging of the arm/hand, other effective interventions are excluded, perception is not addressed, sensation is not addressed, limitations of base research (like homogeneity), disconnect between evidence and practice or clinical treatment, unclear what is meant by suitable candidate for mental imagery, aligned with practice, updates are helpful, would like to use ones with higher evidence, standardization, not addressing spectrum of recovery and function, general principles don't mention the arm or hand

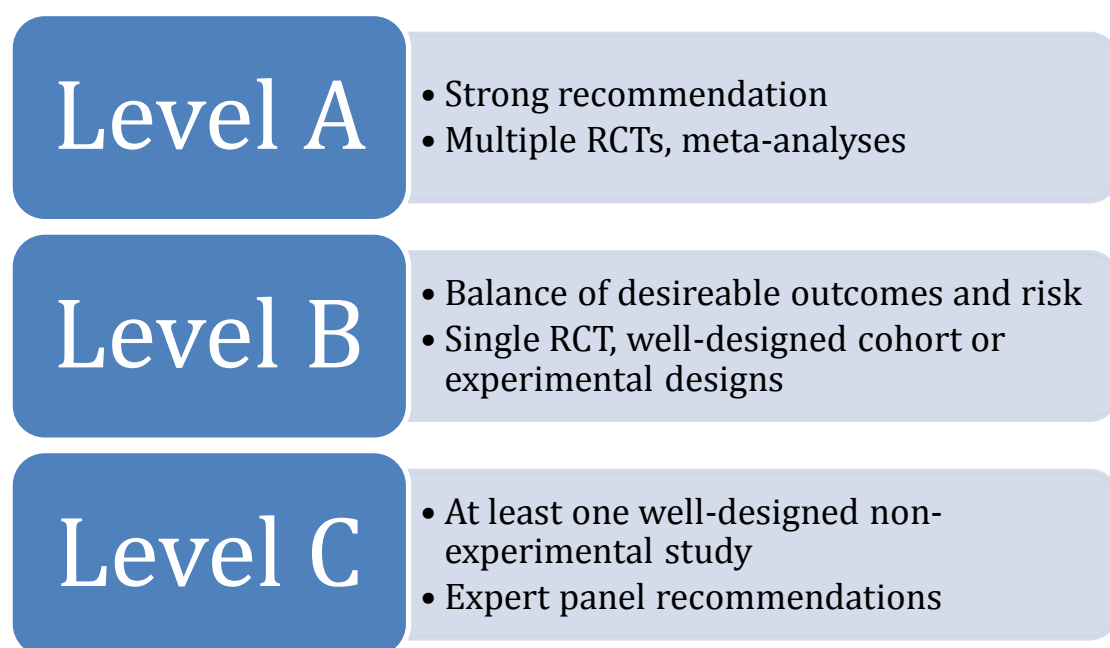
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<sup>12</sup> Weekend

<sup>13</sup> Range of Motion

<sup>14</sup> Quality of Life

**Figure 1. Operational definitions for Evidence Levels used in CBPRSC** (based on Guyatt et al, 2008)<sup>35</sup>



Appendix A: Rehabilitation Chapter of the Canadian Best Practice Recommendations  
for Stroke Care

**CANADIAN BEST PRACTICE RECOMMENDATIONS FOR STROKE CARE**

**Part Two: Providing Stroke Rehabilitation to Address Physical, Functional, Cognitive and Emotional Issues to Maximize Participation in Usual Life Roles**

**Best Practice Recommendation 5.5.1**

**Management of the Arm and Hand following Stroke**

*Definition: For the purposes of these recommendations 'early' has been defined as patients who are less than 6 months post stroke, and 'late' is defined as more than 6 months from index stroke event.*

**General Principles**

- i. Patients should engage in training that is meaningful, engaging, progressively adapted, task-specific and goal-oriented in an effort to enhance motor control and restore sensorimotor function [Evidence Level: Early-Level A; Late-Level A].
- ii. Training should encourage the use of patients' involved affected limb during functional tasks and be designed to simulate partial or whole skills required in activities of daily living (e.g. folding, buttoning, pouring, and lifting) [Evidence Level: Early-Level A; Late-Level A].

**Specific Therapies**

- i. Therapists should provide supplementary training programs aimed at increasing the active movement and functional use of the affected arm between therapy sessions, e.g. Graded Repetitive Arm Supplementary Program (GRASP) suitable for use during hospitalization and at home [Early - Evidence Level A; Late - Evidence level C].
- ii. The Grasp Program should include:
  - a. strengthening exercises for the arm and hand (using small wrist weight, putty, hand gripper), range of motion exercises (stretching, active exercises), and exercises that improve gross and fine motor skills (e.g., blocks, Lego™, pegs) [Early - Evidence Level A; Late - Evidence level C];
  - b. the GRASP protocol suggests that the program be delivered for one hour per day, six days per week [Evidence Level: Early-Level A; Late-Level C];
  - c. appropriate patients, based on the GRASP protocol, may include those with some arm function (i.e., Chedoke-McMaster; or the Fugl-Meyer Upper Limb Motor Impairment Scale score between 10 and 57) and with active scapular elevation (shoulder shrug) and palpable wrist extension [Early - Evidence Level A; Late - Evidence level C].
- iii. Following assessment to determine if a patient is a suitable candidate, patients should be encouraged to engage in mental imagery to enhance upper-limb, sensorimotor recovery [Evidence Level: Early-Level A; Late-Level B].
- iv. Functional Electrical Stimulation (FES) targeted at the wrist and forearm muscles should be used to reduce motor impairment and improve function [Evidence Level: Early-Level A; Late-Level A].
- v. Traditional or modified constraint-induced movement therapy (CIMT) should be used for a select group of patients who demonstrate at least 20 degrees of active wrist extension and

10 degrees of active finger extension, with minimal sensory or cognitive deficits.

- a. Traditional CIMT refers to a two-week training regimen consisting of six hours of intensive upper-extremity training coupled with restraint of the unaffected arm for at least 90 percent of waking hours [Evidence Level: Between 3 and 6 months-Level A; Late-Level A].
  - b. Traditional CIMT, where therapy is provided for more than 2 hours/day, should not be used within the first month following stroke [Evidence Level A].
  - c. Modified CIMT most often refers to a less intense program which varies in terms of time of constraint, intensity of associated therapy, and duration of intervention (weeks). M-CIMT may be initiated in the first month following stroke in appropriate patients [Evidence Level: Early-Level A; Late-Level A].
- vi. Mirror therapy may be appropriate for select patients to improve ADLs, reduce pain, and improve visual spatial neglect [Evidence Level A].
  - vii. Sensory stimulation (e.g., TENS, acupuncture, muscle stimulation, biofeedback) for the upper extremity may be offered to select patients to improve sensory motor function [Evidence Level A].
  - viii. For patients with a flaccid arm (i.e., Chedoke-McMaster Stroke Assessment <3) electrical stimulation should be considered [Evidence Levels: Early- Level B; Late- Level B].
  - ix. Where available, virtual reality techniques, using both immersive techniques (such as virtual reality) and non-immersive techniques (such as video games), can be used as an adjunct to other rehabilitation therapies as a means to provide additional opportunities for repetition, intensity and task-oriented training [Evidence Level B].
  - x. Range of movement exercises should be provided that includes placement of the upper limb in a variety of appropriate and safe positions within the patient's visual field [Evidence Level: Early-Level C; Late-Level C]. Refer to Recommendation 5.5.3 for additional information.

#### Adaptive Devices

- i. Adaptive devices (cutting boards, utensils) designed to improve safety and function should be used if other methods of performing specific functional tasks are not available or tasks cannot be learned [Evidence Level C].
- ii. The need for special equipment (e.g., wheelchairs, safety devices) should be evaluated on an individual basis. Once provided, patients should be reassessed, as appropriate, to determine if changes are required or equipment can be discontinued with the aim of achieving normal unassisted function [Evidence Level C].
- iii. Functional dynamic orthoses are an emerging therapy tool that may be offered to patients to facilitate repetitive task-specific training [Evidence Level C].

#### Rationale:

Arm and hand function is frequently reduced following stroke, limiting stroke survivors' ability to perform activities of daily living. Unfortunately, a large number of stroke survivors with initial arm weakness do not regain normal function; however, many therapeutic techniques have been developed for those individuals who have minimal arm movement.

## **Appendix B: Interview Guide**

### Cognitive Interview for Understanding of Barriers and Facilitators for Implementation of Stroke Clinical Practice Guidelines

**Introduction to start:** Thank you for volunteering to participate in a cognitive interview about clinical practice guidelines. We will be using a think-aloud interview process in which you will describe what you are thinking as you use the clinical guidelines. I understand that being asked to think aloud may be new and unfamiliar to you. There are no wrong answers. I am only interested in knowing what is going through your mind as you use the guidelines.

#### **Cognitive Interview**

The purpose of this interview is to find out what you think about the Canadian Best Practice Recommendations for Stroke Care (CBPRSC) as you use them. I will be tape recording the interview. Do I have your permission to record the interview?

Please read the consent form.

The interview format will be a 'think aloud' process where we ask you to say out loud what you are thinking. Please remember that there are no wrong answers. I did not create these recommendations and you will not hurt my feelings with any of your comments. Feel free to say anything you're thinking. Do you have any questions before we begin?

**Cognitive Interview Questions:** Please look over the (CBPRSC) for upper limb rehabilitation. Take as much time as you would like to look over the document. As you are doing this, tell me out loud any thoughts that go through your mind.



*If the interviewee:*

*Asks what s/he is supposed to do. . .*

“I am interested in what you are thinking as you use the CBPRSC. I need to understand how do you interpret each recommendation in CBPRSC for upper limb rehabilitation after stroke?”  
Do whatever you need to help you think aloud about the CBPRSC.”

*Appears to be having difficulty thinking aloud. . .*

“Tell me what you are thinking.”  
“What thoughts are going through your mind right now?”

*Is thinking aloud with no difficulty. . .*

“Good. Your comments help me understand what you’re thinking about.”

*Asks you questions about the CBPRSC. .*

“I’m very interested in knowing what questions you have; however, due to the nature of the project, I cannot answer your questions at this time. I will write down your questions and respond to them after we have finished the interview. Please continue to ask questions you have while you are using the CBPRSC. It will be helpful to know what questions you have about the Recommendations.”

**Potential probes to use during the pre-interview:  
(Probes may be scripted below or spontaneous based on the response of  
the interviewee)**

- How do you interpret each recommendation for rehabilitation of upper limb after stroke?
- Do you accept the recommendations? Why?
  - a. Are they relevant to your field?
  - b. Do you think they are helpful?
- To which extent do you think the recommendation can be implemented?
  - a. How much do you use them (give percentage)?
  - b. What specific recommendations you would like to use more?
  - c. Is Information needed to implement provided? Accessible? If not what is needed?
  - d. What are the barriers to implementation? Are the solutions?
  - e. What are the facilitators to implementation?
  - f. How widely do you think they have been implemented?
  - g. How much they are implemented at your work place?
  - h. How much input and control do you have about how much they are implemented?
- Are there important issues are not addressed by the guideline? What are they?
- Are there any effect modifiers that might alter guideline implementation for different patients?
- Does the guideline assist with customizing intervention to different patients?  
How yes? How no? What is needed?
- To what extent does the interview increase understanding and change perception of the guideline?
- What the general remaining general impressions of the guideline and its potential to impact on practice (Strengths, Weakness, and Gaps).

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**CHAPTER 4: DISCUSSION AND CONCLUSION**



## **Discussion**

With the marked growth of the body of EBP literature in the rehabilitation field, there is a need for understanding the implementation behaviour of rehabilitation therapists using evidence in order to fulfil the existing gap in the knowledge to practice. This manuscript style thesis has focused on a) how implementation behaviours can be analyzed and understood through the lens of theory and b) therapists' understanding of particular recommendations from the Canadian Best Practice Recommendations for Stroke Care (CBPRSC) and the barriers and facilitators for implementing these recommendations in the clinical context. It includes two manuscripts one of which has reviewed the application of the Theory of Planned Behaviour (TPB) as a theoretical framework through which an individual human behaviour could be understood and predicted. The review has shown the wide use of the TPB in multiple circumstances within the clinical contexts including patients and clinicians' behaviours. In this review, we synthesized several systematic reviews comparing use of various socio-cognitive theories in similar contexts where health related behaviors are targeted. The review has indicated the merits of choosing TPB framework as a highly suitable model relative to other theories that could also have been employed to achieve the objectives of this study. For example, the Theory of Reasoned Action (TRA) has a limitation of not being able to adequately predict health related behaviours by itself.<sup>8</sup>

Other models might have been equally useful to inform our thinking, but we cannot be certain if any specific one would have been more useful since there are many models that have been used in knowledge translation. TRA and TPB have a greater effect than Health Belief Model to predict health related behaviour.<sup>9</sup> In regards to the self-efficacy model, TPB has shown to be broader as it includes the concept of self-efficacy along

with other components that lead to understanding and predicting of a particular behavior (See table 1).

The second manuscript included one of the first studies to evaluate barriers and facilitators to implementing evidence-based recommendations for rehabilitation of the UE post-stroke. It had a data collected from two countries (Canada and Saudi Arabia) and targeted OTs and PTs who are working in early stroke rehabilitation for UE. Although some of the identified barriers and facilitators have been reported in the health care literature,<sup>1-3</sup> this study is unique as it focuses on a rehabilitation lens and we are not aware of any similar studies that looked specifically at the UE recommendations from OT and PT perspectives. Despite the fact that the participants have raised many implementation issues, they seem to recognize the importance of using evidence to guide their practice and many of them demonstrated interest in increasing their use of CPG. The importance of the role of education and training was obvious for each participant in this study and the findings show the advantages of providing educational opportunity such as workshops, journal clubs, courses or mentoring from knowledge brokers<sup>6</sup> to increase therapists' awareness about clinical guidelines.

The findings of this study link to the step of 'Assessing Barriers to Knowledge Use' of the KTA process framework.<sup>4</sup> The Theory of Planned Behaviour (TPB) was used early in the development of the thesis because it has been widely used to understand clinicians' behaviours in different contexts. In this study, it was used to format the questions that guided the cognitive interviews to obtain responses from therapists regarding their understanding and interpretation for certain recommendations within CBPRSC. Also, the TPB was used to classify the barriers and facilitators of implementing the selected recommendations as its components in the first manuscript and the original theoretical scaffold. While the themes were not ultimately directly

linked to the Theory of Planned Behaviour, the process of starting with a theory to organize the thinking around a problem, yet maintaining sufficient objectivity to let the data drive the results and conclusions is an important balance. To address the concern that TPB will not enable understanding of behaviour under some circumstances such as fear or threat,<sup>5</sup> participants were instructed to freely express their opinions/thoughts in regard to understanding and using of each recommendation.

Using cognitive interviewing to collect data for this study had the advantage of obtaining participants' perspectives on what actions they thought the guideline was instructing them to do and to delve more deeply into issues around understanding of what actions should be taken. Cognitive interviewing has been previously used extensively to understand how people understand and respond to items on outcome questionnaires. Our approach was an extension of those techniques, since we explored the response of intention to implement the action which requires a clear understanding of what specific actions are stated in the recommendation. This process was helpful, adding a layer of insight to this work by illuminating the need for clearer recommendations and operational supports. Although we interpreted participants' understanding as representing the potential actions that they intended to perform relative to each recommendation, the actual actions of participants in clinical practice may not be concordant with their descriptions.

The researchers were hoping to get more participants from other provinces in Canada and Saudi Arabia, but because of time and funding constraints for the study, it was not possible to do so. There may be issues related to the implementation of the CBPRSC in other areas, such as rural health facilities as compared to the largely urban population interviewed. Moreover, the objective of this study was to explore the issues

of implementation for particular recommendations for UE rehabilitation after stroke regardless the geographical influences on practice.

The existing barriers and facilitators tend to be contextual based on different variables within the clinical setting. For example, the barriers in the acute stage of stroke are different from barriers at post-acute stage, although there are some similarities. The findings of this study highlight that there were substantial differences in perceptions of the barriers among participants depending on the stage of rehabilitation in which they are working, years of experience, and level of education and training. Also, our findings suggest that any guideline implementation strategy must be time efficient and considers contextual differences between rehabilitation therapists.

### **Clinical Implications**

The global objective of this study was to document therapists' understanding of and to identify the barriers in implementation behaviour towards the UE guidelines of the CBPRSC as an illustration of a current clinical practice which has been shown to be suboptimal in term of adherence to CPGs.<sup>1</sup> CPGs are developed based on the highest level of evidence and professional consensus, and use of such guidelines has been effectively tested to obtaining the optimal care for stroke survivors. Addressing the issues identified by this study will help to improve clinical outcomes and reduce the residual disability for persons after stroke.

The variations in interpretation of guideline recommendations (for example, the scope of definitions used for mental imagery) highlight the need for continuing education and KT to support implementation of the evidence for these specific modalities in the clinical setting. To illustrate, use of implementation models such as PETTLEP (Physical, Environment, Task, Timing, Learning, Emotion, and Perspective)

model to incorporate mental imagery into individual treatment sessions would address many of the concerns raised by the therapists in our study.<sup>10</sup> Other barriers identified included lack of knowledge and training, which can be addressed by some KT interventions such as knowledge brokers. Also, facilitators are recognized which can be nurtured and leveraged to support use of CPGs. For example; in regards to the GRASP implementation, family involvement has been showing to increase the benefits from the program.<sup>11</sup> Moreover, the general principle recommendation helps therapist to draw an effective treatment plan as it covers the whole elements of physical rehabilitation and was strongly accepted by every participant.

### **Limitations**

- This study started with the TPB as a theoretical framework based on review of the literature, but other options might have provided different results.
- The identified implementation issues were relative to the CBPRSC and there are many other guidelines, and these might have found different results. Further, we only looked at a selection of the UE guidelines, and focusing on different recommendations may have elicited different concerns. However, since many CPG share similar recommendations, the general findings are thought to be transferable.
- It is a challenge to claim data saturation in this type of study. We felt that we did at the macro level for participants in local areas of sampling, but it is possible than more participants from different contexts would have added to our findings.
- As this study found patient and family roles were both a facilitator and barrier for guideline implementation from therapists' perspectives, including patient perspectives on guidelines might also have generated greater insights.

- This study has compared therapists' perspectives from 2 health systems, but there is a vast diversity of systems this may not be generalizable to.

### **Directions for Future Research**

This study explored the contextual issues (barriers and facilitators) that play roles in implementing particular recommendations for UE rehabilitation after stroke. The knowledge translation of evidence is an iterative process that builds throughout the knowledge to action cycle. The findings of this study give direction for future research to develop and monitor effective KT strategies to increase therapists' uptake of best practice recommendations. From one perspective, the identified implementation issues from different healthcare systems reflect the need for KT interventions that will help addressing the specific barriers for implementing CPG within each healthcare system separately, in addition to the global barriers which existed in both systems. For example, a future study might evaluate the effectiveness of knowledge broker as a KT intervention that will address particular barriers in a clinical context. From a rehabilitation perspective, a randomized controlled trial can compare the effectiveness of implementing multiple recommendations for UE rehabilitation from CBPRSC versus using any singular treatment recommendation.

Future research can further explore the details to generate deeper insights into individual barriers explored by this study in order to inform the process of selecting and tailoring a KT intervention that would be suitable to address an individual barrier. For instance, a study can explore more of therapists' issues related to self-efficacy components by taking into consideration all the issues that are related to the therapists' capabilities to implement particular recommendations.

Providing therapists' feedback on specific recommendations back to the CPG

developers was a common issue considered by the majority of participants: a future study might look at testing some channels through which therapist can easily provide their feedback and being engaged in the process of guideline's evaluation from clinicians' lens. As this study has identified the implementation issues qualitatively, the same recommendations could be evaluated quantitatively using guideline evaluation rating systems such as the Guidelines Implementability Appraisal (GLIA) tool.<sup>12</sup> As there were many barriers indicated by therapists about the role of patients being as barriers in some circumstances, it would be helpful to look at patients' perspectives on implementing specific recommendations from CBPRSC.

Also, there is an opportunity to further explore the issue raised by participants in this study about the perception the UE is lower priority compared to the LE in terms of rehabilitation after stroke. Future work can investigate the institutional, social and policy factors related to length of stay, quality benchmarks, administrative vs. therapist vs. patient priorities both during the inpatient and outpatient phases of rehabilitation. Our study suggested there may be less attention paid from the rehabilitation therapist towards rehabilitation of UE post stroke, and this was attributed to multiple factors, including prioritization of mobility goals to support early discharge, in addition to the slower physiological recovery of the UE post stroke.

## **Conclusion**

Clinical practice guidelines have a substantial role in enhancing clinical outcomes for stroke survivors. There have been huge efforts in the last decade to establish and disseminate the clinical guidelines globally. As the current evidence indicates that healthcare outcomes have not demonstrated the expected effectiveness in terms of post-stroke UE deficit remediation, there is a need to understand and address the contextual

barriers for implementing the guidelines effectively, which may be affecting the ability to maximize UE function post-stroke. This program of research has explored specific barriers for implementing the Canadian Best Practice Recommendations for Stroke Care for UE rehabilitation after stroke in both Canadian and Saudi contexts, and gives direction for further research to address the barriers to implementation.



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Table.1: Comparison between Social Cognitive Theories that might be used to Predict and Understand Behaviour

Theory	Self-efficacy	Health belief model	Theory of reasoned action	Theory of planned behaviour
Components	perceived self-efficacy and outcome expectancies	perceived susceptibility, perceived severity, perceived benefits, and perceived barriers, Cues to action, Self-efficacy	behavioural attitudes' and subjective norms.	behavioural attitudes, subjective norms, and perceived behavioural control
Perspectives	Lack of - behavioral intention -lack of clear definition in self-efficacy	- The HBM is characterized by a lack of adequate combinatorial rules and inconsistent application (Armitage and Conner 2000, Yarbrough and Braden 2001).  - Its main components have weak effect sizes, and its predictive capacity is limited as compared to that of other social cognition models (Harrison et al 1992, Zimmerman and Vernberg 1994)  - Mainly use with patients behaviours	- Lack of the self-efficacy component - Lack of the threat concept	- Lack of the threat concept - Ajzen (1998), the TRA and TPB are both mathematically and structurally better specified than, and framed at a higher level of generalization than, the HBM.