

ISSN 2312-5705

Volume 1 Issue 1, April 2014

MJHS

MALTA JOURNAL OF HEALTH SCIENCES



UNIVERSITY OF MALTA
L-Università ta' Malta

FACULTY OF HEALTH SCIENCES

www.um.edu.mt/healthsciences/mjhs

Editorial Board

Chairperson

Professor Angela Xuereb
Dean, Faculty of Health Sciences,
University of Malta,
MSD 2080, Malta.
angela.a.xuereb@um.edu.mt

Editor-in-Chief

Dr Daniela Gatt
Department of Communication Therapy,
University of Malta,
MSD 2080, Malta.
mjhs@um.edu.mt

Associate Editors

Dr Stephen Lungaro-Mifsud
Department of Physiotherapy
stephen.lungaro-mifsud@um.edu.mt

Dr Josianne Scerri
Department of Nursing
josianne.scerri@um.edu.mt

Dr Victoria Sultana
Department of Nursing
victoria.sultana@um.edu.mt

Dr Vasilis Valdramidis
Department of Food Studies & Env. Health
vasilis.valdramidis@um.edu.mt

Dr Francis Zarb
Department of Radiography
francis.zarb@um.edu.mt

Advisors

Dr Rita Borg Xuereb, Department of Midwifery
Dr Sandra Buttigieg, Department of Health Services Management
Dr Cynthia Formosa, Department of Podiatry
Prof. Carmel J. Caruana, Department of Medical Physics
Mr René Mifsud, Department of Occupational Therapy

Copy Editors

Web Administrators

Dr Stephen Lungaro-Mifsud
Dr Vasilis Valdramidis
Dr Francis Zarb

Ms Juanita Briffa
juanita.briffa@um.edu.mt
Mr Nicolai Schembri
nicolai.schembri@um.edu.mt

Aim and scope

The *Malta Journal of Health Sciences* is a peer-reviewed, open access publication that promotes the sharing and exchange of knowledge in Health Sciences. It provides a platform for novice and established researchers to share their findings, insights and views within an inter-professional context. The Journal originates within the Faculty of Health Sciences, University of Malta.

The *Malta Journal of Health Sciences* disseminates research on a broad range of allied health disciplines. It publishes original research papers, review articles, short communications, commentaries, letters to the editor and book reviews. The readership of the journal consists of academics, practitioners and trainee health professionals across the disciplines of Applied Biomedical Science, Audiology, Communication Therapy, Community Nursing, Environmental Health, Food Science, Health Services Management, Medical Physics, Mental Health Nursing, Midwifery, Nursing, Occupational Therapy, Physiotherapy, Podiatry and Radiography.

Submitted manuscripts undergo independent blind peer review, typically by two reviewers with relevant expertise. All manuscripts are reviewed as rapidly as possible and an editorial decision is generally reached within approximately two months of submission. Authors of manuscripts that require revisions will have two weeks to submit their revised manuscripts. No manuscript that has already been published or is under consideration for publication elsewhere will be considered.

Types of manuscripts

Review articles will present a substantial survey with an adequate historical perspective of the literature in an area of Health Sciences. The manuscript should not exceed the limit of 5,000 words.

Research papers should be manuscripts comprising complete reports of original, scientifically sound research. They must contribute new knowledge, be prepared for a wide readership and should not exceed 4,000 words.

Short communications should be brief reports of scientifically sound research, but of limited scope e.g. limited amount of data, that contribute new knowledge. They should not exceed 2,000 words.

Commentaries should be focused and opinionated articles on any subject within the scope of the Journal. These articles should be related to a contemporary issue, such as recent research findings. They should not exceed 2,000 words.

Letters to the editor should provide further debate on a topic addressed by a paper published in the Journal. Authors of the manuscript will be sent an edited copy of the letter and they will have the right to reply. They should not exceed 1,000 words.

Book reviews should be timely and objective. They should discuss and assess the main ideas and major objectives of the book and how effectively these are accomplished. Finally, constructive comments about the strengths and weaknesses of the book should be presented. They should not exceed 1,000 words.

The manuscript lengths cited above do not include the Abstract and References.

Instructions for authors

Prior to manuscript submission, it should be ensured that the following guidelines are adhered to. Manuscripts not conforming to these guidelines may be returned.

Submission of Manuscripts

Manuscripts are to be emailed to the Editor-in-Chief on mjhs@um.edu.mt

General guidelines

All papers must be written in correct and consistent English (UK). The manuscript, including references, tables and figure legends, should be typed in double line spacing, with margins at least 25 mm on each side. Text should be standard 10 or 12 pt. Author names and/or affiliations should not appear anywhere in the manuscript pages or images in order to ensure blind peer review. Continuous line numbers should be added to the whole document (in Microsoft Word: View menu → Print Layout → Layout → Text Layout → Line Numbers).

Title page: The full title page should also be submitted as a separate document and should include the following:

Title of paper Abbreviations should not be used in the title.

Submission category This should be specified as full research paper, book review etc.

Authors Full names of all authors are to be provided, followed by qualifications, affiliations and addresses. The corresponding author should be indicated and full details, including email and mailing addresses and telephone numbers, should be provided.

Running Head A running headline of not more than 40 characters should be included at the top of the page.

Blind title page: A blind title page giving only the title without author details should also be submitted.

Abstract: The abstract should be an accurate summary of the paper presented in one paragraph (not exceeding 300 words). The abstract should:

- (i) indicate the specific purpose of the article;
- (ii) describe the methodology used to achieve the purpose;
- (iii) present the findings including key statistics (this section may be omitted for articles that are not data-based);
- (iv) present the conclusions based on the data provided;
- (v) highlight the novelty of the work.

The abstract should *not* include references.

Keywords: Immediately after the abstract, a list of up to 6 key words is to be included. Selected words and phrases should relate directly to the content of your work.

N.B. The title, abstract and keywords should be chosen carefully as they determine the ease with which readers access the article through online search engines.

Main text: The article text should consist of the sections outlined below, in the same order. Results or Findings and Discussion could also be combined. Repetitions between sections should be avoided. Abbreviations and acronyms may be used where appropriate but must always be defined at their first mention.

Introduction Briefly describe the purpose of your work, explain its importance and provide a relevant theoretical background.

Methods Describe the research design, the materials and/or participants and the methods used for data collection. Sufficient detail should be provided to allow reproduction of the study design.

Results or Findings Present results in a clear and logical sequence. If tables are used, do not duplicate the data in the text but describe trends and main points.

Discussion This should provide an interpretation of the results without repeating them.

Conclusions The main conclusions of the paper are to be presented in this section.

Acknowledgements (if relevant) Collate acknowledgements in a separate section at the end of the article before the references. N.B. Please refer to the section on Ethical Guidelines for more information.

References Authors are responsible for the accuracy of references. All references must appear both in the text and the reference list. References should follow the Harvard referencing system. In the text, the information required is:

- the surname of the authors;
- the year of publication;
- the page number (direct quotes only).

Commas are used to separate information within parentheses e.g. (author's name, year of publication). Full stops are always used after the abbreviation *p.* for page number e.g. p.34 (or pp. for multiple pages). If the citation is at the end of the sentence, it is considered to be part of the sentence, so the full stop is placed after the closing parenthesis.

Examples

Book (1 author)

Neville, C. (2010) *The Complete Guide to Referencing and Avoiding Plagiarism*. 2nd Ed. Maidenhead: Open University Press.

In text:

Neville (2010) argues that...

Book (2 to 3 authors)

Bradbury, I., Boyle, J. & Morse, A. (2002) *Scientific Principles for Physical Geographers*. Harlow: Prentice Hall.

In text:

Bradbury, Boyle and Morse (2002)...

Book (4 or more authors)

Reece, J.B., Urry, L.A., Cain, N.L., Wasserman, S.A., Minorsky, P.V. & Jackson, R.B. (2012) *Campbell Biology*. 9th Ed. London: Benjamin Cummings.

In text:

(Reece et al., 2012)...

Journal article (printed)

Trefts, K. & Blacksee, S. (2000) Did you hear the one about Boolean Operators? Incorporating comedy into the library induction. *Reference Services Review*, 28(4), pp.369-378.

In text:

Trefts and Blacksee (2000) argue that...

Journal article (electronic/online)

Wilson, J. (1995) Enter the Cyberpunk librarian: future directions in cyberspace. *Library Review*. [Online] Emerald Database 44(8), pp.63-72. Available from: <http://www.emeraldinsight.com>. [Accessed: 30th January 2012].

In text

Wilson (1995) argues that.....

Website

BBC News.(2008)*Factory gloom worst since 1980*. [Online] Available from:<http://news.bbc.co.uk/1/hi/business/7681569.stm>. [Accessed: 19th June 2012].

References should be arranged first alphabetically and then further sorted chronologically if necessary. More than one reference from the same author(s) in the same year must be identified by the letters "a", "b", "c" etc., placed after the year of publication.

Tables should be referred to specifically in the text of the article and provided in the same document. They should be in editable MS Word format.

Number tables consecutively with Arabic numerals (1, 2, 3 etc.), in the order in which they appear in the text. Each table should have a short descriptive title, be self-explanatory and not duplicate data given in the text or figures. Ensure that all columns and rows are properly aligned. Include horizontal rules at the top and bottom of a table and one below the column headings. If a column heading encompasses two or more subheadings, then the main headings and subheadings should be separated by a single short rule. No other rules should be included, neither horizontal nor vertical. Appropriate space should be used to separate columns. Rows should be double-spaced.

A table may have footnotes if necessary. Each footnote should begin on a new line. Abbreviations in tables should be defined in footnotes even if defined in the text or in a previous table.

Figures should be referred to specifically in the text of the paper. Number figures consecutively using Arabic numerals and avoid repeating material in the text. Abbreviations used in figures should be defined in the caption.

Image files should be supplied in EPS, TIFF, PDF, PPT

or JPEG format, with each figure uploaded separately and numbered. Unless essential to the content of the article, all illustrations should be supplied in black and white with no colour contained within them. Files should be saved at the appropriate dpi (dots per inch) for the type of graphic - definitely not less than the typical screen value of 72 dpi for both the vertical and horizontal directions. Lower resolutions will not be usable.

Save line drawings at 800 dpi or 1200 dpi for fine line work and 300 dpi for halftone and colour work. The image should be cropped to show just the relevant area, while the amount of white space around the illustration should be kept to a minimum. Supply illustrations at the size they are to be printed, usually 76 mm wide (single column of text) or, for especially large figures, 161 mm wide (two columns of text). All annotations should be included within the images supplied.

Participant identity must be obscured.

Additional points to note:

(i) do not put a box around graphs, diagrams or other artwork;
(ii) avoid background gridlines unless these are essential (e.g. confidence limits);

(iii) ensure that lettering is appropriately sized and corresponds to 8 or 9 pt when printed;

(iv) include all units of measurement on axes;

(v) all lines (e.g. graph axes) should have a minimum width of 1/4 pt (0.1 mm), otherwise they will not print; 1 pt weight is preferable;

(vi) avoid using tints (solid black and white or variations of crosshatching are preferred). Any tints that are used must be at a minimum 5% level to print (but do not use too high a tint as it may print too dark);

(vii) do not use three-dimensional histograms when the addition of a third dimension gives no further information.

Appendices are discouraged if the material can be included in the main text. If an appendix is necessary e.g. mathematical calculations that would disrupt the text, it should be supplied as a separate file. If more than one appendix are included, these should be identified using different letters. An appendix may contain references. Appendices must be referred to in the main text.

Footnotes should be used sparingly. If used, they should be numbered consecutively throughout the paper using superscript Arabic numbers. Do not include footnotes in the reference list.

Peer review process

All manuscripts are pre-screened by the Editor-in-Chief (or Editorial Board member) upon submission. Priority is given to articles that will help allied health professionals to make better decisions, increase pertinent knowledge base and support high quality research. Immediate manuscript rejection by the *Malta Journal of Health Sciences* is expected in the following instances:

(i) study does not have a theoretical or evidence-based argument for the relevance of the work to allied health practice;

(ii) manuscript does not contain sufficiently new or important information and therefore does not offer a significant contribution to the literature;

(iii) reliability study does not include a discussion of the influence that the findings will have in the field;

(iv) study evaluates a new test without a sound comparison to current tests;

(v) study has serious flaws in the Methods section;

(vi) authors did not obtain ethics approval from a properly constituted ethics committee, where appropriate.

Manuscripts that qualify for review are evaluated by at least two experts as appropriate. A double blind review process is adopted. After the reviewers receive a paper from the editor, they read it

closely and provide individual critiques in which they:

(i) comment on the validity of the science, identifying scientific errors and evaluating the design and methodology used;

(ii) judge its significance by evaluating the importance of the findings;

(iii) determine the originality of the work based on how much it advances the field;

(iv) recommend that the manuscript is rejected or accepted with minor revision; major revision will entail resubmission and further review.

The Editor-in-Chief/Editorial Board member reads the manuscript and the reviewers' comments, makes his/her own comments, and provides guidance to the Editorial Board on the suitability of the manuscript for publication. The Editor-in-Chief does not need to heed this recommendation. The Editorial Board will then decide on the content of the feedback letter to the author/s.

Ethical guidelines

The *Malta Journal of Health Sciences* adheres to the following ethical guidelines for research and publication.

Authorship

The definition of authorship is based on the following criteria:

(i) significant contribution of authors to the conception and design of the research, data collection or analysis and interpretation of data;

(ii) drafting and/or critically reviewing the manuscript for its academic content;

(iii) providing final approval of the version to be submitted (or resubmitted) for publishing.

Authors are expected to meet all three criteria. Contributors who do not qualify under the authorship criteria should be included in the Acknowledgments section.

Acknowledgments

Any acknowledgements should be included at the end of the article, prior to the Declaration of Conflicting Interests (if applicable) and your References. Any sources of funding must also be acknowledged under a separate heading entitled *Funding*, directly after the Acknowledgments section. Funding acknowledgments should be in the form of a sentence as shown below, with the funding agency written in full, followed by the grant number in square brackets:

This work was supported by XXX [grant number xxx].

Declaration of conflicting interests

Authors are expected to disclose any associations that might pose a conflict of interest in connection with the submitted manuscript. All sources of funding or products must be included in the Acknowledgments section of the manuscript.

Originality of work

Submission of a manuscript implies that the work described:

(i) has not been published before (except in the form of an abstract or academic thesis), and

(ii) is not under consideration for publication elsewhere. If the manuscript is accepted for publication, it cannot be published in the same form elsewhere, in print or electronically, in English or in any other language, without the written consent of the copyright-holder.

Permissions

When previously published material (e.g. tables, photographs or illustrations) are included in submitted manuscripts, the authors are required to obtain a written statement from the copyright holder giving permission for reproduction. A copy of the permission obtained must be submitted to the Editor-in-Chief of this journal.

Author misconduct and article withdrawal

As a policy, submitted articles are checked for plagiarism using

duplication detecting software. The Editor-in-Chief reserves the right to reject any manuscript where it is suspected there is unethical conduct during a research project, or in the manuscript authoring or content.

Studies involving human and animal subjects (details)

Research undertaken with human and animal subjects must have been carried out in accordance with relevant internationally accepted guidelines such as the Declaration of Helsinki for clinical research involving humans (<http://www.wma.net/en/30publications/10policies/b3/index.html>), recommendations by the International committee of Medical Journal Editors (<http://www.icmje.org>), the British Educational Research Association ethical guidelines (<http://www.bera.ac.uk/publications/Ethical%20Guidelines>) and the EU Directive 2010/63/EU for research on animals (http://ec.europa.eu/environment/chemicals/lab_animals/legislation_en.htm).

Ethical approval

Ethical approval from a research ethics committee and/or institutional review board is usually required and details regarding the board providing approval should be listed in the Methods section of the manuscript.

Publishing policy

Copyright on the published article will be retained by the author/s. Authors grant the *Malta Journal of Health Sciences* license to publish the article and identify itself as the original publisher. In addition, authors may allow any third party the right to use the article as long as its original authors, citation details and publisher are identified, save for commercial purposes. Individual users may access, download, copy, display and redistribute to colleagues open access *Malta Journal of Health Sciences* articles solely for non-commercial and non-promotional purposes.

Table of Contents

Malta Journal of Health Sciences Volume 1 - Issue 1 (April 2014)

Editorial	
1	Editorial Daniela Gatt
Regular Articles	
2	Institute of Health Care - Faculty of Health Sciences (1987-2013): A celebration Review Article John Rizzo Naudi
8	The impact of pregnancy on foot health Research Article Dorothy Cassar, Cynthia Formosa
12	Low back pain: a comparative study on the value of core training vs traditional strengthening exercises Research Article Laura Schembri, Pauline Fenech, Mark Sacco
19	The impact of providing care to relatives with a severe mental illness: the caregivers' experience Research Article Michelle Fenech, Josianne Scerri
Commentaries	
24	Psychophysiology of respiratory disease: clinical considerations for the Advanced Practice Nurse Commentary Sarah Miller, Laura Owens, Tracy Collins, Erin Silverman

Editorial

Daniela Gatt

Editor-in-Chief, Malta Journal of Health Sciences

Health and science come together in myriad ways. Despite the diversity characterising the health sciences, the importance attached to optimal quality of life in the human being is common to all. The health science disciplines therefore feed into health care, which focuses on the diagnosis, management and prevention of impairments that impinge on the individual's health status. The remit of health sciences is wide-ranging. One can only imagine the wealth of knowledge that research in the various fields generates when considered collectively as an effort towards improving health care. It is precisely for this purpose that the Malta Journal of Health Sciences (MJHS) is being launched.

The brainchild of Professor Angela Xuereb, Dean of the Faculty of Health Sciences at the University of Malta, the Journal is being set up with the aim of bringing together research from the various allied health disciplines. This is no mean feat, considering that the different health science professions embody a multiplicity of perspectives on health care research. However, it is a proposition that seems feasible, considering the positive response received from various sectors, locally and internationally.

It has now been almost a year since the Editorial Board rose to the challenge of launching the Journal. It has been a steep learning curve, but the team spirit of conviction and perseverance has seen us through the various obstacles. The Editorial Board members have all pooled their knowledge, experience, insight ... and sheer hard work. They have done so thoughtfully and methodically. It has been a labour of love. Indeed, it might be the best editorial board an editor-in-chief could wish for!

It is with a deep sense of pride that we hereby launch the Malta Journal of Health Sciences. The peer-reviewed papers in this first issue address a range of topics. The invited paper by Professor Rizzo Naudi maps out the events that led to the foundation of the Institute of Health Care, which eventually developed into the Faculty of Health Sciences we know today. This historical review should provide a useful reference for academics and students alike. The clinical commentary by Miller and colleagues addresses the psychophysiology of dyspnea in chronic obstructive pulmonary disease and calls for consideration of the psychological comorbidities in female patients. The research paper by Cassar and Formosa, which looks at foot health in pregnant women, underscores the relevance of providing foot care education and podiatry services to expectant mothers. Comparing the effectiveness of the Pilates method and traditional back exercises in treating low back pain, Fenech and colleagues report better long-term outcomes for the Pilates method, increasing the scientific evidence in support of this intervention method. Finally, Fenech and Scerri familiarise us with the dynamics of caring for a relative with severe mental illness, presenting findings that highlight caregivers' need for community support.

I trust that you will find these articles stimulating and intriguing. May they act as a trigger for further scientific debate. Naturally, the Editorial Board of the Malta Journal of Health Sciences would be interested in feedback about the impact of the articles published in terms of discussion and constructive follow-up. It also encourages reviews and commentaries on timely topics, as well as reports of original investigations related to various aspects of health science research. These contributions would assist in keeping the science of health care informed and alive.

Professor Angela Xuereb's compelling enthusiasm and constant encouragement has to be acknowledged in helping us to reach our goal. Heartfelt thanks also go to the Associate Editors, Dr Stephen Lungaro-Mifsud, Dr Josianne Scerri, Dr Victoria Sultana, Dr Vasilis Valdramidis and Dr Francis Zarb, for making this issue materialise with their commitment and unfailing support. We are grateful to Ms Juanita Briffa and Mr Nicolai Schembri for their efficient administration of the Journal website. Mr Jackson Said's advice on the copy-editing process has also been invaluable.

May all the energy that has gone into this first issue of the Malta Journal Health Sciences act as a stimulus for us to value health science research, engage in it and share it with our peers in the field.

INSTITUTE OF HEALTH CARE - FACULTY OF HEALTH SCIENCES (1987-2013): A CELEBRATION

John Rizzo Naudi

Faculty of Health Sciences, University of Malta, Msida, Malta

Abstract. The Institute of Health Care embarked on its mission of training health care professionals at the University of Malta in 1987. A degree programme in Nursing Studies was the first course offered by the Institute of Health Care. By expanding steadily to provide training opportunities in a variety of allied health professions, the Institute of Health Care attracted increasing numbers of students over its 25 years of existence. This paper provides a brief historical account of the developments that led to the founding of the Institute of Health Care and to its subsequent upgrade to the Faculty of Health Sciences in August 2010. It also traces the advancement of the Institute of Health Care's individual professional divisions as they grew into faculty departments and expanded their teaching and research portfolios. A key contributor to the Institute of Health Care's success was the dedication and commitment of its teaching staff, a factor which continues to support the Faculty of Health Sciences in its ongoing mission.

1 Introduction

The Institute of Health Care (IHC) was founded in 1987. Its inception was triggered by the author's appointment as Parliamentary Secretary for Elderly Affairs, with an additional special portfolio of Medical and Health Education and Training. Backed by a long experience in hospital and other health care services, the author recognised the importance of professional training for nurses and other allied health professionals. This perception prompted him to propose the foundation of an institute within the University of Malta that would enable the local allied health workforce to keep abreast with the very rapid and remarkable advances that were happening in the field of health care. This recommendation led to the launch of the IHC, a rather bold venture that was not fully appreciated at the time. Nonetheless, the Institute embarked on its mission of training health care professionals with dedication and optimism, unfailingly supported by the late Rev. Professor Peter Serracino Inglott, who was Rector of the University. For the first few years of its existence, the IHC operated from a room within the Department of Pharmacy at the University campus. Professor Anthony Serracino Inglott was the IHC's first director.

An undergraduate degree programme in Nursing Studies was

the first course to be offered by the IHC. In the Maltese Islands, the recruitment of students for nursing courses had always been difficult. During the 19th and earlier part of the 20th century, nursing had a poor image in the Maltese Islands for people other than those with a religious vocation. Nursing in the state hospitals was dominated by the Sisters of Charity, who came to Malta in 1870. Usually, there were two or three Sisters in each ward, so that highly educated lay nurses had very few opportunities to develop their capabilities and advancement in the hospital services. As a result, training in nursing was not an attractive prospect for young people. The dedicated work and presence of the Sisters in the state hospitals lasted for over a century until the 1970s, when their numbers began to diminish because of lack of vocations.

The St Luke's Hospital Training School for Nurses was officially opened during the latter part of 1947 under the distinguished leadership of Sister Aldegonda Farrugia, a Sister of Charity. Sister Aldegonda was the first Registered Nurse in Malta and the first Maltese nursing tutor. The nurses who were trained at the School for Nurses were to become the nursing staff of the state hospitals, without whose tutoring services the IHC would have been unable to provide novel undergraduate nursing training. Moreover, the difficult historical background of nursing in Malta was a deterrent for young people to train in the field. Student recruitment was made more difficult following the launch of several new courses at the University. Despite these difficulties, a decision was taken in 1987 by the author and his collaborators to formally give recognition to the nurse as a professional member of the health care team. The introduction of the B.Sc. (Honours) programme in 'Nursing Studies' at the IHC marked the rise in status of nursing to a profession.

During the summer of 1987, a delegation led by the author visited a number of universities in England and Scotland. As a result, a link was formally established with the University of Liverpool, thanks to Professor Herbert Gillies, a renowned professor in the School of Tropical Medicine at the University of Liverpool. The late Professor Kate Morle was Head of the Nursing Studies Department. As a consequence of this link, the IHC was fortunate to have Ms Barbara Burkey as the first Coordinator of the Nursing Studies Division. After setting up the new B.Sc. (Honours) course in Nursing Studies for newcomers to the profession, Ms Burkey also proceeded to develop an undergraduate degree programme for qualified staff, together with a number of other courses, among which were the following:

- a Diploma in Nursing and Midwifery for qualified staff
- a Diploma in Psychiatric Nursing for qualified staff
- a diploma to degree programme in Nursing and Midwifery
- a Certificate in Nursing Practice course
- a Return to Nursing course for the 60 to 70 nurses at Zammit Clapp Hospital who had been away from nursing for many years

Correspondence to: J. Rizzo Naudi
(john.rizzo-naudi@um.edu.mt)

Received: 09.02.2014 - Revised: 19.03.2014 - Accepted: 20.03.2014 - Published: 24.04.2014
© 2014 The author

- a Supervising and Assessing course for qualified staff
- a Nurse Tutors course for lecturing staff on the IHC's Nursing programmes
- a post qualification diploma to master's programme in Nursing and Midwifery Education.

The implementation of these various programmes during the early days of the IHC was made possible by adopting a 'snakes and ladders system' which utilised all available talents and avoided wastage. Through this system, students who failed their course could pursue nursing training at a lower level, with the opportunity of progressing again to a higher level of nursing. Several nurses went through this process successfully. Ms Burkey also set up a Nursing Development Unit within the IHC, which exposed nursing students to the ideal ward setting.

Ms Burkey made an invaluable contribution to nursing and midwifery education. She also offered her full support for multidisciplinary developments in the IHC. She left her mark on nursing and midwifery practice in Malta by unfailingly promoting the professional image of nursing and the quality of care given to health service consumers.

Ms Burkey's successors, Ms Isabel Avallone, Ms Grace Jaccarini and Dr Roberta Sammut, together with their lecturing and administrative staff, continued to enlarge and develop the Nursing Division. By the year 2000, a growing interest in nursing studies courses became apparent. Soon after, the Nursing Division was to become inundated with a steady flow of applicants.

Following the IHC's upgrade to faculty status, the Department of Nursing continued to expand with Dr Roberta Sammut at its helm. The Department of Nursing is by far the largest department in the Faculty of Health Sciences, with 809 students currently following its various programmes in general, community and mental health nursing. 523 students are currently registered on three full-time courses, with 178 students following the B.Sc. (Honours) Nursing programme, four students following the B.Sc. (Honours) Mental Health Nursing course and 341 students enrolled in the Diploma in Nursing programme. 198 students attend seven part-time courses, including two Ph.D. candidates, 20 M.Sc. in Nursing students and six M.Sc. in Mental Health Nursing students. Additionally, 88 students have enrolled on a range of Continuing Professional Development courses (R. Sammut, personal communication, March 14, 2014). For the last three years, courses in mental health nursing have been run by Mr Martin Ward, an international expert in the field. Today, many members of the nursing profession have obtained higher qualifications at master's and doctoral levels. The nurse has also become clearly established as a professional and a respected member of the health care team. There is now a Directorate of Nursing with a professional nurse as its head.

2 Development and Extension of the Institute of Health Care

The IHC's remit went far beyond the training of professional nurses. Once the Nursing Division was established, the IHC strove to offer opportunities for training in other health care specialties. The following years saw the introduction of programmes in various other areas of study, namely (in alphabetical order) Applied Biomedical Sciences, Communication Therapy, Dental Technology, Food Studies and Environmental Health, Health Services Management, Midwifery, Occupational Therapy, Physiotherapy, Podiatry and Radiography. In the IHC's first academic year (1988/89), there was only one student applicant for the Nursing degree programme. During the first few years following the IHC's inception, enrollment in most of the courses continued to be limited. An initiative was therefore undertaken to set up a Pre-Vocational School for Health Care, directed by Mr Anthony E. Azzopardi. This was spurred by the author's realization that a

considerable number of students who had failed their 'O' level examinations in one subject had good grades in the other subjects. Many of these young people had been employed as Health Assistants in the various state hospitals. The Pre-Vocational School gave these students a second chance. The vast majority of students attending the School eventually continued their studies and qualified as health care professionals. A number of these even continued their studies to a degree at bachelor's and master's level. Eventually, the Pre-Vocational School was incorporated within the Malta College of Arts, Science and Technology.

A growing interest in the health care professions was eventually witnessed with time. Ten years after the IHC's launch, the number of students registering for the various courses on offer had increased markedly. Growth in student numbers continued to be steady and unrelenting, prompting the introduction of a numerus clausus in some courses to help preserve standards despite the limited facilities available. The IHC's academic and administrative staff worked in unison to support its expansion. Figure 1 shows members of the academic and administrative staff gathered with Mgr Paul Cremona, who visited the IHC on 29th December 2006, shortly before his ordination as Archbishop of Malta. In January 2008, the IHC moved from its premises within St Luke's Hospital to the Education and Management Block within Mater Dei Hospital. Figure 2 shows members of the IHC Board following the last meeting held at the IHC's premises in St Luke's Hospital.

The IHC received faculty status in August 2010, becoming henceforth known as the Faculty of Health Sciences (FHS). As a result, divisions were upgraded to departments in the respective fields. In turn, coordinators became departmental heads. The Dental Technology Division was transferred to the Faculty of Dentistry following the upgrade to faculty status. The FHS was therefore established with 10 departments. The Department of Medical Physics, the Faculty's most recent addition, brought up the total number of departments to 11. The next section outlines the development of each of the FHS departments. Most accounts outline personal communications with the respective heads and trace the departments' origins back to the IHC.



Figure 1: Academic and administrative members of the IHC staff gathered with Mgr Paul Cremona, who visited the IHC on 29th December 2006 prior to his ordination as Archbishop the following month. Seated in the front row, rightmost position, is Mr Jesmond Sharples, a nurse and IHC graduate who had been appointed Director of Nursing Services in the Ministry of Health.

2.1 Applied Biomedical Science (A. Xuereb, personal communication, March 3, 2014).

The Medical Laboratory Science Division was set up within the IHC in 1992. Initially, it offered a certificate course for techni-



Figure 2: IHC Board members following the last meeting at the IHC's premises at St Luke's Hospital, prior to the move to the new premises at Mater Dei Hospital.

cians working in the Pathology Department at St Luke's Hospital. Eight technicians qualified in 1996. In 1993, a three-year diploma course was started under the direction of Professor Maurice Cauchi and coordinated by Dr Joseph A. Borg. There were 43 diplomates from 1996 to 1999. A degree programme was started in 1992. Professor Angela Xuereb was appointed Coordinator of the degree programme in 1995. Since 1996, there have been 218 graduates.

In 2010, the Division became a Department with the establishment of the FHS. The nomenclature had by then been changed to Applied Biomedical Science. It is headed by Professor Angela Xuereb and is responsible for undergraduate teaching leading to a B.Sc. (Honours) in Applied Biomedical Science. The specific aim of the degree programme is to produce high quality graduates with expertise in all the experimental and routine aspects of a pathology laboratory. Graduates are equipped with the theoretical knowledge and practical skills required for the study and interpretation of pathological processes. They can also work in industry or pursue a career in research.

The Department has an active research programme in areas which include Genetics of Osteoporosis, Inflammation, Atherosclerosis and Myocardial Infarction, Genetics of Tetrahydrobiopterin Deficiencies, as well as Transcriptional Regulation and Control of Globin Gene Expression. The Department is currently expanding its doctoral programme.

In 2013, the Department marked its twentieth anniversary by organizing a symposium, in which a number of students and graduates presented their research. Professor Maurice Cauchi joined the symposium via Skype from Melbourne, Australia.

2.2 Communication Therapy (H. Grech, personal communication, January 19, 2014).

The Communication Therapy Division was the second to form part of the IHC. The B.Sc. (Honours) Communication Therapy programme was launched in October 1991 and has since been offered on a regular basis. This course is geared towards the initial education of generic speech-language pathologists. One hundred and twenty six speech-language pathologists have graduated from the University of Malta after reading for the four-year degree programme. There are currently 60 undergraduate students who are following the Communication Therapy course on a full-time basis.

Besides the undergraduate course, the Department is now offering a postgraduate programme in Audiology leading to a Master of Science degree, besides the Ph.D. programme. The Department was the first within the FHS to have presented the successful com-

pletion of its doctoral students. The Department has also catered for the provision of refresher and updating courses for qualified practitioners, as part of a professional development programme.

The Departmental staff members are actively engaged in research that covers a range of topics related to the acquisition of human communication and its disorders, especially in connection with the Maltese bilingual population. Departmental research to date has focused on the development and standardization of novel diagnostic assessments to identify local children with speech, verbal/written language and auditory processing difficulties. One interesting small-scale project is related to gelotophobia and stuttering; other studies are related to lexical skills in monolingual and bilingual young children.

The Department has also been actively engaged and a partner in the European Speech Language Therapy Consortium through which it has benefited from staff and student participation in Summer Intensive Programmes. Departmental staff members have also been appointed academic advisors/examiners by other universities and received the International Student Prize for Excellence in Research. More recently, the Head of Department, Professor Helen Grech, was appointed President of the International Association of Logopedics and Phoniatrics (IALP). IALP has 58 Affiliated Societies as well as individual members from all continents of the world.

2.3 Food Studies and Environmental Health (A. McElhatton, personal communication, January 11, 2014).

The Environmental Health Science Division, directed by Professor Victor Ferrito, was set up within the IHC in the early 1990s. It had the remit to run courses in environmental health to train health inspectors. The course on offer was an undergraduate diploma programme. The introduction of a 'top-up' mechanism in the mid-1990s enabled diploma holders to take modules over a period of two years on a part-time basis to obtain a degree. There were some twelve odd students who took up this option. It unfortunately failed to garner enough interest to reach greater student numbers. A change in University policy led to its discontinuation. During the same period, a part-time master's degree in food-related areas of environmental health was offered. Again, student registration was low and the programme was discontinued. An undergraduate degree programme was offered twice in the mid-1990s, but this also was discontinued due to poor student uptake. Throughout this time, the diploma course was run regularly.

In the mid-1990s, the Division was asked to run modules in nutrition for qualified health care workers. These modules were grouped and presented as a Post Qualification Diploma in Nutrition and Dietetics, which in 2002 was rebranded as a Postgraduate Diploma in Nutrition and Dietetics. There had been ongoing discussions with the Department of Health to introduce new courses in environmental health as well as nutrition and dietetics since the early 2000s. However, the teaching staff complement was insufficient. A new coordinator, Dr Anna McElhatton, was appointed in 2007. With the establishment of the FHS, the Division became the Department of Food Studies and Environmental Health. In 2010, the Department doubled its resident full-time staff complement with academics specializing in food science and nutrition so that the full-time academics became four. A degree programme in Applied Food and Nutritional Sciences was successfully launched in 2012.

Since 2010, the Department has been placing an emphasis on research, which has resulted in a gradual increase in postgraduate research students. There are currently four Ph.D. candidates and a master's student within the Department. Staff members' research interests include food safety, healthy food perception and choice, as well as water standards and safety. The Department is

involved in several EU thematic networks and seeks to increase the numbers of both undergraduate students and postgraduate candidates reading degrees by research.

2.4 Health Services Management (S. Buttigieg, personal communication, March 2, 2014).

The Health Services Management Division was established within the IHC in 1993 with a first intake of students following a diploma course. This programme was introduced after the successful course in health services management for senior staff of the Department of Health in Malta run by the Health Services Management Centre of the University of Birmingham. The regulations for the local course were amended when a US Peace Corps Volunteer, Ms Patricia Brooks, became the acting coordinator of the programme. The diploma course was upgraded to a master's programme in 2006. Professor Mark O'Callaghan and later Dr Natasha Azzopardi Muscat coordinated the course before Dr Sandra Buttigieg took over as Coordinator in 2007, then as Head of Department when the IHC became a faculty.

The first cohort of master's students graduated in 1997 after four years, the first two years of which covered a post-qualification diploma. Since then, the master's programme in Health Services Management has consistently attracted a multidisciplinary cohort from the various health care professions. Graduates include doctors, pharmacists, physiotherapists, occupational therapists, psychologists, social workers, applied biomedical scientists, nurses and midwives.

2.5 Medical Physics (C. J. Caruana, personal communication, March 2, 2014).

The Medical Physics Unit, previously part of the Department of Radiography, was upgraded to a Department within the FHS in 2013. Headed by Professor Carmel J. Caruana, its mission is to help develop young physicists or engineers to fulfill the role of clinical medical physicist working in the hospital environment, or research medical physicist employed in research laboratories or the biomedical device industry. Clinical medical physicists contribute to maintaining and improving the quality, safety and cost-effectiveness of healthcare services through expert action, involvement or advice regarding the specification, selection, acceptance testing, commissioning, quality assurance and optimised clinical use of medical devices and protection from associated physical agents such as ionizing radiation and magnetic fields. The role of research-oriented medical physicists is much wider. Here, physics concepts, theories and methods are used to enhance the understanding and development of clinical practice as well as experimental medicine. It would include physics based aspects of life science research that would have a future impact on healthcare e.g. advanced microscopy, nanodevices, biomolecular structure, cell biology physics. The Department offers a master's course in Medical Physics and is a prime actor in the development of medical physics curricula at the European level.

2.6 Midwifery (R. Borg Xuereb, personal communication, January 22, 2014).

There are documented records of midwifery practice in Malta dating back to the 16th century. The Medical and Kindred Professions Act of 1901 regulated the midwifery profession together with that of doctors and apothecaries. The School of Midwifery was placed on a sound footing in 1915 when the course of midwifery was set up under the auspices of the University of Malta,

leading to a diploma in Midwifery. The School of Midwifery reverted to the Medical and Health Department in 1946, and was again closed within a few years. In the 1950s and 60s, a small number of nurses were sent to the United Kingdom to train as midwives. The School for Midwives was reopened in 1970 under the leadership of Ms Elizabeth Thompson and eventually Ms Mary Vella Bondin. This course was planned on the UK's system in the training of midwives. The students had to be qualified nurses with at least six months nursing experience prior to commencing the programme.

When the IHC was set up, midwifery and nursing studies formed one division known as the Nursing and Midwifery Division. Nevertheless, each profession had its own curriculum and its own lecturers. In 1990, Midwifery was offered as a direct entry undergraduate diploma course. This was discontinued in 2002 to make way to a direct entry degree programme, with the first graduates qualifying as midwives in 2006. The first master's degree programme opened in 2004. The Division of Midwifery was set up in 2009. This was upgraded to a Department when the FHS was established in 2010. At present, 60 students are reading for a degree in Midwifery, while three students are pursuing their studies at master's level. In addition, four midwives within the Department are reading for a Ph.D. with overseas universities in collaboration with the University of Malta. Erasmus exchange programmes have also become very popular and at present the Department of Midwifery holds agreements with a number of European universities. The Department's hosting of European and international conferences shows that it has gained recognition among overseas institutions and networks.

2.7 Occupational Therapy (R. Mifsud, personal communication, January 29, 2014).

Occupational Therapy was formally introduced to the Maltese Islands in 1956 when two British therapists started to provide a service at St Luke's Hospital to in- and out-patients with orthopaedic conditions. This arrangement continued up to the late 1960s when the expatriate occupational therapists resigned from their posts and left the island, despite formal plans to expand services. In view of the growing need for occupational therapy provision, the Government decided to establish a local workforce. The first call for applications for the recruitment of Maltese students was made in 1970. In 1971, the Medical and Health Department sent the two selected applicants for training at the London School of Occupational Therapy. Mr Joe Busuttil and Mr Mario Scicluna qualified in 1974. These pioneering Maltese occupational therapists set up two clinics, a physical disabilities clinic at St. Luke's Hospital, which also offered part-time services at St. Vincent de Paule Residence for the Elderly, and a mental health clinic at Mount Carmel Hospital. In 1979, a second cohort of Maltese students was sent to the United Kingdom for training at the London and Derby schools of occupational therapy. With more staff qualifying in 1982, the profession could branch out in different areas of practice, thus setting up occupational therapy on a more stable basis in the major hospitals. Nonetheless, the shortage in the staff complement was still very acute.

In line with developments in other health care professions, a move was made to establish occupational therapy education in Malta. In 1984, Mr. Joe Busuttil obtained a post-graduate qualification and set up a local occupational therapy school, which launched its first course programme in October of the same year, under the auspices of the Department of Health. By 1992, the Occupational Therapy Division had been set up within the IHC. Diploma programmes were held between 1992 and 1994, with the last intake graduating in 1998. In the mid-1990s, the courses earned recognition by the World Federation of Occupational Therapy.

The academic profile of the Division changed radically as most staff members undertook postgraduate courses in the United Kingdom. An intensive collaboration with a visiting Fulbright Scholar, Professor Anne McRae from San Jose State University, followed. These developments led to the first undergraduate degree course being offered in 1999, spearheaded by the efforts of Mr René Mifsud and a dynamic team of young academics. In Malta, occupational therapy provides assessments, intervention programmes, consultancy and education to a very diverse range of client populations and age groups. Although staffing is still critical, the profession is now well-established and provides a range of hospital-, clinic- and community-based services.

2.8 Physiotherapy.

Sacco (2008) provides a detailed account of the beginnings of physiotherapy in Malta and the chronology of events leading to current professional training opportunities. The physiotherapy profession was introduced in Malta in March 1943, when Professor Herbert John Seddon (1903-1977), Nuffield Professor of Orthopaedic Surgery at Oxford, who was a world authority on poliomyelitis, was appointed advisor to the Medical and Health Department of Malta during the poliomyelitis outbreak of November 1942 - March 1943. Professor Seddon submitted schemes for the establishment of an Orthopaedic Department and a Physiotherapy Department.

In August 1943, a special Ward for Physiotherapy was opened in Bugeja Hospital, which was the main hospital for surgery during World War II. Arrangements were also made to send four Maltese women to train in the United Kingdom in Massages and Physiotherapy. Of these, Ms Rose D'Amato was the first Maltese physiotherapist to practise in Malta. Throughout the next three decades, there was only a very small number of physiotherapists working in the state hospitals.

The first local diploma course organised by the Medical and Health Department commenced in 1976 with 22 students. Ms Mary Patricia Ralph-Smith, an English physiotherapist, was the tutor. By 1977, the physiotherapy students were clinically effective and physiotherapy services became available to the elderly in the state geriatric hospitals. The second local diploma course organised by the Department of Health commenced in 1982, and by its final year, Mr Mark Sacco became the tutor and coordinator. Further courses were organised for the Department of Health in 1985 and 1989. Their standard was found to be at par with those of the United Kingdom following assessment by external examiners. Students qualifying from the Malta School of Physiotherapy were automatically accepted for recognition by the Council for Professions Supplementary to Medicine in the United Kingdom.

In 1992, physiotherapy was incorporated in the IHC and the diploma course previously offered was upgraded to an undergraduate degree. Since its launch, the degree programme has been offered on a yearly basis, with a total of 278 students commencing the course. Increasing numbers of applicants for the degree programme evidence its popularity among students. Accordingly, the teaching staff complement has grown from one in 1992 to three full-time and five part-time academics. Dr Mark Sacco heads the Department.

2.9 Podiatry (C. Formosa, personal communication, March 2, 2014).

The Podiatry Division, coordinated by Mr Andrew P. Scicluna, was established within the IHC in 1994. It initially offered a diploma course. The first seven graduates qualified in 1997, followed by eight others in 1998 and four others in 1999. The course was later upgraded to a B.Sc. (Honours) degree with 10 students graduating in 2009, followed by 11 in 2010 and 10 in 2012. The degree programme is designed to equip students with the theoretical knowledge and clinical experience necessary to pursue a career

as podiatrists and clinical researchers.

The professionalism and dedication of the Department's teaching staff is a crucial element that has contributed to its success. Headed by Dr Cynthia Formosa, the Department of Podiatry is actively involved in research, with its staff members publishing their work in leading podiatric and medical journals and participating in international conferences. The fields of interest of the Department include clinical biomechanics, diabetes, geriatrics, organizational management and change. There are currently three full-time members of staff within the Department. Two members of staff currently hold a Ph.D. in Diabetes Mellitus Management (University of Brighton) and Clinical Biomechanics (Staffordshire University). One other member of staff is currently reading for a Ph.D. at Canterbury Christ Church University, United Kingdom.

The Department also enjoys international collaborations with other schools of podiatry. A number of external lecturers are regularly invited to deliver modules in specialised areas such as podiatric surgery and podiatric podo-paediatrics, in order to enrich the course programme.

2.10 Radiography (P. Bezzina, personal communication, March 7, 2014).

Radiography education was established in Malta in the late 1970s with a training course coordinated by Dr Fortunato Zammit, held under the auspices of the Department of Health. Previously, radiographers were trained in the United Kingdom at government expense. Although several courses were set up during the next two decades, the numbers of qualifying radiographers were insufficient to cope with the demands of the population. Indeed, the Department of Health expressed concern that the number of radiographers available would not be sufficient to provide an expansion of the service. The then Chief Radiographer had written to the Chief Government Medical Officer in June 1987, stating that more radiographers were urgently required for the service:

"The total number of qualified radiographers engaged in the diagnostic work, including those at Craig Hospital and the Polyclinics now stands at 20 basic grade and 1 chief radiographer. This is far below the projected total of 59. Taking into account the heavy radiographers' wastage rate and the student drop out rate, in my opinion, the next group should not consist of less than 16".

A call for applications was then published on 10th July 1987 but only two students applied. Permission was sought and obtained to issue a second call, which was published on 6th October 1987. The situation became more precarious as there were no applications for this call and permission was again obtained to issue a fresh call for applications. Drastic measures were being made at that time to attract people to health care. The 'A' level entry requirement was removed and applicants could now join the course based on an 'O' level standard of education. The lowering of entry qualifications was not restricted to radiography courses only but to other health care courses, such as physiotherapy and occupational therapy.

At the time the IHC was launched, there were very few radiographers to operate the X-Ray equipment in St Luke's Hospital. A diploma programme was launched by the Radiography Division within the IHC in 1993, but this attracted very few applicants. Students successfully completing the course numbered three in 1997, two in 1998, seven in 2000, eight in 2002 and six in 2003. Meanwhile, the radiography profession was quickly evolving, with various branches emerging beyond the traditional X-Rays. Technological developments were constantly taking place in the two main branches, diagnostic imaging and radiotherapy, the latter also referred to as radiation treatment. Both modes require the radiographer to have a high level of theoretical knowledge and clinical ability. In view of these advances in the profession, the diploma course in radiography was upgraded to an undergraduate

degree programme. A post qualification diploma course was also offered. This was eventually replaced by a master's degree course. To date, a total of 150 students have qualified in the undergraduate course and nine students in the master's course. Headed by Dr Paul Bezzina, the Department of Radiography recently introduced a joint B.Sc. (Honours) programme in Radiography and Radiotherapy in partnership with Cardiff University. This course will provide the health service with radiographers able to work in the two branches of radiology - diagnostic and therapeutic - in support of the government's intention to develop cancer treatment.

3 Conclusion

The IHC grew in stature and beyond recognition during its existence, developing into a worthy predecessor to the FHS which, in turn, has continued to expand. Over the last 10 to 15 years in particular, a greater emphasis was placed on research as part of the formation of the academic staff members, assisting them in attaining postgraduate qualifications at master's and doctoral levels. The greater part of the lecturing staff succeeded in obtaining postgraduate qualifications without neglecting their teaching commitments. This proved to be an investment in the IHC's training and research potential. As the IHC embarked on its mission, it had very few teaching staff in possession of postgraduate degrees. It was therefore inevitable that it depended heavily on foreign experts to teach on its various programmes. The staff members of the IHC and FHS must be congratulated for their commitment to the advancement of the various disciplines. Through their dedication, training in the health care professions is no longer dependent on foreign teachers. This fact must be recorded as the greatest achievement of the IHC and the FHS in line with the most urgent of the IHC's targets, namely to achieve excellence in the education and training of reflective, caring and accountable health professionals, in response to health and health service needs of the population. This target was stated in the mission statement that motivated the IHC's birth 25 years ago.

At present, 10 out of the 11 departments within the FHS have members of staff in possession of a Ph.D. The FHS is currently the second largest faculty at the University of Malta, with over 1,300 students. Altogether, 3,803 students graduated from the IHC and the FHS at certificate, diploma and degree (undergraduate and postgraduate) levels to date. Postgraduate degrees ranged from postgraduate diploma to master's and Ph.D. levels. All of this is reason enough to celebrate the IHC and the FHS, the University of Malta's centre for educating and training allied health professionals.

4 Acknowledgements

I wish to thank the directors of the IHC, Professor Anthony Serracino Inglott, Dr Gauden Galea, Dr Sandra Buttigieg and Professor Angela Xuereb, the present Dean of the FHS, and all the teaching and administrative staff for making the IHC and FHS's success story possible.

I would also like to convey a special thank you to the very few students who joined the IHC's first Nursing Studies programme and motivated it to pursue its goal of giving a new dimension to training in health care professions.

5 Funding

This research has received no specific grant from any funding agency in the public, commercial or non-profit sectors.

References

- Sacco, M. (2008) *Modernising the Maltese Physiotherapy Curriculum: An empirical study*. Unpublished Ph.D. dissertation. United Kingdom: Sheffield Hallam University.

THE IMPACT OF PREGNANCY ON FOOT HEALTH

Dorothy Cassar¹, Cynthia Formosa²

¹Podiatry Department (Primary Health Care), B'Kara Health Centre, B'Kara, Malta

²Department of Podiatry, Faculty of Health Sciences, University of Malta, Msida, Malta

Abstract. Although pregnancy should be a joyous experience to all expectant mothers, it is also known to bring about a number of bodily changes which could impose lifestyle limitations throughout the nine months of pregnancy. In this study, the authors sought to evaluate the impact of pregnancy on foot health. A prospective non-experimental study was conducted. The authors interviewed 40 expectant Maltese mothers using the Bristol Foot Score (BFS). Results showed a significant difference ($p < 0.001$) in foot health in the recruited subjects from Time 0 (15 weeks pregnancy) to Time 1 (37 weeks pregnancy), implying that pregnancy imposes a negative impact on foot health. This finding is of key importance and needs to be taken into consideration by all health stakeholders if better health care is to be offered to all expectant mothers. Both locally and internationally, antenatal care aims to monitor pregnant women's general health and foetal development. However, very little attention is given to foot health. The authors highlight the importance of providing all expectant mothers with footcare education and podiatry services in the Antenatal Clinic.

Keywords pregnancy, quality of life, foot health, foot care advice, health education

1 Introduction

Pregnancy should be a period of joy for every expectant woman and it should be experienced with no health-related complications. However, it has been reported that many physiological and anatomical changes occur soon after fertilisation due to hormonal changes, as well as metabolic and mechanical factors arising from the enlarging uterus and other tissues (Artal, Lockwood & Barss, 2010). All of these are known to impose a negative impact on women's health. Up to 75% of pregnant women have been reported to complain of back and foot pain problems (Goldberg, Besser & Selby-Silverstein, 2001; Karadag-Saygi, Unlu-Ozakan & Basqual, 2010). However, they are usually told that this pain is normal during pregnancy, and that they will have to learn how to live with it for the remaining term of their pregnancy (Karadag-Saygi et al., 2010). The most common foot problems occurring during pregnancy include edema, over-pronation, toe nail changes,

leg pain, varicose veins and pain in the arches and heels.

In the past, the aims of antenatal care were to detect, prevent and manage problems that could result in adverse effects on either the mother or the unborn child (World Health Organisation (WHO), 2005). Nowadays, the aims have been extended to promoting awareness of the sociological aspects involved in child-bearing, including the impact that the latter has on the family, as well as supporting the family's psychological adjustment to child-bearing (National Health Service, (NHS) United Kingdom, 2008). Furthermore, women are today encouraged to keep more active during pregnancy by engaging in physical activity. It is being advised that pregnant women should engage in 30 minutes of daily activity such as walking, because physical activity has beneficial effects. It improves posture and circulation and reduces swelling, leg cramps, backache and varicose veins (Artal & O'Toole, 2003). However, the same authors report that if carried out inappropriately, physical training may result in increased incidence of foot and ankle complications.

Women's satisfaction with the type of care received during pregnancy has been an area of interest to researchers (Abbaszadeh, Azam & Nahid, 2010). Thus, it is important for health care professionals to have a better understanding of the impact of pregnancy on women's health, to be truly able to address patients' health concerns (Russo, 2011). The Society of Chiropodists and Podiatrists, United Kingdom (2010) reported that more than half of the pregnant population has foot problems (Ponnappula & Boberg, 2010). The importance of the physician's role in examining and assessing the foot need not to be emphasized. Despite this evidence, the literature reports that health care professionals are rarely performing foot examinations. When assessing all the possible negative factors which pregnancy can impose, better care and advice could be offered to all expectant mothers as from the early days of pregnancy. This would help to improve their quality of life during pregnancy (Ponnappula & Boberg, 2010).

In this study, the researchers sought to evaluate the impact of pregnancy on foot health. Expectant mothers need to care for their feet to be able to prevent foot pathologies, pain and discomfort. However, the literature reports that foot co-morbidities during pregnancy are often overlooked (Klein, n.d.). To date, no local prospective data exists on the prevalence of foot pathologies in Maltese expectant mothers. Such information could help predict which mothers are most at risk for foot complications and deterioration. These facts highlight the need for research that addresses such issues in this specific population, which is known to have a unique culture. It therefore differs from other populations which have been addressed so far in the research literature. Collecting and analysing key clinical information has been reported to be the stepping stone towards evidence-based improvements in health care. A fuller understanding of the factors that contribute to better foot health is important if improvements in health out-

Correspondence to: Cynthia Formosa
(cynthia.formosa@um.edu.mt)

Received: 26.01.14 - Revised: 30.03.14 - Accepted: 01.04.14 -

Published: 24.04.14

© 2014 The authors

comes are to be achieved.

2 Methods

This study was approved by the University of Malta's Research Ethics Committee and was carried out in accordance with the principles of the Declaration of Helsinki. Participants were recruited from the Antenatal Clinic and Gynaecology Outpatients at Mater Dei Hospital, Malta, when they attended their first antenatal appointment (Time 0). Participants eligible for this study were Maltese 'healthy' pregnant women with less than 20 weeks pregnancy.

Participant recruitment took place over three months. During this time, all expectant women attending their first antenatal appointment who met the inclusion criteria were invited to participate in the study, verbally and in writing. All agreed to participate, leading to a sample size of 40. Authorisation was obtained from the Data Protection Office at Mater Dei Hospital to access the patients' records. Participants were reassured that confidentiality and anonymity would be maintained during the study. Participants all received the normal routine antenatal care offered during their clinical appointments.

The outcome variable measured, foot health, was assessed using the Bristol Foot Score (BFS) (Barnett, Campbell & Harvey, 2005). Permission from the authors to use and translate the questionnaire into the Maltese language was sought and granted. The BFS is a patient-based tool and its overall reliability using Cronbach's Alpha was found to be 0.9036. It consists of 15 questions related to mobility, footwear and general foot health, concern and pain. Scores are calculated by using the Likert scale. The maximum score on the BFS is 73 whilst the least score is 15. A higher score indicates that patients have more foot problems relating to mobility, footwear and general foot health, concern and pain (Barnett et al., 2005).

The contents of this questionnaire were read to the participants in one-to-one interviews in their language of preference (English or Maltese). All interviews were held at the Antenatal Outpatients Clinic at Mater Dei Hospital. When translating the BFS into the Maltese language, the "back translation" method was used. Back translation is the process used to translate a questionnaire into another language by an independent translator (Bernard, 2006). This method has been used extensively in translations of questionnaires across many countries in order to ensure reliability and validity of the original tool as is described in detail elsewhere (see Melvin et al., 2002; Bernard, 2006). Participants were interviewed twice during this study at Time 0 (mean 15 weeks pregnancy) and at Time 1, four months later (mean 37 weeks pregnancy).

3 Results

Data were analysed using the Predictive Analytics SoftWare (PASW) version 18. Normality of distribution was established using a Kolmogorov Smirnov test. This test revealed that the score distribution was not normal. Therefore, a non-parametric test was used to compare mean scores obtained through the Bristol Foot Score. The Wilcoxon Signed Rank Test was used to confirm or reject the null hypothesis, namely that pregnancy imposes no impact on foot health. This non-parametric test was used to compare scores recorded for the participant group at two different time points. When a p -value was found to be less than the 0.05 level of significance, it was deduced that the mean rating scores for each question of the Bristol Foot Score differed significantly, leading to rejection of the null hypothesis.

All participants chose to be interviewed in Maltese. The results of the BFS demonstrated a significant difference in mean scores ($p < 0.001$) from Time 0 to Time 1, implying a deterioration in foot health and increased lifestyle limitations in the participants.

Furthermore, each of the 15 questions on the BFS was analysed

separately in order to identify which factors regarding mobility, footwear and general foot health, concern and pain were mostly affected during the course of pregnancy. Table 1 shows the results for each question of the Bristol Foot Score.

4 Discussion

The aim of this study was to determine the impact of pregnancy on the foot health of Maltese expectant women. Many studies have been conducted in which researchers sought to evaluate low back pain during pregnancy (Murray & Hassall, 2009) but only a few have evaluated the impact of pregnancy on leg, foot or hip pain and overall health. The current study reports a significant difference in foot health and lifestyle limitations in the study population from the first time the participants were interviewed using the BFS at approximately 15 weeks of pregnancy, up to four months after the first interview. This led to the conclusion that pregnancy does impose a negative impact on foot health. This finding is of key importance and needs to be taken into consideration by all health stakeholders, if better health care is to be offered to expectant mothers.

Antenatal care aims to monitor the pregnant woman's health and foetal development. In most hospitals, expectant mothers are assessed and monitored with regard to medical conditions. Issues pertaining to exercise and diet are discussed. Routine antenatal checks include weight and blood pressure monitoring, urine and blood glucose testing as well as monitoring of the unborn child and the mother's overall wellbeing (NHS, 2011; British Broadcasting Corporation (BBC), 2012; Bupa, United Kingdom, 2012). However, very little attention is given to foot health and foot care education. It has been reported that most of the time, pregnant women are told that back pain and foot problems are a normal occurrence during pregnancy and that they will have to learn to live with them for the rest of their pregnancy (Roniger, 2002).

The findings of this study stimulate discussion as to what is key in improving foot health status and quality of life in expectant mothers. Results demonstrated a significant difference in mobility, footwear and general foot health, concern and pain, implying poorer foot health and quality of life. Participants were not aware of the foot changes and pathologies that could arise during pregnancy. Moreover, they did not expect their foot health to change during pregnancy. Participants reported more difficulty in walking to the shops and standing up for long periods of time because of foot complications which developed towards the end of their pregnancy. Their feet became more painful by time, thus making them more conscious about them. Participants reported that towards the end of their pregnancy, mobility became more difficult. Also, more problems during sleep were reported at the second interview, mainly because of cramps in the legs and feet. Most of the pregnant women in later stages of pregnancy realised that they had to change the style of their footwear to more comfortable and wider ones. Furthermore, participants reported that their general health, including physical and emotional status had deteriorated throughout the course of their pregnancy. These findings indicate that the quality of life during pregnancy diminished due to changes in foot health which consequently affected the daily life of the participants.

These findings are congruent with the outcomes of a study conducted by Forger et al. (2005), which reported both physical changes and emotional disturbance during the course of pregnancy. Furthermore, Vullo, Richardson and Hurvitz (1996) reported that most of the foot pain started from the second and third trimester of pregnancy. In a study conducted by Ponnappala and Boberg (2010), more than 50% of pregnant women reported problems in the feet including unsteady gait, swelling of the foot, ankle and leg, as well as an increased foot width. The foot undergoes changes due to the increased weight and edema in the second and third pregnancy trimester. Body mass is said to increase by

approximately 12 kg (Coad & Dunstall, 2005) during pregnancy. Ankle edema of 2.4cm, a decreased gait propulsion force of 10% of body mass and an increase in the medio-lateral sway are additional changes seen during pregnancy. Thus, expectant women have to change their style of footwear.

Gaymer et al. (2009) reported that pregnant women have increased plantar pressures in their feet. Gait changes might increase foot pain during the later stages of pregnancy, accounting for the increase in lower limb pain and back pain in expectant women. Pregnant women have higher midfoot pressures, higher hindfoot pressures and lower forefoot pressures. Dynamic measurements show an increased maximal force in all areas. Pregnant women have a wider step width to maximise stability in the stance phase and to control mediolateral motion. Pregnancy influences foot biomechanics, leading to improper foot positions which induce pain. Gait disorders occurring during pregnancy can increase the risk of falls and musculoskeletal discomfort, thus affecting pregnant women's quality of life (Ponnapula & Boberg, 2010).

The results of this study highlight the need for health care professionals to advise pregnant women about the changes that pregnancy will bring about to their feet. Expectant mothers need

to learn how to deal with these changes, such as foot pain and swelling, and how to avoid other common foot pathologies. They need to be aware of these changes from the start of their pregnancy and not discover them during the course of gestation. Health stakeholders should consider the introduction of foot care and foot health education into the current health care system, especially in light of the fact that podiatric care is not currently offered in most antenatal clinics. Podiatrists need to identify expectant mothers' needs and equip them with the necessary foot care knowledge and skills to help them adapt to health behaviour changes required during pregnancy, in an effort to prevent foot-related complications. Effective education involves creating a situation where patients can actively participate in the management of their health. The true success of education will only be measured in behavioural and health-related outcomes. The authors recommend the provision of footcare education in antenatal clinics to all expectant mothers. Furthermore, availability of a podiatry service should also be considered for assessment of feet during the course of pregnancy and advice regarding appropriate foot-care and footwear. Improved care could result in improved foot outcomes and better quality of life during pregnancy.

Table 1. Bristol Foot Score (BFS): means and standard deviations for the participants (N = 40) obtained at Time 0 (before) and Time 1 (after) (bold font indicates a significant change in the *p*-value over time).

		Wilcoxon Signed Rank Test Statistics		
		Mean	Std. Deviation	<i>p</i> -value
Do problems with your feet affect whether you go out of the house to visit family or friends?	After	1.21	0.528	0.038
	Before	1.03	0.162	
Do problems with your feet affect you when you walk to the shops?	After	1.45	0.724	0.001
	Before	1.05	0.226	
Do problems with your feet affect you when standing still?	After	2.53	1.059	0.002
	Before	2.03	0.788	
Do problems with your feet affect you when walking on bumpy or stony ground?	After	1.68	0.904	0.004
	Before	1.24	0.675	
Over the last two weeks how painful have your feet been?	After	2.53	1.289	0.001
	Before	1.68	1.068	
Over the last two weeks how often have you felt conscious of your feet?	After	2.66	1.529	0.009
	Before	2.00	1.356	
Over the last two weeks how often have you felt fed up about your feet?	After	2.03	1.174	0.010
	Before	1.42	0.722	
Over the last two weeks how often have you felt worried that your feet will get worse in the future?	After	2.16	1.701	0.421
	Before	1.97	1.515	
Over the last two weeks how often have you felt as if your feet are not a real part of you?	After	1.16	0.437	1.000
	Before	1.16	0.370	
Because of your feet have you had any problems sleeping in the last two weeks?	After	1.89	1.203	0.044
	Before	1.42	0.826	
In the last two weeks have you been able to put your everyday shoes on easily?	After	2.55	1.408	<0.001
	Before	1.61	1.152	
Over the last two weeks how often have you been able to wear any shoes you like?	After	2.71	1.972	0.052
	Before	2.05	1.785	
If you could afford any shoes you wanted, how easily could you find shoes that fit comfortably?	After	2.79	0.991	0.001
	Before	2.18	0.955	
How would you rate your general foot health status?	After	3.13	0.906	0.301
	Before	2.97	0.677	
How would you rate your general health status?	After	3.08	0.673	0.005
	Before	2.79	0.622	

5 Acknowledgements

The authors are grateful to Dr Sue Barnett, who gave them permission to use the BFS. The authors would like to thank all participants who agreed to take part in this study. The authors would also like to thank the staff at the Antenatal Clinic and Gynaecology Outpatients at Mater Dei Hospital for their help and support during data collection.

6 Funding

This research has received no specific grant from any funding agency in the public, commercial or non-profit sectors.

References

- Abbaszadeh F., Azam. B. & Nahid M. (2010) Quality of life in pregnant women. *Payesh Journal*, 9, pp.69-75.
- Artal, R., Lockwood, C. & Barss, V. (2010) *Anatomical and physiological changes of pregnancy and exercise*. Available from: <http://www.uptodate.com/contents/anatomical-and-physiological-changes-of-pregnancy-and-exercise> [Accessed 3rd August 2011].
- Artal R. & O'Toole, M. (2003) Guidelines of the American College of Obstetricians and Gynecologists for exercise during pregnancy and the postpartum period. *British Journal of Sports Medicine*, 37, pp.6-12.
- Barnett. S. Campbell, R. & Harvey, I. 2005. The Bristol Foot Score: developing a patient-based foot-health measure. *Journal of the American Podiatric Medical Association*, 95, pp.264-272.
- Bernard, R. (2006) *Research methods in anthropology: qualitative and quantitative approaches* (4th ed.). USA: AltaMira Press.
- British Broadcasting Services (BBC) (2012) *Antenatal Care*. Available from: http://www.bbc.co.uk/health/physical-health/pregnancy/pregnancy_antenatalcare.shtml. [Accessed 24 April 2012].
- Bupa (2012) Antenatal Care. Available from <http://www.bupa.co.uk/individuals/health-information/directory/a/antenatal-care>. [Accessed 24th April 2012].
- Coad, J. & Dunstall, M. (2005) *Anatomy and Physiology for Midwives* (2nd ed.). Edinburgh: Churchill Livingstone.
- Forger, F., Østensen, M., Schumacher, A. & Villiger, P. (2005) Impact of pregnancy on health related quality of life evaluated prospectively in pregnant women with rheumatic diseases by the SF-36 health survey. *Annals of the Rheumatic Diseases*, 64, pp. 1494-99.
- Gaymer, C., Whalley, H., Achten, J., Vatish, M. & Costa, M.L. (2009) Midfoot plantar pressure significantly increases during late gestation. *The Foot*, 19, pp. 114-6.
- Goldberg, J., Besser, P. & Selby-Silverstein, L. (2001) Changes in foot function throughout pregnancy. *The American College of Obstetricians and Gynecologists*, 97, p.39.
- Haas, J. S., Jackson, R.A., Fuentes-Afflic, E., Stewart, A.L., Dean, M.L. & Brawarsky, P. (2005) Changes in the health status of women during and after pregnancy. *Journal of General Internal Medicine* 20, pp. 45-51.
- Karadag-Saygi, E., Unlu-Ozakan, F. & Basqual, A. (2010) Plantar pressure and foot pain in the last trimester of pregnancy. *Foot and Ankle International*, 31, pp.153-7.
- Klein, M. (n.d.) Pregnancy and foot orthotics. Available from: <http://www.drmarcklein.com/orthotics/pregnancy-foot-orthotics.php>. [Accessed 12th August 2011].
- Melvin, C.S., Gaurish, G., Vikram, P., Damodar, S.K. & John, F. (2002) The prevalence and correlates of hazardous drinking in industrial workers: a study from Goa, India. *Alcohol and Alcoholism*, 38, pp.79-83.
- Murray, L., & Hassall, J. 2009. Change and adaptation in pregnancy. In D. Fraser & M. Cooper (Eds) *Myles Textbook for Midwives* (15th ed.) (pp. 189-226). Edinburgh: Churchill Livingstone.
- National Health Service (NHS), United Kingdom (2008) *Antenatal care: routine care for the healthy pregnant woman*. Available from: <http://www.nice.org.uk/nicemedia/pdf/CG062NICEguideline.pdf>. [Accessed 23rd August 2011].
- National Health Service (NHS), United Kingdom (2011) *Your antenatal care: routine care for the healthy pregnant woman*. Available from: <http://www.nhs.uk/conditions/pregnancy-and-baby/pages/antenatal-midwife-care-pregnant.aspx>. [Accessed 24th April 2012].
- Ponnapula, P. & Boberg, J. (2010) Lower extremity changes experienced during pregnancy. *Journal of Foot and Ankle Surgery*, 49, pp.452-58.
- Roniger, R. (2002) *Learning Curves*. Available from: <http://www.kalindra.com/SI%20Medical%20Files/roniger.pdf>. [Accessed 15th October 2010].
- Russo, J. (2011) *Changes during pregnancy*. Available from: <http://family.wikinut.com/Normal-Psychological-Effects-of-Pregnancy/5zpb4w7o/>. [Accessed 29th October 2011].
- Martinez, C.H., Raparla, S., Plauschinat, C.A., Giardino, N.D., Rogers, B., Beresford, J., Bentkover, J.D., Schachtner-Appel, A., Curtis, J.L., Martinez, F.J. & Han, M.K. (2012) Gender differences in symptoms and care delivery for chronic obstructive pulmonary disease. *Journal of Women's Health*, 21(12), pp.1267-1274.
- The Society of Chiropractors and Podiatrists, United Kingdom (2010) *Feet for Life Month 2010 - Foot Health in Pregnancy*. Available from: <http://www.scpod.org/about-us/campaigns/campaigns-archive/feet-for-life-month-2010-foot-health-in-pregnancy/>. [Accessed 24th April 2012].
- Vullo, V.J., Richardson, J.K. & Hurvitz, E.A. (1996) Hip, knee, and foot pain during pregnancy and the postpartum period. *The Journal of Family Practice*, 43, pp.63-8.
- World Health Organization (WHO) (2005) *What is the effectiveness of antenatal care?* Available from: http://www.euro.who.int/_data/assets/pdf_file/0005/74660/E87997.pdf. [Accessed 4th April 2012].

LOW BACK PAIN: A COMPARATIVE STUDY ON THE VALUE OF CORE TRAINING VS TRADITIONAL STRENGTHENING EXERCISES

Laura Schembri¹, Pauline Fenech¹, Mark Sacco²

¹Back Unit, Musculoskeletal Section, Physiotherapy Department, St. Luke's Hospital, G'Mangia, Malta

²Department of Physiotherapy, Faculty of Health Sciences, University of Malta, Msida, Malta

Abstract. This randomised controlled trial (RCT) employed a pre-test/post-test design to compare the effects of core training (Pilates method) and traditional back exercises on a population with low back pain (LBP). Therapeutic intervention related to the Pilates method has recently become popular, but there is little evidence to prove it works. In this study, 120 individuals with LBP were allocated to three different groups. Group A was the control group, Group B was given modified Pilates intervention and Group C received traditional back exercises. All three groups were given a posture re-education session and back-care advice. After the initial session, the control group had individual sessions on posture re-education. The other groups undertook a six-week course of either modified Pilates or general back exercise classes. The modified Pilates group was taught how to use the core muscles, incorporating stabilisation with increasing functional movements. The back exercise group did similar exercises without learning to specifically stabilise. The Oswestry Low Back Pain Disability Questionnaire (ODQ) and the Visual Analogue Scale (VAS) were used as measures for pain and functional disability. Post-test ODQ readings showed no significant difference for pain-related function whilst VAS readings revealed a significant improvement in pain levels in all three groups, with the control group showing the best scores. However, the six-month follow-up scores showed that only the modified Pilates group continued to improve. At this stage, the control group was beginning to regress and the back exercise group was almost back to baseline measures. It was therefore concluded that core stability exercises have better long-term effects than traditional back exercises.

Keywords Back pain, core stability, exercise, Pilates, posture

1 Introduction

It has been reported that 60-80% of people in the Western hemisphere suffer from back pain at some time in their life (Long, BenDebba & Torgersen, 1996). Of these, 85% are classified as suffering from non-specific low back pain (NSLBP) (Krismer & van Tulder, 2007), which is the term coined due to a lack of diagnosis (Ferreira et al., 2007). Much research has been carried out on the effects of management of low back pain (LBP) (e.g. Liddle, Baxter & Gracey, 2003; Hayden et al., 2005). Klaber-Moffett et al. (1999) conducted a study on mechanical back pain, which is the term used to define pain caused by placing abnormal stress and strain on the muscles of the vertebral column. They evaluated the effects of exercise programmes on patients with LBP and concluded that exercise classes were clinically more effective than traditional general practitioner (GP) intervention.

Maher, Latimer and Refshauge (1999) undertook a major review of all randomised controlled trials (RCTs) investigating NSLBP over a span of more than 30 years. They found that structured exercise programmes that are intensive, supervised and involving the whole body, provide the best treatment for NSLBP in the sub-acute and chronic phases. Hanney, Kolber and Beekhuizen (2009) agreed that avoiding physical activity and adapting fear avoidance behavior increases risk for chronicity and that improved fitness decreases pain perception. In a survey of GP practice, Williams et al. (2010) found that primary care does not follow evidence-based guidelines and may contribute to the high costs of managing LBP.

In the past decade there has been a shift towards core stability training or segmental stabilisation training (Jull & Richardson, 2000). Whilst traditional exercises generally work to increase the "global" strength of the larger muscles responsible for movement, the "core stability" approach aims to improve the dynamic stability role of the "local" muscles (Richardson et al., 2002). Figure 1 shows how the local muscles work together, acting as a cylinder to provide segmental stabilisation to the spine. However, many reviews argue that although stability training is widely popular, there is still not enough strong evidence to prove that it works better than more traditional training in the rehabilitation process of LBP (e.g. Mannion et al., 2012; Ferreira et al., 2006). Norris (1995) describes muscular imbalance and "active instability" as major culprits in LBP, arguing that retraining quality of movement is essential to target muscle imbalance. This is corroborated by Vleeming et al. (1995), O'Sullivan et al. (1997), Jull and Richardson (2000) and Comerford and Mottram

Correspondence to: Laura Schembri (laura-ann.schembri@gov.mt)

Received: 31.01.14 - Revised: 04.04.14 - Accepted: 05.04.14 -

Published: 24.04.14

© 2014 The authors

(2001a). However, a systematic review by Macedo et al. (2009) reported that there was no evidence found to prove that motor control exercise is any better than manual therapy or other forms of exercise.

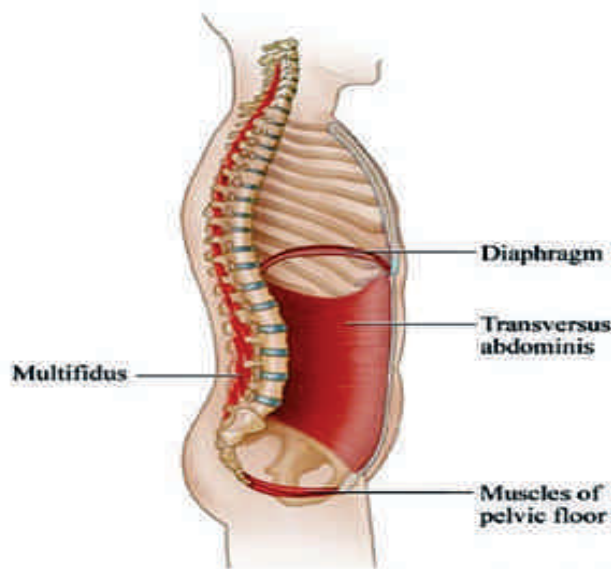


Figure 1: Muscular segmental stabilisation to the spine (City Edge Physio Sydney Physiotherapy, 2014).

Panjabi (1992) described the stabilising system of the spine as being made up of three components, termed the active (muscular), passive (ligamentous) and neural (control) subsystems, which intercommunicate harmoniously to provide stabilisation by controlling intervertebral movement. He defined the neutral zone as the range of “intervertebral motion in which there is minimal internal resistance for spinal motion to be produced” (p.394). The neutral zone can be abnormally increased due to laxity in the passive joint restraints or due to lack of dynamic muscular control (Panjabi, 1992).

In 2003, Panjabi looked at load distribution during movement in the spinal column and concluded that the spine is flexible with low loads and stiffens with increasing load. The analogy of a ball in a bowl was employed to aid visualisation of the load displacement curve. The ball moves easily within the neutral zone (base of bowl) but requires greater effort to move in the outer regions of the movement (steeper sides of the bowl). The shape of the bowl indicates spinal stability: the deeper the bowl, the more stable is the spine. This compares well with the biomechanical work carried out by Granata and Wilson (2001) who concluded that co-contraction of muscles is necessary to achieve stability in the spine, but specific neuromuscular control is required to maintain stability in asymmetric lifting postures. In such postures, the spinal load is increased significantly and the risk of overload injuries is higher.

A considerable amount of research has been carried out on the mechanism of the spinal stabilising system. Electromyography (EMG) testing and ultrasound scanning have shown that the local stabilisers, mainly Transversus Abdominis (TrA), the deep fibres of Lumbar Multifidus and lately also a small portion of Psoas Major, have a specific stabilising role on the spine (Hodges, 1999; Richardson et al., 2002; Standaert, Weinstein & Rumpeltes, 2008). Cresswell (1992) observed intra-abdominal pressure (IAP) during dynamic trunk loading and concluded that TrA contributes to the general mechanism of trunk stabilisation

rather than producing torque. He also concluded that TrA is controlled independently of the other abdominal muscles and should be re-educated more specifically, as sufferers of LBP lose timing and cross-sectional area of both Multifidus and TrA, which have been found to work in synchrony (Wallwork et al., 2009; Jansen et al., 2010). These must be re-educated to work as postural (tonic) muscles, which contract submaximally prior to and during movement and have been found to work optimally in neutral postures (Mew, 2009).

In the presence of LBP, the function of the stabilising muscles is impaired (Hodges 1999; Urquhart et al., 2005). This impairment can be related to alterations in timing or a decreased cross-sectional area (Comerford and Mottram, 2001b; Jansen et al., 2010) which, in turn, may be due to reflex inhibition caused by pain (Dickx et al., 2010). Danneels et al. (2002) compared EMG results of Multifidus and Iliocostalis Lumborum in healthy participants and patients with LBP. They concluded that back pain patients have a decreased ability to recruit Multifidus voluntarily. Although EMG was normal during low load stabilisation exercises, a low EMG result was reported during high load strength exercises. This may have been due to pain, pain avoidance or deconditioning of the muscle.

Improvement in pain and function has been reported with exercise interventions based on the inward movement of the lower abdominal wall (Hides, Richardson & Jull, 1996; O’Sullivan et al., 1997). Urquhart et al. (2005) carried out several EMG tests on TrA and concluded that the best position for independent contraction of TrA is in supine. Through the use of ultrasound screening, Mew (2009) found that TrA thickness improves more when trained in a good standing posture, which is more functional (Reeve & Dille, 2009).

Pilates exercises are considered to be a good rehabilitation tool for core strengthening and spinal stability (Akuthota & Nadler, 2004). Comerford and Mottram (2001b) demonstrated that the principles of proprioceptive facilitation and overflow, as practised in Pilates, are utilised to re-educate dysfunctional movement. Although Pilates is a popular tool in rehabilitation of back pain, few quality studies have been done to compare its effectiveness compared to more traditional exercises.

2 Method

2.1 Participants

One hundred and twenty participants were recruited over a six-month period. Referrals were made to the Physiotherapy Outpatients Department at St Luke’s Hospital, Malta via the Orthopaedic Outpatients Department at Mater Dei Hospital or directly from the participants’ GP. Physiotherapists working in the back-care unit within the Physiotherapy Department at St. Luke’s Hospital assessed all patients referred for NSLBP. Approval to carry out the study was obtained from the Research Ethics Committee of the Faculty of Health Sciences, University of Malta, the Manager of Physiotherapy Services and all referring orthopaedic and medical staff. Each participant was given an informative letter explaining the purpose of the study. Informed consent was obtained from the patients prior to random assignment to the treatment groups. Ethically, all patients were given valid treatment and were reassured that confidentiality was guaranteed.

56% of the participants were females and 44% were males. While 21% of all participants were aged between 16 and 35 years, 38% were between the ages of 36 and 50 years and 41% were aged 51-65 years. The participants’ age distribution within groups following random assignment is shown in Table 1.

Table 1. Age distribution within groups following the randomisation process.

Age	Group A	Group B	Group C
16-35 years	10	7	1
36-50 years	7	15	10
51-65 years	17	8	10

Table 2 lists the entry and exclusion criteria for participant selection.

Table 2. Criteria for participant recruitment.

Entry Criteria	Exclusion Criteria
18-65 years	Acute pain
6 weeks with LBP	Neurological dysfunction
(VAS)* score > 3cm	Recent surgery or childbirth

*The Visual Analogue Scale (VAS) is described in Section 2.4 (Data collection)

2.2 Procedure

The study consisted of two parts. The primary study was a pre-test/post-test control group design with simple randomisation administered upon entry to the study. Participants were randomly assigned to Group A (posture re-education), Group B (core stability exercises) or Group C (traditional back exercises) by administrative staff who were not involved in the study. The second part of the study was a follow-up reassessment of the outcome measures after a six-month period.

2.3 Interventions

Participants were assessed individually by two senior musculoskeletal physiotherapists and baseline measures taken on their first visit to the department. Each participant was taught how to correct posture during the first session. All participants received back-care and ergonomic advice which was suited to their individual needs. The two intervention groups were given a written Home Exercise Programme (HEP).

Group A participants were reviewed individually and followed a postural re-education programme, which consisted of advice and practice of posture re-alignment during sitting, standing and daily active functions. Group B attended Core Stability classes which teach how to co-ordinate ‘core’ muscle activity with costal breathing and graded ‘flowing’ movement. The exercises are a modification of the original Pilates exercises. The HEP consisted of three modified Pilates Level 1 exercises (Withers & Stanko, 2004), as presented in Figure 2. The aim of the Abdominal Preparation (A) is to teach deep neck flexor co-contraction and shoulder stabilisation. In Hip Twist Level 1 (B), the aim is to teach hip dissociation while maintaining neutral spine. In Breaststroke Preparation (C), the aim is to teach neutral spine in prone position. In all three exercises, one had to pair the movements with breathing control and TrA and Multifidus co-contraction.

Group C attended traditional back exercise classes. The HEP consisted of three traditional back exercises as illustrated in Figure 3. The Curl Up (A) aims at strengthening the abdominal muscles, the Knee Hug (B) releases tension from the lower back and gluteal muscles and the Spine Twist (C) gently mobilises the spine to release neural tension, and stretches tight structures. All groups attended over a period of six weeks and classes were taught at the Physiotherapy Department, St Luke’s Hospital. The participants were advised to carry out their HEP once daily.

2.4 Data Collection

The outcome measures used in this study were the Oswestry Disability Questionnaire (ODQ) (Fairbank et al., 1980) and the Visual Analogue Scale (VAS) (Boonstra et al., 2008), both of which were scored by all participants who completed the six-week course. The ODQ is used to score disability induced by LBP

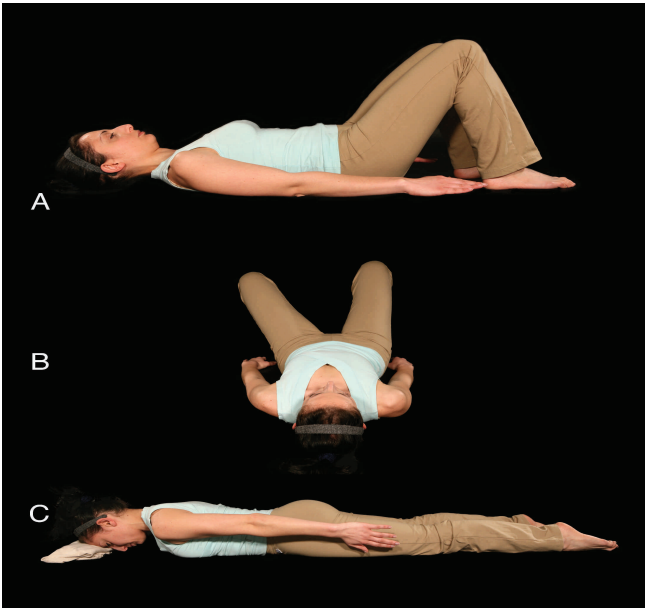


Figure 2: The HEP of three modified Pilates Level 1 exercises (Group B).

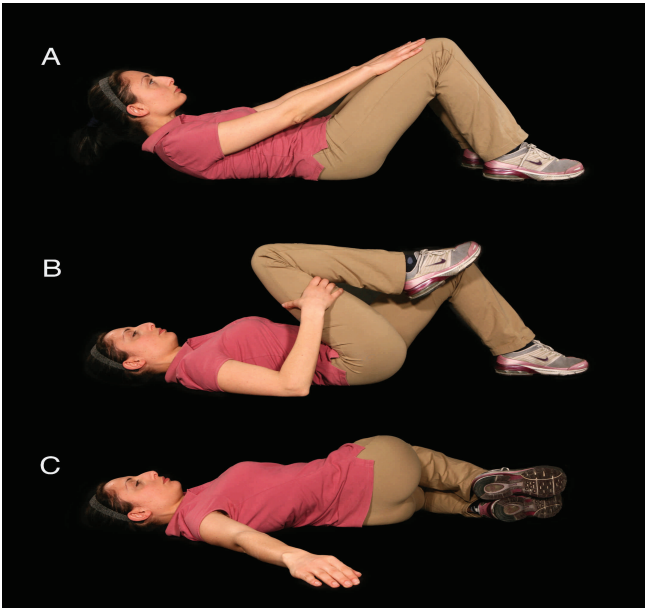


Figure 3: The HEP of three traditional back exercises (Group C).

and has been translated into many languages, including Maltese (Sant’Angelo, 2000). It is a validated tool that is designed to assess a patient’s level of function or disability, providing quantitative data that are suitable for quality assurance and research purposes (Beattie & Maher 1997; Kopec, 2000; Stratford, Riddle & Binkley, 2001; Vianin, 2008). The VAS scale is a valid and reliable tool to rate pain intensities along a 10cm line. The patient is asked to put a mark along this line to reflect the intensity of the pain. The score is measured from the zero anchor to the patient’s line (Williamson & Hoggart, 2005).

The Kolmogorov-Smirnov test indicated that the scores ob-

tained for the three individual groups had a non-normal distribution. The Kruskal-Wallis test was therefore used to compare the mean scores obtained for the three independent groups.

2.5 Results

A total of 120 participants were eligible to take part in this study. These were divided equally to three pre-defined groups of 40 participants in each group, of whom 33 completed the postural programme, 32 completed the Pilates programme and 24 completed the traditional back class programme. For statistical analysis, the data were grouped in such a manner that no intervention group could be recognised.

Paired sample t-tests were used to test for significant differences in measures obtained before and after the programme. The VAS readings indicated a significant difference at the 1% level ($p = 0.003$) between the three groups, while the ODQ readings showed no significant difference ($p = 0.123$). Results showed an improvement across all groups in pain and disability scores, as illustrated in Figures 4 and 5 respectively. In Group A, the average VAS was 6.02cm upon entry to the programme and 2.42cm upon discharge. The average individual change was a decrease of 3.6cm (<60%). The average ODQ score was 43% before treatment and 35% after treatment (<12%). Six months later, average scores were 3.87cm for the VAS and 36% for the ODQ. The average VAS score for Group B was 6.19cm upon entry to the programme and 4.44cm upon discharge, with a decrease of 1.75cm on average (<28%). ODQ results showed that the average disability measure pre-intervention was 47%, versus 43% upon completion of the programme (<4%). Six months later, average scores stood at 4.07cm and 35.4% for the VAS and ODQ respectively. Group C results showed the average VAS to be 5.35cm upon entry and 4.08cm upon discharge. The average individual change was a decrease of 1.27cm (<24%). The average ODQ for the back exercise program was 39% versus 33% (<6%). Six months post-intervention, average scores were 5.07cm (VAS) and 39.92% (ODQ).

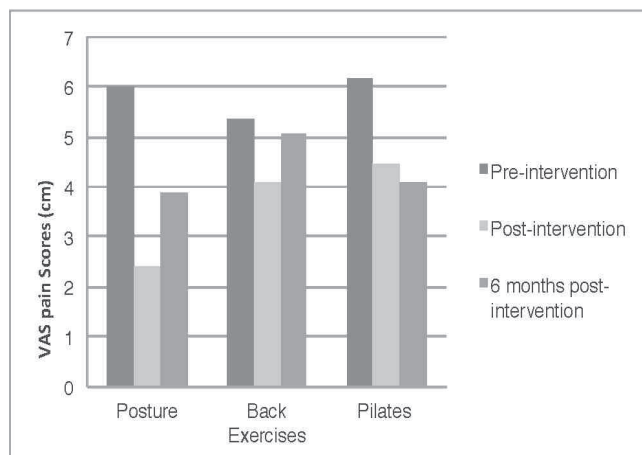


Figure 4: Pain scores obtained pre-intervention, post-intervention and six months post-intervention using the (VAS).

Although Group A showed the best improvement in scores initially, Group B scores continued to improve over time, with patients doing equally as well as participants in Group A after six months. Participants in Group C initially improved but had regressed close to pre-intervention levels after six months. Age-related pre- and post-test differences were interesting. As shown in Figure 6, the 16-35-year-old age group improved by 70% on VAS scores and by 23% on ODQ scores. The 36-50-year-olds scored an average of 24% improvement on the VAS and 9% on the ODQ

while the 51-65-year-olds improved by 35% and 16% on the VAS and ODQ respectively.

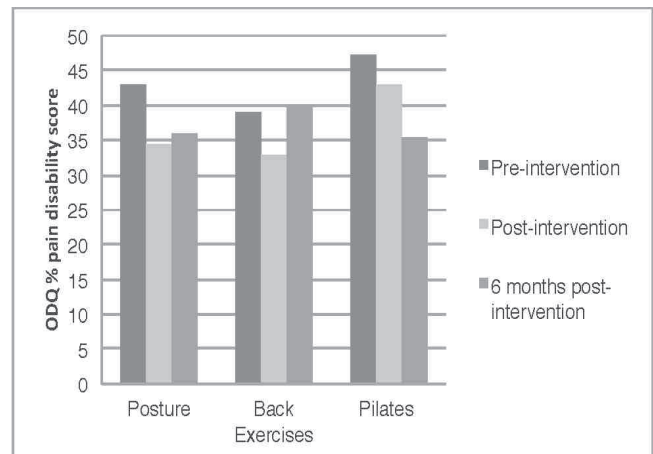


Figure 5: Percentage pain disability scores obtained pre-intervention, post-intervention and 6 months post-intervention using the ODQ.

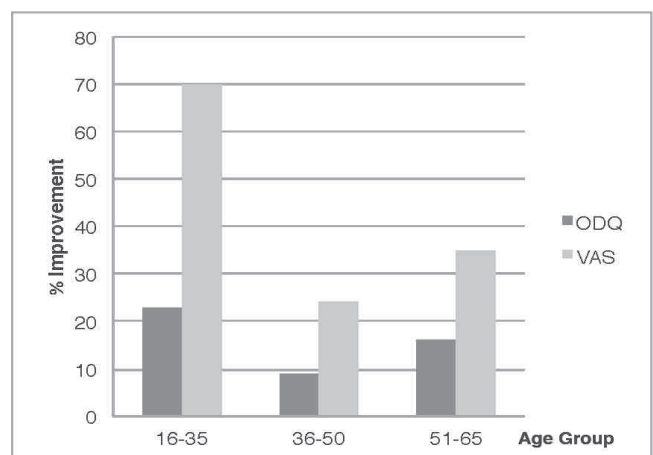


Figure 6: Percentage improvement measured by the ODQ and VAS across age groups.

3 Discussion

The aim of this RCT was to compare the effect of core training and traditional back exercises on a population with LBP. A pre-test/post-test design was implemented over a period of six weeks. Outcome measures consisted of ODQ and VAS scores. Six months after programme completion, a follow-up re-assessment of the outcome measures was carried out.

Pain and disability scores improved in all groups. At six weeks post-intervention, Group A showed the most significant improvements in both ODQ and VAS scores. However, results obtained after six months show that participants in Groups A and C had regressed to some extent. Group C scores had regressed close to pre-test levels. Group A scores were still much better than pre-intervention levels and were at par with Group B scores, which had continued to improve over the six months following the programme. Group A showed the highest percentage difference between six-week post-test VAS and ODQ scores. This group was

not provided with a HEP but participants were given four individual postural re-education sessions during the programme. Class/-group therapy is still a new concept for managing physiotherapy patients in Malta, who may not expect to be given exercise as a means to manage their pain (Sacco, 2003). This may have introduced a bias in favour of Group A. Participants in Group B who had undergone the core stability programme had better VAS outcomes than those in Group C, who followed the traditional back classes. The opposite was true with the ODQ results at six weeks. These findings are comparable to those of similar research studies in which the effects of core stability exercises were investigated (Macedo et al., 2009). The evidence is inconclusive as to which type of exercise is best and actually leans towards incorporating any general exercise programme to improve function (Pool-Goudzwaard et al., 1998; Danneels et al., 2002; Standaert et al., 2008). However, scores taken after six months showed that participants who had learned core stability exercises continued to improve while those who only had postural re-education regressed slightly. This led to them having similar six-month results. O'Sullivan et al. (1997) found that reduction of pain and functional disability levels which were statistically significant were maintained at 30 months in participants who had undergone core stability rehabilitation.

It is noteworthy that the participants had been randomly assigned to three groups without considering that age differences could affect outcomes. The distribution of ages between groups appears to relate to the initial results and may have introduced a bias in favour of Group A as age-related differences were striking. The 16-35-year-old participants showed the greatest improvement, which finding could be due to several factors such as healing occurring faster in younger populations. For socio-cultural reasons, the youth are more body and movement aware in Malta (Sacco, 2003), so they assimilate exercises more easily. Also, they were more likely to be cases of first incidence of LBP, which would be easier to treat than recurrent episodes, or chronic LBP (Liddle et al., 2003).

The 36-50-year-old participants showed the least improvement. This may be because the patients in this age group are likely to have had the greatest physical demands due to their lifestyles at work and at home, and also the least time for their own well-being. The 51-65-year age group had a better outcome than their younger counterparts, which may reflect the fact that they had more time for themselves and so were more likely to implement their HEP. It would have been a good idea to record compliance to the HEP with a diary. Another factor contributing to the results obtained for the older groups may have been chronicity of pain. If pain persists for more than 12 weeks, or the individual suffers three or more LBP episodes in one year, the resumption of normal daily life becomes increasingly difficult due to the development of chronic pain (Balague et al., 2007; Liddle et al., 2003). As time passes, it becomes increasingly difficult for medical intervention to break down maladaptive behaviours (Arnau, Vallano & Lopez, 2006) and increased pain perception, which can impact heavily on psychological and physical function (Stroud et al., 2000). Psychosocial factors can be a bigger predictor of chronicity than biological or physical factors (Woby, Urmston & Watson, 2007).

Several weaknesses have been identified in this study. The comparative aspect of the investigation was aimed at testing the hypothesis that one type of exercise programme may be more beneficial than the other. While planning the study, it was not envisioned that the results would reflect that it may be more beneficial to give individual attention rather than treat in groups. It may have been more valid to give Group A postural awareness classes so as to have a better correlation between the groups. Age-related influences on outcomes had not been considered but appeared to affect scores. The inclusion criteria were left open, with variables such as lifestyle, previous therapies and participation in activities that could have heightened body awareness not taken into consid-

eration. These factors could have impacted the results.

The current study was based on physiological processes so it did not explore psychosocial aspects of back pain, which may have important implications. It would have been useful to collect qualitative data to better understand the effects of pain in this population. It is important to value the sociocultural factors that may have affected the participants' perceptions of their pain and treatment. The authors noted that although patients were stating that they felt much better, the ODQ scores did not reflect that whilst the VAS scores did. The study would have been more valuable had there been a larger population sample or a longer timeline.

4 Conclusion

The results of this study imply that core stability exercises have a better effect on improving pain and disability over a longer period than traditional back exercises. All participants were also given postural and ergonomic advice. Interestingly, the control group who had postural re-education did as well as the core stability group. Age was not considered to be a factor when allocating participants into groups. However, the younger age group showed marked improvement with posture re-education and exercise. These results are clinically significant. Further longitudinal studies in this area are called for, with a recommendation that participants are followed up for at least one year post-intervention in order to find out which approach has better long-term outcomes.

5 Funding

This research has received no specific grant from any funding agency in the public, commercial or non-profit sectors.

References

- Akuthota, V. & Nadler, S.F. (2004) Core strengthening. *Archives of Physical Medicine and Rehabilitation*, 8, pp.86-92.
- Arnau, J.M., Vallano, A. & Lopez, A. (2006) A critical review of guidelines for low back pain treatment. *European Spine Journal*, 15, pp.543-553.
- Balague, F., Mannion, A.F., Pellise, F. & Cedraschi, C. (2007) Clinical update: low back pain. *The Lancet*, 369, pp.726-728.
- Beattie, F. & Maher, C. (1997) The role of functional status questionnaires for low back pain. *Australian Journal of Physiotherapy*, 43, pp.29-38.
- Boonstra, A., Schiphorst-Preuper, H., Reneman, M., Posthumus, J. & Stewart, R. (2008) Reliability and validity of the visual analogue scale for disability in patients with chronic musculoskeletal pain. *International Journal of Rehabilitation Research*, 31, pp.165-169.
- City Edge Physio Sydney Physiotherapy (2014) *Core Stability: what are the core muscles?* [Online] Available from: <http://www.cityedgephysio.com.au/core-stability.html>. [Accessed: 4th April 2014].
- Comerford, M.J. & Mottram, S.L. (2001a) Functional stability re-training: principles and strategies for managing mechanical dysfunction. *Manual Therapy*, 6, pp.3-14.
- Comerford, M.J. & Mottram, S.L. (2001b) Movement and stability dysfunction - contemporary developments. *Manual Therapy*, 6, pp.15-26.
- Cresswell, A.G. (1992) Responses of intra-abdominal pressure and abdominal muscle activity during dynamic trunk loading in man. *European Journal of Applied Physiology and Occupational Physiology*, 66, pp.315-320.
- Danneels, L.A., Coorevits, P.L., Cools, A.M., Vanderstraeten, G.G., Cambler, D.C., Witvrouw, E.E. & De Cuyper, H.J. (2002) Differences in electromyographic activity in the

- Multifidus muscle and the Iliocostalis Lumborum between healthy subjects and patients with sub-acute and chronic low back pain. *European Spine Journal*, 11, pp.13-19.
- Dickx, N., Cagnie, B., Parlevliet, T., Lavens, A. & Danneels, L. (2010) The effect of unilateral muscle pain on recruitment of lumbar Multifidus during automatic contraction: an experimental pain study. *Manual Therapy*, 15, pp.364-369.
- Fairbank, J.C., Couper, J., Davies, J.B. & O'Brien, J.P. (1980) The Oswestry low back pain disability questionnaire. *Physiotherapy*, 66, pp.271-273.
- Ferreira, P.H., Ferreira M.L., Maher, C.G., Herbert, R.D. & Refshauge, K. (2006) Specific stabilisation exercise for spinal and pelvic pain: a systematic review. *Australian Journal of Physiotherapy*, 52, pp.79-88.
- Ferreira, M.L., Ferreira, P.H., Latimer, J., Herbert, R.D., Hodges, P.W., Jennings, M.D., Maher, C.G. & Refshauge, K.M. (2007) Comparison of general exercise, motor control exercise and spinal manipulative therapy for chronic low back pain: a randomized trial. *Pain*, 131, pp.31-37.
- Granata, K.P. & Wilson, S.E. (2001) Trunk posture and spinal stability. *Clinical biomechanics*, 16, pp.650-659.
- Hanney, W.J., Kolber, M.J. & Beekhuizen, K.S. (2009) Implications for physical activity in the population with low back pain. *American Journal of Lifestyle Medicine*, 3, pp.63-70.
- Hayden, J.A., van Tulder, M.W., Malmivara, A. & Koes, B.W. (2005) Exercise therapy for treatment of non-specific low back pain. *Cochrane Database of Systematic Reviews*, 20(3).
- Hides, J.A., Richardson, C.A. & Jull, G.A. (1996) Multifidus muscle recovery is not automatic after resolution of acute, first episode low back pain. *Spine*, 21, pp.2763-2769.
- Hodges, P.W. (1999) Is there a role for Transversus Abdominus in lumbo-pelvic stability? *Manual Therapy*, 4, pp.74-86.
- Jansen, J., Weir, A., Denis, R., Mens, J., Backx, F. & Stam, H. (2010) Resting thickness of Transversus Abdominus is decreased in athletes with long-standing adduction-related groin pain. *Manual Therapy*, 15, pp.200-205.
- Jull, G.A. & Richardson, C.A. (2000) Motor control problems in patients with spinal pain: a new direction for therapeutic exercise. *Journal of Manipulative and Physiological Therapeutics*, 23, pp.115-117.
- Klaber Moffett, J., Torgersen, D., Bell-Syer, S., Jackson, D., Llewelyn-Phillips, H., Farrin, A. & Barber, J. (1999) Randomised controlled trial of exercise for low back pain: clinical outcomes, costs and preferences. *British Medical Journal*, 319, pp.279-283.
- Kopec, J.A. (2000) Motor control problems in patients with spinal pain: a new direction for therapeutic exercise. *Spine*, 25, pp.3110-3114.
- Krismer, M. & van Tulder, M. (2007) Low back pain (non-specific). *Best Practice and Research Clinical Rheumatology*, 21, pp.77-91.
- Liddle, S.D., Baxter, G.D. & Gracey, J.H. (2003) Exercise and chronic low back pain: what works? *Pain*, 109, pp.200-201.
- Long, D., BenDebba, M. & Torgensen, W. (1996) Persistent back pain and sciatica in the United States: patient characteristics. *Journal of Spinal Disorders*, 9, pp.40-58.
- Macedo, L.G., Maher, C.G., Latimer, J. & McAuley J.H. (2009) Motor control exercise for persistent, nonspecific low back pain: a systematic review. *Physical Therapy*, 89, pp.9-24.
- Mannion, A.F., Caporaso, F., Pulkovski, N. & Sprott, H. (2012) Spine stabilisation exercises in the treatment of chronic low back pain: a good clinical outcome is not associated with improved abdominal muscle function. *European Spine Journal*, 21, pp.1301-1310.
- Maher, C., Latimer, J. & Refshauge, K. (1999) Prescription of activity for low back pain: what works? *Australian Journal of Physiotherapy*, 45, pp.121-132.
- Mew, R. (2009) Comparison of changes in abdominal muscle thickness between standing and crook lying during active abdominal hollowing using ultrasound imaging. *Manual Therapy*, 14, pp.690-695.
- Norris, C. (1995) Spinal stabilisation: Muscle imbalance and the low back. *Physiotherapy*, 81, pp.127-138.
- O'Sullivan, P., Twomey, L., Allison, G., Sinclair, J., Miller, K. & Knox, J. (1997) Altered patterns of abdominal muscle activation in patients with chronic low back pain. *Australian Journal of Physiotherapy*, 43, pp.91-98.
- Panjabi M.M. (1992) The stabilizing system of the spine. Part II. Neutral zone and instability hypothesis. *Journal of Spinal Disorders*, 5, pp.390-397.
- Panjabi M.M. (2003) Clinical spinal instability and low back pain. *Journal of Electromyography and Kinesiology*, 13, pp.371-379.
- Pool-Goudzwaard, A.L., Vleeming, A., Stoeckart, R., Snijders, C.J. & Mens, J.M.A. (1998) Insufficient lumbopelvic stability: a clinical, anatomical and biomechanical approach to 'a-specific' low back pain. *Manual Therapy*, 3, pp.12-20.
- Reeve, A. & Dilley, A. (2009) Effects of posture on the thickness of Transversus Abdominus in pain-free subjects. *Manual Therapy*, 14, pp.679-684.
- Richardson, C.A., Snijders, C.J., Hides, J.A., Damen, L., Pas, M.S. & Storm, J. (2002) The relation between the transverse abdominis muscles, sacroiliac joint mechanics, and low back pain. *Spine*, 27, pp.399-405.
- Sacco, M. (2003) Beliefs and attitudes towards physical exercise amongst the Maltese population. Unpublished research paper. UK: Loughborough University.
- Sant' Angelo, O. (2000) The value of hydrotherapy in the rehabilitation of low back pain with radicular involvement in the lower limbs. Unpublished B.Sc. (Honours) dissertation. Malta: University of Malta.
- Standaert, C.J., Weinstein, S.M. & Rumpeltes, J.R. (2008) Evidence-informed management of chronic low back pain with lumbar stabilization exercises. *The Spine Journal*, 8, pp.114-120.
- Stratford, P.W., Riddle, D.L. & Binkley, J.M. (2001) Assessing for change in a patient's status: a review of current methods and a proposal for a new estimate true change. *Physiotherapy Canada*, 53, pp.175-181.
- Stroud, M. W., Thorn, B. E., Jensen, M. P. & Boothby, J. L. (2000) The relation between pain beliefs, negative thoughts and psychosocial functioning in chronic pain patients. *Pain*, 84, pp.347-352.
- Urquhart, D.M., Hodges, P.W., Allen, T.J. & Story, I.H. (2005) Abdominal muscle recruitment during a range of voluntary exercises. *Manual Therapy*, 10, pp.144-153.
- Vianin, M. (2008) Psychometric properties and clinical usefulness of the Oswestry Disability Index. *Journal of Chiropractic Medicine*, 7, pp.161-163.
- Vleeming, A., Pool-Goudzwaard, A.L., Stoeckart, R., van Wingerden, J.P. & Snijders, C.J. (1995) The posterior layer of the thoracolumbar fascia. *Spine*, 20, pp.753-758.
- Wallwork, T.L., Stanton, W.R., Freke, M. & Hides, J.A. (2009) The effect of chronic low back pain on size and contraction of the lumbar Multifidus muscle. *Manual Therapy*, 14, pp.496-500.
- Williams, C.M., Maher, C.G., Hancock, M.J., McAuley, J.H., McLachlan, A.J., Britt, H., Fahridin, S., Harrison, C. & Latimer, J. (2010) Low back pain and best practice care. *Archives of Internal Medicine*, 170, pp.271-277.
- Williamson, A. & Hoggart, B. (2005) Pain: a review of three commonly used pain rating scales. *Journal of Clinical Nursing*, 14, pp.798-804.
- Withers, G. & Stanko, E. (2004) Matwork Level 1 Manual. London: The Australian Physiotherapy and Pilates Institute.

- Williamson, A. & Hoggart, B. (2005) Pain: a review of three commonly used pain rating scales. *Journal of Clinical Nursing*, 14, pp.798-804.
- Woby, S.R., Urmston, M. & Watson, P.J. (2007) Self-efficacy mediates the relation between pain-related fear and outcome in chronic low back pain patients. *European Journal of Pain*, 11, pp.711-718.

THE IMPACT OF PROVIDING CARE TO RELATIVES WITH A SEVERE MENTAL ILLNESS: THE CAREGIVERS' EXPERIENCE

Michelle Fenech¹, Josianne Scerri²

¹Community Mental Health Services, Department of Health, Malta

²Department of Nursing, Faculty of Health Sciences, University of Malta, Msida, Malta

Abstract. The purpose of this study is to explore the impact on Maltese family caregivers in providing care to a relative with a severe mental illness (SMI). Purposive sampling and in-depth semi-structured interviews were conducted with seven caregivers (four females and three males). The interview data were transcribed verbatim and analysed using Interpretative Phenomenological Analysis (IPA). Four themes emerged from the analysis, namely Range of Emotions, Increased Responsibility, Toll on Physical Health and Change in Lifestyle. This study demonstrates that the caregivers experienced a range of negative emotional and physical responses. Changes in their lifestyle were made, as caregivers provided complete care to their ill relative, as well as ensured that they came to no harm. Female participants tended to self-blame, attributing behavioural problems in the ill relative to their actions. Parent caregivers experienced distress regarding care provision in the eventuality that they suffered from ill health or death. Although parents acknowledged the support provided by siblings, they strived to cope by themselves, as siblings were perceived to have responsibilities of their own. The role of mental health professionals in such a scenario includes the understanding of the unique perceptions of family caregivers, as well as targeting any dysfunctional perceptions. Furthermore, caregivers should be made aware of entities that provide support within the community setting. Sufficient resources also need to be provided to ensure effective community support to family caregivers.

Keywords: severe mental illness, family caregivers, qualitative research, interpretative phenomenological analysis

1 Introduction

Severe mental illnesses (SMIs) such as schizophrenia, bipolar disorder and major depression are often devastating, having a significant impact on both patients and their families (Rose, Mallinson & Walton-Moss, 2002). The three aforementioned SMIs are included within the list of six leading causes of disabilities (National Alliance on Mental illness, 2013).

Due to the deinstitutionalisation process, an increasing number

of people with SMIs are living within the community (Vecchio, Stevens & Cybinski, 2008). It is estimated that 90% of individuals with a SMI receive ongoing practical and emotional support from family caregivers (Ostman & Hansson, 2000). While being the primary source of support, caregivers also strive to make sense of the mental illness (Rose et al., 2002). Such demands may affect the caregiver in a number of ways, amongst which emotionally, physically, financially and psychosocially (Idstad, Ask & Tambs, 2010). In fact, one-third to one-half of caregivers suffer significantly more from psychological distress and display a higher incidence of mental ill health when compared to the general population (Shah, Wadoo & Latoo, 2010). The responsibilities of caregiving, added to the pressures related to maintaining a family and an occupation, can lead to stress and burnout (Glendy & Mackenzie, 1998). Being highly stressed and burdened not only leads to a detrimental effect on the caregivers' and ill relatives' health, but may even influence the caregiver to abandon care (Caqueo-Urizar, Gutierrez-Maldonado & Miranda-Castillo, 2009). Additionally, the challenges that these caregivers endure in providing constant support to an ill relative is sometimes unrecognized and/or taken for granted (Jeon & Madjar, 1998). Conversely, while most empirical studies document the burden associated with caring for a person with a severe mental illness, Aschbrenner et al. (2011) have demonstrated the positive aspects of caring for these persons, citing aspects such as personal growth and gratification.

According to Petrie, Broadbent and Kydd (2008), relatively few qualitative studies have explored the "underlying dimensions of mental illness beliefs and more research could be useful in this area" (p.561). The present study aims to contribute to the extant literature by exploring the perspectives of Maltese caregivers regarding the impact of providing care to relatives with a severe mental illness. Such information may be of assistance when formulating local interventions that are effective in targeting the expressed needs of this group.

2 Methods

2.1 Participants

A qualitative phenomenological approach was used to provide an in-depth exploration of the unique experiences of the study participants. Purposive sampling was employed and family caregivers were recruited if they a) cared for a person who had schizophrenia, bipolar disorder or depression either continuously or intermittently over a period of three years (thus ensuring that the patient did have a SMI) b) had provided support to the ill relative for more than six months, and c) were aged 18 years and over.

The sample consisted of seven caregivers (four women and three

Correspondence to: Michelle Fenech
(michelle.fenech@gov.mt)

Received: 02.03.2014 - Revised: 07.04.2014 - Accepted: 08.04.2014 - Published: 24.04.2014
© 2014 The authors

men) who provided care to their relatives with a SMI. The caregivers consisted of four parents, one spouse and two siblings, with the most common role being that of the mother of the ill relative. Two of the caregivers were not living in the same household as the relative having a SMI but were actively involved in their relatives' care. The participants, mean age was 63 years, with an age range of 61-84 years. The mean length of time for care provision to the ill relative was 12 years. The mean age of the relative with SMI was 49 years. Three of the ill relatives had schizophrenia while two had bipolar disorder and depression respectively.

2.2 Data Collection

Semi-structured face-to-face interviews were conducted in the participants' home setting. The interview schedule consisted of two sections. The first part enabled the collection of demographic data on both the participants and their relatives with a SMI. The second part consisted of seven open-ended questions, which explored the perceived impact of caring for a person with a SMI, the coping strategies used and their satisfaction with support services available to their ill relative and themselves. Two pilot interviews were conducted with two female caregivers of persons with SMI. The interviews lasted approximately 50 minutes and the participants encountered no difficulties in completing them. The actual study interviews were then conducted with the participants and lasted about 45 minutes.

2.3 Ethical Issues

Approval to implement the study was obtained from the University of Malta Research Ethics Committee. The aim and nature of the research study was first explained to potential participants by a senior member of staff from the Community Mental Health outreach team. This was done to ensure that the caregivers did not feel coerced to participate. An information letter explaining the purpose of the study and highlighting caregivers' voluntary participation and their right to withdraw from the study at any point was provided. Written consent was obtained from every participant. Those caregivers who agreed to participate were contacted by the first author and additional queries were addressed. A pseudonym was assigned to every caregiver and all information collected was stored in a locked cabinet, to safeguard participant confidentiality. A psychologist was also available to provide support, in the event that any participant experienced distress during the interview.

2.4 Analysis

Interview transcripts were analysed using Interpretative Phenomenological Analysis (IPA), using the procedures outlined by Smith, Flowers and Larkins (2009). Accordingly, the first analytic stage involved the audio-recorded interviews being transcribed verbatim and the transcriptions re-read to get a sense of the participants' experience. The second step involved reading and noting down significant points related to the caregivers' experiences. These points were then used to document emergent themes. The connections among these were identified to formulate clusters of themes.

3 Results

Four major themes incorporating aspects related to the impact of providing care to relatives with SMI emerged, namely Range of Emotions, Increased Responsibility, Toll on Physical Health and Change in Lifestyle. Selected excerpts from the interview transcripts are provided to illustrate these themes. Text within square brackets represents clarifications provided by the authors.

3.1 Range of emotions

All caregivers described the range of emotions experienced when caring for a relative with a SMI. These emotions included feelings of loss, sadness, excessive worry, guilt, frustration and burnout. The sadness experienced was intensive and caregivers yearned for the past, as described in the following excerpts.

"I am hurt because I want him the way he used to be, just the way he used to be before, that he walks properly at least. This is because now depression has set in and he has ended up physically like this ... I wish that all my troubles would just disappear and everything returns to how it was before." (Daniela)

"Yes, in the past, everything ... in the past you used to see him always active, he would socialise and involve himself in everything, he would go around, as proud as a king, but then this [the disease] struck him." (Anne)

Participants stated that living with a relative having a SMI poses problems which are not transient in nature, due to changes throughout the course of the illness. Consequently, participants perceived that they could never lead a 'normal' life and often searched for a meaning to their situation.

"Sometimes I get angry, honestly, I get angry and ask why. But why did this happen to me?" (Daniela)

Furthermore, caregivers who were parent grieved at lost expectations they held for their ill son or daughter.

"... this week I was thinking about my son and I was saying to myself 'Were he not depressed, he would be married by now.'" (Anne)

Male caregivers expressed more negative emotions towards caring for a person with mental illness in comparison to their female counterparts. They recurrently stated that they were facing difficulties associated with their relatives' behaviour and perceived being held accountable by health professionals when there was no improvement in their relative's mental health state. The following excerpt demonstrates the frustration experienced by Steve.

"She [person with mental illness] wouldn't be aware of what she is doing, and it is of no use getting angry ... but it's only natural to get angry and sometimes I get furious and start swearing, that's how it goes, you know."

Conversely, the female caregivers blamed themselves for triggering certain behavioural responses in their relative, as exemplified in Joyce's quote.

"Honestly, when I'm tired, I get anxious and I snap at her, and she senses how I feel and retaliates back in an odd manner. That's when she alarms me, because I ask myself 'Why does she act like this?' Then I say to myself that I must have been the cause, I triggered her behaviour."

Participants also explained how the stigma related to mental illness caused them much suffering. In fact, Joe described feeling hurt at seeing a family member suffer due to the stigma of mental illness at his workplace.

"Once he [relative with mental illness] was treated at the psychiatric hospital ... on returning to work his colleagues thought he would do something irrational and they were scared that he would commit suicide."

Moreover, two family caregivers reported that their relatives were frequently ridiculed and watched with curiosity.

"If we go somewhere, they will just stare at him because he moves his leg or arm like this. My son is physically not the same as he used to be. Even the fact that saliva drips from his mouth, it really hurts me when people laugh at him. I'm aware of their behaviour but he doesn't mind, unlike me." (Daniela)

In conclusion, all family caregivers expressed some type of emotional turmoil, as demonstrated by Karl who, however, explained what gives him the will to live.

"... because sometimes that's what keeps me alive, because sometimes I feel like committing suicide, but those kids come to my mind [pointing towards his three grandchildren]."

3.2 Increased responsibility

Participants who were parents worried about who would take over their role in the future and how their relative would cope without their assistance. Parents were strongly aware that providing care to a relative with a severe mental illness took up a substantial amount of their own time and energy. They also considered the siblings of a person with a SMI as having their own personal needs and life challenges. For this reason, they felt that it was unfair to impose such a responsibility on them. They viewed their own responsibility to provide care as an obligation.

"It affects me in the sense that I am unable to relax, that I neglect my personal needs and that if she needs anything, she gets priority even if it means sacrificing my own needs to satisfy hers." (Joyce)

Furthermore, whilst Anne was appreciative of the enormous support and help that she received from her children in providing care, Steve described his frustration at having to care for an ill relative on his own, as demonstrated in the following excerpt.

"Some of them [other siblings] work, some own shops, some are married and have to take care of their homes, therefore they have a lot of responsibility and so I have to carry the burden all by myself."

Participants described their role in providing complete care to their relative, such as preparing food, shopping, cleaning, providing transportation and accompanying them to appointments. Steve described the role change that happened in his life as follows.

"Before she got ill, I used to go to work, and she prepared things for me, for example the clothes, the uniforms, and once I was back home she used to prepare something for dinner, nothing elaborate ... Nowadays, I do everything myself. I never knew how to do any house chores but then I had to learn to do everything."

Furthermore, the caregivers expressed satisfaction that symptoms associated with the SMI had stabilised and were well-controlled by treatment. Yet, they were concerned regarding various side effects related to their treatment. As expressed by Karl:

"She's a vegetable, lethargic ... when she has to walk, she does so without any urgency and I think it is the medication she's on because she wasn't like this when she was not depressed. She used to run, not walk. But now ..."

Karl continued to describe the need to continually supervise the ill relative so as to ensure that she does not harm herself.

"Sometimes, she has even left the key inserted inside the key-hole of the front door. It has become commonplace for her to be absent-minded, you can't trust her to stay unattended. For instance, she could very easily switch on the oven and then go to sleep."

3.3 Toll on Physical Health of Caregiver

The majority of caregivers expressed their concern at the fact that although their ill relative was capable of carrying out basic activities of daily living, s/he still relied heavily on the caregiver's assistance. This dependency was mainly attributed to the relative with a SMI demonstrating a lack of willingness to do work. Furthermore, as described by Daniela, the caregiver gets accustomed to this behaviour after a period of time and accepts it. However, the constant stress and strain of caregiving is likely to have an adverse impact on caregivers' health, as described by Anne:

"I am feeling more and more tired. In the evenings, I have to go to bed earlier to rest because I do need to rest, one really needs to ... , even if one was made of steel, even if you don't have so much to worry about, let alone with all my problems."

Steve expressed similar concerns.

"She has honestly got me miserable, I never know where I stand with her and I suffer from heartburn on a daily basis caused by the anxiety I experience."

3.4 Change in Lifestyle

All the participants elaborated on how their lifestyle was affected. Two participants described social restrictions and feelings of stress, as demonstrated by Kim's response.

"I go out but I get bored. When I receive a call, I tense up thinking that something has happened to my son...last time, I went out to play bingo, my youngest son was asleep, and instead of switching off the oven, I left it on. Thank God a thought passed my mind and I returned home because I might have killed my son and burnt the house down."

Furthermore, some participants felt that they were only able to relax when their ill relative was being supervised, as exemplified by Joyce:

"I try to keep myself active by going for a walk or an outing. I try to rest. However, to be honest, I only relax when there's someone else to care for her. That's the only way to relax and feel better."

Other participants explained that disruption of life plans was also common, with some having had to leave their job, with the consequent effect of this on their standard of living.

"...in the past, when I used to work, I never bothered when it came to spending. I used to tell her 'Go now and do the shopping and do not worry at all', because I earned enough money, but then she got ill and things changed. I couldn't keep my job. Nowadays, I have to be very careful on how I spend." (Steve)

In fact, financial strain was an issue frequently mentioned by caregivers, even when the relative was not living in the same household. Reportedly, it was caused by the relatively poor financial situation of the ill relative due to unemployment, as explained by Steve:

"...the benefits she receives do not always cover her needs. There are instances when she goes for months and doesn't require any financial help, however then comes a month when she needs frequent visits to the doctor. Many times I take meals over to her ... that's all out of my own pocket. I don't ask her to pay."

4 Discussion

As deinstitutionalisation has gained momentum, increasing numbers of researchers have focused their research on the experiences of persons with a mental illness and their caregivers (Maurin & Boyd, 1990). To the authors' knowledge, no study has explored the lived experiences of Maltese caregivers who, along with their ill relative, were both receiving support from the community outreach team. The present study shows that providing care to a person with a SMI has an impact on the life of the caregiver. This impact can be categorised into experiencing a range of negative emotions, suffering a toll on one's physical health, feeling the need to make lifestyle changes and assuming an even greater amount of responsibility than before. These experiences may arise due to the increased needs of persons with SMI for day-to-day care and supervision (Chang & Horrocks, 2005). However, an additional contributing factor could be the experience of financial hardships (due to loss of income or increased health-related expenditure), as cited by participants in this study.

Moreover, those caregivers who were parents expressed concern on who would eventually replace them in providing care and how their ill relative would cope without their assistance. They expressed their appreciation for the support received from siblings and stated that this support helped them cope with the situation. Caregivers who were parents also expressed preoccupation with shifting the responsibility of care from themselves onto the ill relatives' siblings, as the latter had their own problems and commitments. These interesting dynamics within the family structure may represent the role of the family in Southern European countries as a network of micro-solidarity as well as in assisting coping (Moreno, 2002). In one case, a sibling (who lived on his own) expressed resentment at the fact that he was left alone to

care for his ill relative. The onus of care was placed on him as he was perceived to have fewer responsibilities and commitments than his other siblings. Consequently, it is important that family caregivers are made aware of a number of entities in Malta that offer long-term residential care for individuals having a SMI. For instance, one finds community homes and rehabilitation facilities that make use of care worker services provided by the local psychiatric hospital and/or non-governmental organisations. The question of availability of enough resources in this regard prevails, and the need for additional support as identified by studies such as the present one are indicated. Further research that explores family dynamics in caring for persons with a mental illness within a local context is required.

In the present study, the experiences of caregivers seemed to differ by gender. For instance, female participants tended to resort more to self-blame, attributing their actions as triggers for behavioural problems in their ill relative. This could be due to experiencing greater psychological distress, which has been associated with having negative thoughts and interpreting experiences in a negative manner (Burger, 1997).

Burnout was reported by all caregivers living with an ill relative, irrespective of their diagnostic group. Furthermore, caregivers expressed feeling a greater subjective burden with the patients' loss of functionality. The latter may have affected the caregivers due to their involvement in the day-to-day care of the ill relative, with many family caregivers reported to have to give up/decrease social activities (Samele & Manning, 2000), while others may take time off from paid work or may decide not to work full-time. Thus, caregivers may perceive that they are kept from self-actualising and developing their full potential due to their caregiving role (Ogilvie, Morant & Goodwin, 2005).

In this study, participants also described how stigma related to mental illness denied their relatives full integration into the community. Furthermore, due to stigma, situations of social exclusion, loss of friends and reduction of job opportunities were also reported. In fact, patient unemployment was recognised as the main factor that contributed to the caregivers' financial strain, even when the ill relative was not living in the same household. Other studies (e.g. Selolilwe, 2006) have also documented that caregivers experience the stigma of mental illness. Effective anti-stigma interventions are needed to empower caregivers and the person with mental illness to challenge both self-stigmatisation and discriminatory behaviour, and to target attitudes which are not conducive to social integration in the community (Buizza et al., 2007).

5 Strengths and Limitations

A limitation of the present study was that participants were all in the mid- or late adulthood phase (being 61 years and older). However, caregivers of persons with severe mental illnesses can be of various ages. Thus, there is the need to explore the experiences of family caregivers falling under other age categories.

The study has a number of strengths which include a) maintaining an audit trail throughout the process of analysis b) presenting excerpts from the interview transcripts to strengthen the reader's understanding regarding the process of interpretation c) conducting interviews by the same researcher to ensure consistency d) validating the analysis conducted by the first author by two other researchers and e) maintaining a reflexive stance throughout the study due to the professional roles of the researchers.

6 Recommendations

The role of the mental health worker is of importance in providing care and support not only to the ill relative, but also to other family members such as caregivers. This study also contributes to the extant literature, by demonstrating that support

provided should also target caregivers whether they live in the same residence as the ill relative or not. Care interventions can be conducted at an individual level and through the development of programmes which provide information regarding the illness, treatment, aspects of care, support services available and how to access them. The role of the caregiver in such an intervention should not be that of a passive recipient of information, but rather an active one, where personal experiences and the uniqueness of each caregiver's situation are acknowledged. Formulated interventions and care plans should then target the unique needs specific to each patient - carer dyad. In this way, one may reduce feelings of burden in caregivers while promoting personal growth.

7 Conclusion

Due to deinstitutionalisation, society and the health care system depend on the participation of families in assuming health care responsibilities of ill relatives. At the same time, however, they often "fall short of providing family caregivers with the recognition and support they need and often fail to acknowledge and make best use of the expertise family caregivers develop through their ongoing experience" (Jeon & Madjar, 1998, p.705). In fact, this study has demonstrated that family caregivers experienced the burden of care, irrespective of whether their mentally ill relative lived with them or not. Consequently, interventions that target the unique needs of these caregivers within a community setting are required.

8 Acknowledgements

We would like to thank all the caregivers who gave their time to take part in this study and who shared their experiences with us. We would also like to thank Mr Martin Ward and Ms Paulann Grech from the Faculty of Health Sciences, University of Malta, for their feedback on an earlier draft of this paper.

9 Funding

This research has received no specific grant from any funding agency in the public, commercial or non-profit sectors.

References

- Aschbrenner, K.A. Greenberg, J.S. Allen, S.S. & Seltzer, M.M. (2010) Subjective burden and personal gains among older parents of adults with serious mental illness. *Psychiatric Services*, 61 (6), pp.605-611. doi:10.1176/appi.ps.61.6.605.
- Buizza, C., Schulze, B., Bertocchi, E., Rossi, G., Ghilardi, A. & Pioli, R. (2007) The stigma of schizophrenia from patients' and relatives' view: a pilot study in an Italian rehabilitation residential care unit. *Clinical Practice and Epidemiology in Mental Health*, 3, pp.23-30. doi:10.1186/1745-0179-3-23.
- Burger, J.M. (1997) *Personality*. New York: Brooks/Cole.
- Caqueo-Urizar, A., Gutierrez-Maldonado, J. & Miranda-Castillo, C. (2009) Quality of life in caregivers of patients with schizophrenia: a literature review. *Health and Quality of Life Outcomes*, 7, p.84-88. doi:10.1186/1477-7525-7-84.
- Chang, K.H. & Horrocks, S. (2005) Lived experiences of family caregivers of mentally ill relatives. *Journal of Advanced Nursing*, 53(4), pp.435-443.
- Glendy, S.H. & Mackenzie, A.E. (1998) Caring for relatives with serious mental illness at home: the experience of family carers in Hong Kong. *Archives of Psychiatric Nursing*, 7(5), p.288-294.
- Idstad, M., Ask, H. & Tambs, K. (2010) Mental disorder and caregiver burden in spouses: the North-Trondelag health study. *BioMed Centre*, 10, pp.516-522. Available from: <http://www.biomedcentral.com/1471-2458/10/516>. [Ac-

- cessed 9th May 2011].
- Jeon, Y. & Madjar, I. (1998) Caring for a family member with chronic mental illness. *Qualitative Health Research*, 8(5), pp.694-706.
- Maurin, J.T. & Boyd, C.B. (1990) Burden of mental illness on the family: a critical review. *Archives of Psychiatric Nursing*, 4(2), pp.99-107.
- Moreno, L. (2002) *Mediterranean Welfare and 'Superwomen'*. Available from: <http://digital.csic.es/bitstream/10261/1496/1/dt-0202.pdf>. [Accessed 23rd February 2014].
- National Alliance on Mental Illness (2013) *Mental illness facts and statistics*. Available from: <http://www.namigc.org/wp-content/uploads/2013/01/MentalIllnessFactSheet-July-2013.pdf>. [Accessed 31st January 2014].
- Ogilvie, A.D., Morant, N. & Goodwin, G.M. (2005) The burden of informal caregivers of people with bipolar disorder. *Bipolar Disorder*, 7, pp.25-32.
- Ostman, M. & Hansson, L. (2000) Family burden and care participation: a test-retest reliability study of an interview instrument concerning families with a severely mentally ill family member. *Nordic Journal of Psychiatry*, 54, pp.327-332.
- Petrie, K., Broadbent, E. & Kydd, R. (2008). Illness perceptions in mental health: issues and potential applications. *Journal of Mental Health*, 17(6), pp.559-564.
- Rose, L., Mallinson, R.E. & Gerson, L.D. (2006) Mastery, burden, and areas of concern among family caregivers of mentally ill persons. *Archives of Psychiatric Nursing*, 20(1), pp.41-51. doi:10.1016/j.apnu.2005.08.009.
- Rose, L., Mallinson, R.K. & Walton-Moss, B. (2002). A grounded theory of families responding to mental illness. *Western Journal of Nursing Research*, 24(5), pp.516-536.
- Samele, C. & Manning, N. (2000) Level of caregiver burden among relatives of the mentally ill in South Verona. *European Psychiatry*, 15, pp.196-201.
- Selolilwe, E.S. (2006). Experiences and demands of families with mental ill people at home in Botswana. *Journal of Nursing Scholarship*, 38(3), pp.262-268.
- Shah, A.J., Wadoo, O. & Latoo, J. (2010) Psychological distress in carers of people with mental disorders. *British Journal of Medical Practitioners*, 3(3), pp.327-334.
- Smith, J. A., Flowers, P. & Larkins, M. (2009) *Interpretative Phenomenological Analysis: Theory, methods and research*. London: Sage Publications.
- Vecchio, N., Stevens, S. & Cybinski, P. (2008) Caring for people with a mental disability at home: Australian carers' perceptions of service provision. *Community Mental Health Journal*, 44, pp.125-134. doi:10.1007/s10597-007-9111-x.

PSYCHOPHYSIOLOGY OF RESPIRATORY DISEASE: CLINICAL CONSIDERATIONS FOR THE ADVANCED PRACTICE NURSE

Sarah Miller¹, Laura Owens¹, Tracy Collins¹, Erin Silverman²

¹University of Memphis, Loewenberg School of Nursing, Memphis, TN, USA

²University of Florida, Department of Physiological Sciences, Gainesville, FL, USA

Abstract. The purpose of this article is to describe the psychophysiology of dyspnea in chronic obstructive pulmonary disease (COPD), identify the unique impact of respiratory disease on the female patient, and discuss the relationship of anxiety and depression in disease manifestation. Current COPD assessment and treatment guidelines published by the United States Department of Health and Human Services, the World Health Organization as well as the National Institute for Health and Care Experience (NICE) will be presented along with implications for the Advanced Practice Nurse (APN). Practitioners treat COPD patients with advanced physiological complications along with psychological comorbidities that worsen the disease perception and progression. Therefore, a recommendation will be made to integrate assessment and evaluation of psychological comorbidities in COPD patients, with particular consideration given to the female patient. Utilizing a holistic, integrated treatment plan will serve to enhance patient care, alleviate disease burden and impact overall quality of life in the patient with COPD.

Keywords chronic obstructive pulmonary disease (COPD), dyspnea, psychophysiology, depression, anxiety, gender

1 Introduction

Chronic respiratory diseases, such as chronic obstructive pulmonary disease (COPD), are the third leading cause of death in America, behind heart disease and cancer (Centers for Disease Control and Prevention, United States Department of Health and Human Services (CDC), 2012). COPD is a term that refers to a large group of deteriorating respiratory diseases that interfere with breathing due to airway obstruction (American Lung Association (ALA), 2013a). COPD limits quality of life (QOL) by preventing or limiting every day activities such as working, activities requiring physical exertion, household chores and participation in family activities (ALA, 2013a). Consequently, individuals with COPD frequently report lower than normal health-related QOL, while also demonstrating increased levels of anxiety and depression (Arne et al., 2009), along with decreased capacity for exercise,

decreased physical activity levels and non-completion of self-care activities of daily living (ADLs) (Pitta et al., 2006). HRQoL encompasses the more subjective influence of the disease on the quality of life and how overall QOL in turn affects personal mental and physical health (Ketelaars et al., 1996; CDC, 2000). The deleterious effects of COPD on QOL can be partially attributed to the associated sensation of difficulty breathing, or dyspnea (Burgel et al., 2013). Dyspnea has been rated as one of the most significant contributors to diminished HRQoL in patients with COPD (Nishimura et al., 2008).

This article utilizes available psychophysiological evidence to provide Advanced Practice Nurses (APNs) an overview of the need for assessment of psychological comorbidities in patients with chronic obstructive pulmonary disease (COPD) in order to better manage patient outcomes and improve quality of life. Further, this article will describe the role dyspnea plays in perception of health-related quality of life (HRQoL), the unique psychological comorbidities often noted in female COPD patients, current practice guidelines related to COPD care, and implications for the Advanced Practice Nurse (APN).

2 Dyspnea

To fully examine the effects of dyspnea on the patient, it is first necessary to understand the neurological processing of negative (aversive) respiratory sensations. During a COPD exacerbation, the respiratory system is presented with a 'load' that disrupts normal bodily homeostasis and must be physically overcome or adapted to. An example of a respiratory load is an increase in lower airway resistance, accumulation of mucus, or bronchial spasms. There are two primary cognitive components to the perception of increased respiratory loads: discriminative and affective (Davenport & Vovk, 2009). Initially, the brain discriminates the respiratory sensation through a complex interaction among multiple respiratory afferent groups and brainstem centers that control respiratory motor drive (Davenport & Vovk, 2009). This is the somatosensory event related to cognitive awareness of breathing disruption.

During the following affective phase, the individual qualifies how he or she feels as a result of the aversive respiratory event and if the sensation is unpleasant. In experimental settings, subjects seldom report unpleasant evaluations of short or single breath loads, but this changes with persistent dyspnea and results in increases in unpleasant affective evaluation (Alexander-Miller & Davenport, 2010). Extremely large resistive loads have been shown to induce fear of suffocation and increased discomfort (Pappens, Smets, Van den Bergh & Van Diest, 2012b). The nature of this affective phase is highly variable across individuals.

Correspondence to: Sarah Miller (snmiller2@memphis.edu)

Received: 31.01.14 - Revised: 16.03.14 - Accepted: 22.03.14 -

Published: 24.04.14

© 2014 The authors

Females tend to magnify their perception of extended respiratory loads (Alexander-Miller and Davenport, 2010), while highly anxious subjects have reduced respiratory sensory gating leading to altered perception (Chan et al., 2012).

Due to the progressive and chronic nature of COPD, patients often experience sustained, undesirable respiratory sensations that lead to discomfort and altered perception of their breathing. These sensations vary by individual, based upon gender, previous experiences, and levels of anxiety (Alexander-Miller & Davenport, 2010; Chan et al., 2012).

Individuals who report extreme "fear of suffocation" experience increased physical discomfort associated with dyspnea (Pappens et al., 2012a). These individuals tend to place greater strain on respiratory muscles by increasing ventilatory response to loads. This added physiological strain results in a mutual reinforcement of both fear and maladaptive breathing (Pappens et al., 2012b). Some individuals react with extreme fear to respiratory stimulation, such as increased carbon dioxide, which can trigger a hypersensitive fear network (Nardi, Freire & Zin, 2009; Sinha, Papp & Gorman, 2000). Studies have shown that COPD patients experience restricted ability to perform ADLs and this fear of dyspnea leads to avoidance of activities (Janssens et al., 2011; Mikkelsen et al., 2004; Ng et al., 2007; Yohannes, Baldwin & Connolly, 2000; Zoeckler et al., 2012; Zoeckler et al., 2014).

Essentially, individuals with chronic respiratory disease learn to fear disease exacerbations, specifically dyspnea (Janssens et al., 2011). This fear is self-potentiating and eventually becomes limiting as individuals avoid activities (such as social events, engaging in physical activity or ADLs, or even leaving their home), potentially contributing to further social isolation, physical deconditioning and reduced QOL (Thomas, Decramer & O'Donnell, 2013).

3 Psychological Comorbidities

Furthering the physiological detrimental effects and morbidity of chronic respiratory disease is the added burden of psychological comorbidities. Depression and anxiety are comorbidities frequently associated with COPD (Kunik et al., 2005), with prevalence estimates generally higher than other advanced chronic diseases (Maurer et al., 2008). These psychological comorbidities associated with COPD are often left untreated or under-treated (Cully et al., 2006), leading to decreased QOL, increased rates of hospitalization, and reductions in treatment adherence (Stapleton et al., 2005).

It is still unclear what the exact relationship direction is between depression and anxiety in COPD, but a recent study found that depression adversely affects COPD prognosis, resulting in increased exacerbation risk and possibly death (Atlantis et al., 2013). Management of depression and anxiety may improve QOL while increasing capacity for physical activity and treatment adherence (Stapleton et al., 2005; Light et al., 1985). COPD has also been shown to contribute to the emergence and exacerbation of psychiatric disorders such as depression and anxiety and may decrease treatment adherence by diverting cognitive resources (Turan, Yemez & Itil, 2013).

4 Unique impact on the female patient

Female COPD mortality has been on a steady rise and has quadrupled since 1980 (ALA, 2013b). Since 2000, COPD has claimed more female than male lives, with women making up 53% of COPD deaths (CDC, 2012). The impact of COPD on women in particular is understudied, despite evidence showing gender-based differences in treatment response (Haave, Skumlien & Hyland, 2008; Varkey, 2004).

COPD more adversely affects women than it does men, and women with COPD have higher levels of anxiety and depression (Di Marco et al., 2006). The quality of life for women is impacted earlier in life than their male counterparts with similar disease severity (de Torres et al., 2006; Naberan et al., 2012). This may be attributed to increases in subjective feelings of shortness of breath, which has a strong correlation for QOL (van Haren-Willems & Heijdra, 2010). Women show more variance in reports of symptom intensity (particularly dyspnea) than males with similar disease progression and also have lower exercise capacity (de Torres et al., 2006). An in-depth 2014 study by Raheison et al. found significant gender differences impacting the female patient, particularly from chronic sputum. Females reported lower QOL than men and were more impacted by chronic cough, despite lower GOLD-staged disease severity (Raheison et al., 2014). The Global Initiative for Chronic Obstructive Lung Disease (GOLD) provides evidence-based guidelines for assessment, diagnosis, management, diagnostic spirometry and staging criteria of airflow limitation in the severity of COPD (GOLD, 2014).

Women also feel that they experience diagnostic delays, have trouble reaching their physician, and believe their treatment time with a physician to be insufficient (Martinez et al., 2012). The delay in diagnosis for female patients can be credited to COPD being historically thought of as an "older white man's disease." Although the disease remains undiagnosed in women much longer than for men, COPD continues to develop rapidly in women and must be addressed in primary care. The ALA (2013b) called for "taking action" against rising COPD morbidity and mortality, encouraging healthcare providers to adopt practices and policies to improve diagnosis and screening of COPD in women.

5 Clinical COPD Guidelines

APNs use a process of diagnostic reasoning to assess, evaluate and recommend treatment for the patient. The four major concepts addressed in all current assessment guidelines are diagnosis, evaluation, management, and treatment. Together, each category enhances the other by integrating available patient evidence to facilitate optimal care by the provider while lessening the chance of misdiagnosis and biases. Considering the consequences of dyspnea on QOL and subsequent psychological effects, it is recommended that an early psychological evaluation including screening for anxiety and depression be assimilated into each of the four concepts of care. Raheison et al. (2014) recommend management of COPD should incorporate psychological distress and socioeconomic status, particularly in women who are unemployed and living alone, and consider the specific impact of chronic sputum in women.

The National Institute for Health and Care Experience (NICE) and GOLD have published professional guidelines for COPD assessment and coexisting comorbidities (NICE, 2014; GOLD, 2014). NICE guideline 91 highlights the importance of early identification of patients with a chronic health condition, such as COPD, who are at increased risk for depression and functional impairment (NICE, 2014). The guidelines address disease-associated mood fluctuations, loss of pleasure in activities, pain, functional impairment and disability that can increase the risk of depression and anxiety. Cote and Chapman (2009) report that psychiatric disorders such as depression are three times more common in women with COPD than in men with COPD. Women admit to these manifestations while reporting their chief complaint to a provider (Cote & Chapman, 2009). Therefore, assessing for anxiety and depression in women with COPD and implementing the standards set forth in the GOLD and NICE guidelines will enhance the quality of care provided by APNs for the female COPD patient.

6 Final Commentary

While clinical guidelines are well established to diagnose and treat COPD, practice guidelines target isolated diseases and do not encompass comorbidities, presenting a challenge in COPD care (Garcia-Olmos et al., 2013). Like many chronic diseases, COPD affects multiple aspects of the patient and varies by each patient. Vigilant review of clinical practice guidelines is necessary to optimize evidence-based care. Providers should be alert to the high risk of psychological comorbidities and screen patients for depression and anxiety upon initial presentation (Maurer et al., 2008). Early psychological assessment and intervention can be accomplished with addition of HRQoL evaluation using the VQ-11 scale, a short questionnaire completed by the patient, which provides a reliable COPD-specific HRQoL measure and is recommended for routine practice (Ninot et al., 2013). Early recognition, supportive care and treatment can ease the burden of psychological comorbidities in patients with COPD.

A holistic, integrated treatment plan will serve to optimize patient outcomes, decrease the burden of symptoms, prevent/manage exacerbations, slow disease progression, reduce disease morbidity and overall improve the HRQoL in the patient with COPD.

In summary, psychological and perceptual assessment should evolve as a new priority in clinical assessment of COPD patients. Females with COPD demonstrate increased physical and psychological burden from their disease, yet there is no specialized treatment plan to address this population. Future research should aim to quantify the predictors of psychological comorbidities in COPD patients and develop guidelines to address these factors.

7 Funding

This research has received no specific grant from any funding agency in the public, commercial or non-profit sectors.

References

- Alexander-Miller, S. & Davenport, P.W. (2010) Perception of multiple-breath inspiratory resistive loads in males and females. *Biological Psychology*, 84(1), pp.147-149.
- American Lung Association (ALA) (2013a) *Trends in COPD (chronic bronchitis and emphysema): morbidity and mortality*. [Online] Available from: <http://www.lung.org/finding-cures/our-research/trend-reports/copd-trend-report.pdf>. [Accessed: 20th January 2013].
- American Lung Association (ALA) (2013b) *Taking her breath away: the rise in COPD in women*. [Online] Available from: <http://www.lung.org/lung-disease/disparities-reports/rise-of-copd-in-women/>. [Accessed: 20th January 2013].
- Arne, M., Janson, C., Janson, S., Boman, G., Lindqvist, U., Berne, C. & Emtner, M. (2009) Physical activity and quality of life in subjects with chronic disease: chronic obstructive pulmonary disease compared with rheumatoid arthritis and diabetes mellitus. *Scandinavian Journal of Primary Health Care*, 27(3), pp.141-147.
- Atlantis, E., Fahey, P., Cochrane, B. & Smith, S. (2013) Bidirectional associations between clinically relevant depression or anxiety and COPD: a systematic review and meta-analysis. *Chest*, 144(3), pp.1084-1085.
- Burgel, P.R., Escamilla, R., Perez, T., Carré, P., Caillaud, D., Chanez, P., Pinet, C., Jebrak, G., Brinchault, G., Court-Fortune, I., Paillasseur, J.L. & Roche, N. for the INITIATIVES BPCO Scientific Committee (2013) Impact of comorbidities on COPD-specific health-related quality of life. *Respiratory Medicine*, 107(2), pp. 233-241.
- Centers for Disease Control and Prevention, United States Department of Health and Human Services (CDC) (2000) *Measuring healthy days: Population assessment of health-related quality of life*. [Online] Atlanta, Georgia: CDC. Available from: <http://www.cdc.gov/hrqol/pdfs/mhd.pdf/> [Accessed 31st January 2014].
- Centers for Disease Control and Prevention, United States Department of Health and Human Services (CDC) (2012) *CDC Wonder online database, compiled from Compressed Mortality File 1979-2009 Series 20 No. 20*. [Online] Available from: <http://wonder.cdc.gov/mortsql.html/> [Accessed 20th December 2013].
- Chan, P.Y., von Leupoldt, A., Bradley, M.M., Lang, P.J. & Davenport, P.W. (2012) The effect of anxiety on respiratory sensory gating measured by respiratory-related evoked potentials. *Biological Psychology*, 91(2), pp.185-189.
- Cote, C. & Chapman, K. (2009) Diagnosis and treatment considerations for women with COPD. *International Journal of Clinical Practice*, 63(3), pp.486-493.
- Cully, J.A., Graham, D.P., Stanley, M.A., Ferguson, C.J., Sharafkhan, A. Souček, J. & Kunik, M.E. (2006) Quality of life in patients with chronic obstructive pulmonary disease and comorbid anxiety or depression. *Psychosomatics*, 47(4), pp.312-319.
- Davenport, P.W. & Vovk, A. (2009) Cortical and subcortical central neural pathways in respiratory sensations. *Respiratory and Physiological Neurobiology*, 167(1), pp.72-86.
- de Torres, J.P., Casanova, C., Hernández, C., Abreu, J., Montejó de Garcini, A., Aguirre-Jaime, A. & Celli, B.R. (2006) Gender differences in determinants of quality of life in patients with COPD: a case series study. *Health and Quality of Life Outcomes*, 28(4), p.72.
- Di Marco, F., Verga, M., Reggente, M., Maria Casanova, F., Santus, P. Blasi, F., Allegra, L. & Centanni, S. (2006) Anxiety and depression in COPD patients: the roles of gender and disease severity. *Respiratory Medicine*, 100(10), pp.1767-74.
- García-Olmos, L., Alberquilla, A., Ayala, V., García-Sagredo, P., Morales, L., Carmona, M., José De Tena-Dávila, M., Pascual, M., Muñoz, A., Salvador, C. & Monteagudo, J. (2013) Comorbidity in patients with chronic obstructive pulmonary disease in family practice: a cross sectional study. *BMC Family Practice*, 14, p.11.
- Global Initiative for Chronic Obstructive Lung Disease (GOLD) (2014) *GOLD teaching slide set: global strategy for diagnosis, management and prevention of COPD*. [Online] Available from: http://www.goldcopd.org/uploads/users/files/GOLD_Report_2014_Jan23.pdf/ [Accessed 29th January 2014].
- Haave, E., Skumlien, S. & Hyland, M.E. (2008) Gender considerations in pulmonary rehabilitation. *Journal of Cardiopulmonary Rehabilitation and Prevention*, 28(3), pp.215-219.
- Janssens, T., De Puter, S., Stans, L., Verleden, G., Troosters, T., Decramer, M. & Van den Bergh, O. (2011) Dyspnea perception in COPD: association between anxiety, dyspnea-related fear, and dyspnea in a pulmonary rehabilitation program. *Chest*, 140(3), pp.618-625.
- Ketelaars, C.A., Schlösser, M.A., Mostert, R., Huyer Abu-Saad, H., Halfens, R.J. & Wouters, E.F. (1996) Determinants of health-related quality of life in patients with chronic obstructive pulmonary disease. *Thorax*, 51(1), pp.39-43.
- Kunik, M.E., Roundy, K., Veasey, C., Souček, J., Richardson, P., Wray, N.P. & Stanley, M.A. (2005) Surprisingly high prevalence of anxiety and depression in chronic breathing disorders. *Chest*, 127(4), pp.1205-1211.
- Light, R.W., Merrill, E.J., Despars, J.A., Gordon, G.H. & Mutalipassi, L.R. (1985) Prevalence of depression and anxiety in patients with COPD: relationship to functional capacity. *Chest*, 87(1), pp.35-38.
- Martinez, C.H., Raparla, S., Plauschinat, C.A., Giardino, N.D.,

- Rogers, B., Beresford, J., Bentkover, J.D., Schachtner-Appel, A., Curtis, J.L., Martinez, F.J. & Han, M.K. (2012) Gender differences in symptoms and care delivery for chronic obstructive pulmonary disease. *Journal of Women's Health*, 21(12), pp.1267-1274.
- Maurer, J., Rebbapragada, V., Borson, S., Goldstein, R., Kunik, M.E., Yohannes, A.M. & Hanania, N.A. for the ACCP Workshop Panel on Anxiety and Depression in COPD (2008) Anxiety and depression in COPD: current understanding, unanswered questions, and research needs. *Chest*, 134 (4 Suppl.), pp.43S-56S.
- Mikkelsen, R.L., Middelboe, T., Pisinger, C. & Stage K.B. (2004) Anxiety and depression in patients with chronic obstructive pulmonary disease (COPD): a review. *Nordic Journal of Psychiatry*, 58, pp.65-70.
- Nabaran, K., Azpeitia, A., Cantoni, J. & Miravittles, M. (2012) Impairment of quality of life in women with chronic obstructive pulmonary disease. *Respiratory Medicine*, 106(3), pp.367-73.
- Nardi, A.E., Freire, R.C. & Zin, W.A. (2009) Panic disorder and control of breathing. *Respiratory Physiology and Neurobiology*, 167(1), pp.133-143.
- National Institute for Health and Care Experience (NICE) (2014) *Depression in adults with a chronic physical health problem: treatment and management*. [Online] Available from: <http://publications.nice.org.uk/depression-in-adults-with-a-chronic-physical-health-problem-cg91> [Accessed 3rd March 2014].
- Ninot, G., Soye, F. & Préfaut, C. (2013) A short questionnaire for the assessment of quality of life in patients with chronic obstructive pulmonary disease: psychometric properties of VQ11. *Health and the Quality of Life Outcomes*, 11, p.179.
- Ng, T. P., Niti, M., Tan, W. C., Cao, Z., Ong, K. C. & Eng, P. (2007) Depressive symptoms and chronic obstructive pulmonary disease: effect on mortality, hospital readmission, symptom burden, functional status, and quality of life. *Archives of Internal Medicine*, 167, pp.60-67.
- Nishimura, K., Oga, T., Ikeda, A., Hajiro, T., Tsukino, M. & Koyama, H. (2008) Comparison of health-related quality of life measurements using a single value in patients with asthma and chronic obstructive pulmonary disease. *Journal of Asthma*, 45(7), pp.615-620.
- Pappens, M., Smets, E., Van Den Bergh, O. & Van Diest, I. (2012a) Fear of suffocation alters respiration during obstructed breathing. *Psychophysiology*, 49(6), pp.829-832.
- Pappens, M., Smets, E., Vansteenkoven, D., Van Den Bergh, O. & Van Diest, I. (2012b) Learning to fear suffocation: a new paradigm for interoceptive fear conditioning. *Psychophysiology*, 49(6), pp.821-828.
- Pitta, F., Troosters, T., Probst, V.S., Spruit, M.A., Decramer, M. & Gosselink, R. (2006) Physical activity and hospitalization for exacerbation of COPD. *Chest*, 129(3), pp.536-544.
- Raherison C., Tillie-Leblond, I., Prudhomme, A., Taillé, C., Biron, E., Nocent-Ejnaini, C., Mathieu, B. & Ostinelli, J. (2014) Clinical characteristics and quality of life in women with COPD: an observational study. *BMC Women's Health*, 14(1), p.31.
- Sinha, S. Papp, L.A. & Gorman, J.M. (2000) How study of respiratory physiology aided our understanding of abnormal brain function in panic disorder. *Journal of Affective Disorders*, 61(3), pp.191-200.
- Stapleton, R.D., Neilsen, E.L., Engelberg, R.A., Patrick, D.L. & Curtis, J.R. (2005) Association of depression and life-sustaining treatment preferences in patients with COPD. *Chest*, 127(1), pp.328-334.
- Thomas, M., Decramer, M. & O'Donnell, D.E. (2013) No room to breathe: the importance of lung hyperinflation in COPD. *Primary Care Respiratory Journal*, 22(1), pp.101-111.
- Turan, O., Yemez, B. & Itil, O. (2013). The effects of anxiety and depression symptoms on treatment adherence in COPD patients. *Primary Health Care Research and Development*, 8, pp.1-8.
- van Haren-Willems, J. & Heijdra, Y. (2010) Increasing evidence for gender differences in chronic obstructive pulmonary disease. *Women's Health*, 6(4), pp.595-600.
- Varkey, A.B. (2004) Chronic obstructive pulmonary disease in women: exploring gender differences. *Current Opinions in Pulmonary Medicine*, 10(2), pp.98-103.
- Yohannes, A.M., Baldwin, R.C. & Connolly, M.J. (2000) Depression and anxiety in elderly outpatients with chronic obstructive pulmonary disease: prevalence, and validation of the BASDEC screening questionnaire. *International Journal of Geriatric Psychiatry*, 15, pp.1090-1096.
- Zoeckler, N., Kenn, K., Kuehl, K., Stenzel, N. & Rief, W. (2014) Illness perceptions predict exercise capacity and psychological well-being after pulmonary rehabilitation in COPD patients. *Journal of Psychosomatic Research*, 76, pp.146-151.
- Zoeckler, N., Rief, W., Kuehl, K. & Kenn, K. (2012) COPD-specific anxiety and depressive symptoms in COPD patients. *Pneumologie*, 66, pp.290-296.

Table of Contents

Malta Journal of Health Sciences Volume 1 - Issue 1 (April 2014)

Editorial

-
- | | |
|---|----------------------------------|
| 1 | Editorial
<i>Daniela Gatt</i> |
|---|----------------------------------|
-

Regular Articles

-
- | | |
|----|---|
| 2 | Institute of Health Care - Faculty of Health Sciences (1987-2013): A celebration Review Article
<i>John Rizzo Naudi</i> |
| 8 | The impact of pregnancy on foot health Research Article
<i>Dorothy Cassar, Cynthia Formosa</i> |
| 12 | Low back pain: a comparative study on the value of core training vs traditional strengthening exercises Research Article
<i>Laura Schembri, Pauline Fenech, Mark Sacco</i> |
| 19 | The impact of providing care to relatives with a severe mental illness: the caregivers' experience Research Article
<i>Michelle Fenech, Josianne Scerri</i> |
-

Commentaries

-
- | | |
|----|--|
| 24 | Psychophysiology of respiratory disease: clinical considerations for the Advanced Practice Nurse Commentary
<i>Sarah Miller, Laura Owens, Tracy Collins, Erin Silverman</i> |
|----|--|
-