Hand Conditions Associated with Diabetes:
an observational study characterising hand function

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Discipline of Medicine

Submitted in total fulfilment of the requirements
of the degree of Doctor of Philosophy

May, 2011
“I love a hand that meets my own with a grasp that causes some sensation.”

Samuel Osgood (1747 – 1813, American Politician)
ABSTRACT

In Chapter 1 of this thesis, I review the literature relating to the hand syndromes associated with diabetes. I describe their unique clinical features and current treatment options. I consider how these hand syndromes may contribute to physical disability in diabetes and formulate questions relating to the degree and the course of this disability.

In Chapter 2, I describe and discuss the rationale for selecting the methods used to measure hand function. The methods used to measure disability and quality of life from the individual’s perspective and evaluate motor and sensory impairments of the hand are explained. Other data that was collected, such as body weight, height and information on diabetes duration and control, are discussed. The sample size required to detect a change in hand function is calculated and the clinics from which study participants were recruited are outlined.

In Chapter 3, I describe the characteristics of the sample of adults with diabetes and the associated hand syndromes at their first assessment. My analysis of the factors that predicted hand disability at the initial presentation in this heterogeneous group is presented.

In Chapters 4, I describe the change in hand function measured over the second and third assessments and determine the factors that were associated with this change. My analysis is extended to examine differences between the dominant and non-dominant hands and between men and women.

In Chapter 5, I consider the precision of measures of hand function and discuss how this affected the data obtained. Minimal detectable changes are analysed and recommendations regarding hand assessments are made.

In Chapter 6, I summarize the evidence that carpal tunnel syndrome and trigger finger contributed to hand disability in adults with diabetes. In addition to specific treatment strategies for these disorders strategies to address broader health issues are recommended. A greater emphasis should be given to strengthening the upper limb and implementing strategies to address physical inactivity and obesity in adults with diabetes.
ACKNOWLEDGEMENTS

I would like to acknowledge and thank my supervisors, Julian McNeil, Gregory Bain and Laura Laslett. I have benefitted from their insightful advice, enthusiasm and humour. I wish to thank Julian and Greg for the mentoring and clinical perspectives that they shared. I hope that in the future I will be able to draw on their example to inspire my own students. I thank Laura for her friendship and advice regarding the processes involved in setting up and conducting clinical studies, managing databases and analytical techniques. I am also thankful that Laura and I pursued further coursework study and extended our knowledge of epidemiological methods.

To my husband, Christopher, and children, John, Natalie and George, thank you for your love and for the constant support you provided. I am grateful for the balance that having a family has given to my life and for providing different perspectives on issues. I appreciated Natalie’s technological skills in editing and drawing images for different presentations. I especially appreciated the support of my sister, Lynette, who provided me with a benchmark of excellence. I thank my parents, Fay and Robert, who taught me persistence and to have an enquiring mind. My father once said, “If it was easy, it wouldn’t be worth doing”, when discussing PhD candidature.

I drew on my prior experience as a physiotherapist and I have been fortunate to have had many skilled and dedicated physiotherapists as colleagues over the years. This network has expanded during my PhD and includes colleagues from different disciplines. I value their friendship and support.

Thank you also to the Modbury Hospital Foundation for supporting my scholarship and allowing me to pursue my research goals.
DECLARATION

This work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution to Christine Redmond and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

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* Hand syndromes associated with diabetes: impairments and obesity predict disability.

Redmond CL, Bain GI, Laslett LL, McNeil JD


Signed:...........................................

Christine Redmond
ACHIEVEMENTS

Work published during the period of this research.

2009
Hand syndromes associated with diabetes: impairments and obesity predict disability.

Redmond CL, Bain GI, Laslett LL, McNeil JD


2008
Predictors of shoulder pain and shoulder disability after one year in diabetic outpatients

LL Laslett; SP Burnet; CL Redmond; JD McNeil


2007
Musculoskeletal morbidity: the growing burden of shoulder pain and disability and poor quality of life in diabetic outpatients.

Laslett LL, Burnet SP, Jones JA, Redmond CL, McNeil JD


Prizes awarded for presentation of this research.

2009
**Oral presentation prize** for the clinical programme: Rheumatology Association (SA Chapter) Meeting, Adelaide

2008
**Dodridge prize** for oral presentation: South Australian Hand Surgery Society Meeting, Adelaide

2007
"MPA 5x5" **oral presentation prize**: Australian Physiotherapy Association National Conference, Cairns
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>AGE</td>
<td>Advanced Glycosylation Endpoint</td>
</tr>
<tr>
<td>BMI</td>
<td>Body Mass Index</td>
</tr>
<tr>
<td>CI</td>
<td>Confidence Interval</td>
</tr>
<tr>
<td>CID</td>
<td>Clinically Important Difference</td>
</tr>
<tr>
<td>CTS</td>
<td>Carpal Tunnel Syndrome</td>
</tr>
<tr>
<td>DASH</td>
<td>Disabilities of the Arm, Shoulder and Hand</td>
</tr>
<tr>
<td>DD</td>
<td>Dupuytren's Disease</td>
</tr>
<tr>
<td>DM</td>
<td>Diabetes Mellitus</td>
</tr>
<tr>
<td>ES</td>
<td>Effect Size</td>
</tr>
<tr>
<td>HbA1c</td>
<td>Glycosylated haemoglobin</td>
</tr>
<tr>
<td>GH</td>
<td>General Health: general health perceptions</td>
</tr>
<tr>
<td>ICC</td>
<td>Intraclass Correlation Coefficient</td>
</tr>
<tr>
<td>IQR</td>
<td>Inter-Quartile Range</td>
</tr>
<tr>
<td>LJM</td>
<td>Limited Joint Mobility</td>
</tr>
<tr>
<td>MCS</td>
<td>SF-36: Mental Component Summary</td>
</tr>
<tr>
<td>MDC</td>
<td>Minimal Detectable Change</td>
</tr>
<tr>
<td>MH</td>
<td>Mental Health - psychological distress and wellbeing</td>
</tr>
<tr>
<td>PCS</td>
<td>SF-36: Physical Component Summary</td>
</tr>
<tr>
<td>PF</td>
<td>Physical Function: limitations in physical health because of health problems</td>
</tr>
<tr>
<td>RE</td>
<td>Role Emotional: limitations in usual role activities because of emotional problems</td>
</tr>
<tr>
<td>RP</td>
<td>Role Physical: limitations in usual role activities because of physical health problems</td>
</tr>
<tr>
<td>SD</td>
<td>Standard Deviation</td>
</tr>
<tr>
<td>SF</td>
<td>Social Functioning: limitations in social activities from physical or emotional</td>
</tr>
<tr>
<td>SF-36v2</td>
<td>Short Form 36-item health survey (version 2)</td>
</tr>
<tr>
<td>SRM</td>
<td>Standardized Response Mean</td>
</tr>
<tr>
<td>TF</td>
<td>Trigger Finger</td>
</tr>
<tr>
<td>VT</td>
<td>Vitality: energy and fatigue</td>
</tr>
<tr>
<td>WEST</td>
<td>Weinstein Enhanced Sensory Test</td>
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