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2nd National Symposium of Health Sciences
16th March 2016

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Dr Josianne Scerri

Dr John Xerri de Caro

Special thanks go to Dr Stephen Lungaro-Mifsud and Dr Francis Zarb for their assistance in editing the Symposium abstracts.

Foreword

It is with great pleasure that I welcome you all to this - the 2nd National Symposium of Health Sciences. I hope that such an event will become a regular biennial forum where important research conducted by the academic members of the Faculty is showcased. It gives witness to the great strides taken by members of the Faculty to reach the highest standards of research possible, most of which is being accepted for publication in prestigious international peer-reviewed journals.

It is also my pleasure to announce the Dean's awards for academic year 2014/5. This has now become a regular annual feature in which awards are presented to the highest achieving students.

All thanks are due to the tireless and enthusiastic work of the Symposium Organising and Scientific Committees. I thank all the members of both Committees for their hard work in the organisation of this event, and for the preparation and editing of the Abstract Booklet which is being published as a supplement to the Malta Journal of Health Sciences (MJHS), and which has now become a regular bi-annual publication of the Faculty.

My sincere thanks also go to our guest speaker, Professor Ian Curran, who has very graciously and generously accepted to honour us with his presence and to share with us his experience of professional excellence in health care.

Finally my heartfelt thanks to all the participants and registrants – I wish you every success.

Professor Angela Xuereb Anastasi
Dean

2nd National Symposium of Health Sciences and Dean's Awards

Faculty of Health Sciences
University of Malta
Wednesday, 16th March 2016

Programme

0930 Registration and Coffee

0930 Poster Presentations

1000 Welcome of Guests and Participants by Professor Helen Grech, Deputy Dean of the Faculty of Health Sciences, University of Malta

Opening of the 2nd National Symposium of Health Sciences

Address by Professor Angela Xuereb Anastasi, Dean of the Faculty of Health Sciences, University of Malta

Address by the Hon. Mr Chris Fearne MP, Parliamentary Secretary for Health

1030 **Presentation of the Dean's Awards**

1050 Short Break

1105 **Platform Presentations**: Sessions 1 and 2

The effect of smoking, alcohol and coffee consumption on inflammation and the risk of Myocardial Infarction
Dr Ritienne Attard
Department of Applied Biomedical Science, Faculty of Health Sciences, University of Malta

Dietary and physical activity assessment in 5-6-year-old Maltese children
Ms Roberta Zarb Adami
Department of Food Studies and Environmental Health, Faculty of Health Sciences, University of Malta

The design and validation of a framework of competencies in spiritual care for nurses and midwives: a modified Delphi study
Dr Josephine Attard
Department of Midwifery, Faculty of Health Sciences, University of Malta

Developing content of health care curricula using a multi-stakeholder research-based approach
Mr Joseph Castillo
Department of Radiography, Faculty of Health Sciences, University of Malta

Predicting wound healing after minor amputations of the diabetic foot using different physiological tests
Dr Cynthia Formosa
Department of Podiatry, Faculty of Health Sciences, University of Malta

1220 Lunch Break and Poster Presentations

1320 **Keynote Speech**

The nature and nurture of professional excellence
Professor Ian Curran
General Medical Council, UK

1420 **Platform Presentations**: Sessions 3 and 4

Speech perception skills in Maltese adolescent cochlear implant users
Ms Jackie Busuttil
Department of Communication Therapy, Faculty of Health Sciences, University of Malta

Biochemical measurements of total serum calcium, alkaline phosphatase and albumin in relation to bone mineral density and fracture susceptibility in Maltese postmenopausal women
Dr Melissa Formosa
Department of Applied Biomedical Science, Faculty of Health Sciences, University of Malta

The lived experiences of caregivers of persons with depression: an interpretative phenomenological analysis
Ms Isaura Camilleri
Department of Mental Health, Faculty of Health Sciences, University of Malta

1520 Short Break

1535 **Platform Presentations**: Sessions 5 and 6

Characterisation of the interactions between a biofilm-forming bacterium and fungi related to pear fruit diseases
Mr Davide Sardella
Department of Food Studies and Environmental Health, Faculty of Health Sciences, University of Malta

Maltese patients' satisfaction with the Nurse-led Heart Failure Clinic: a mixed methods study
Ms Anne Marie Sapiano
Department of Nursing, Faculty of Health Sciences, University of Malta

The effectiveness of intermittent electrical stimulation on lower extremity arterial perfusion and walking capacity in patients living with diabetes and intermittent claudication
Mr Christian Ellul
Department of Podiatry, Faculty of Health Sciences, University of Malta

How is the European Union perceived to influence health systems? The Malta case study
Dr Natasha Azzopardi Muscat
Department of Health Services Management, Faculty of Health Sciences, University of Malta

1635 Closing Address

Poster Programme

First Session: 0930 – 1000; Second Session: 1220 – 1320

1 **An evaluation of two novel techniques for estimating the spatial resolution (SR) of Positron Emission Tomography (PET) scanners from daily uniformity images**
Jean Mikhail Bickle, Shelan Mahmood, Michael Waller, Garry McDermott

2 **Combined effect of smoking and the -148C>T fibrinogen polymorphism and the risk of Myocardial Infarction in the Maltese population**
Julia Bonaci, Christine Tabone, Ritienne Attard, Alexander Gatt, Philip Dingli, Karen Cassar, Stephanie Bezzina Wettinger, Rosienne Farrugia

3 **Nursing students' response to simulated deterioration**
Alexis Borg Sapiano, Roberta Sammut, Josef Trapani

4 **Compliance with Carbapenem Resistant Enterobacteriaceae (CRE) at Mater Dei Hospital: a pressing concern**
Dale Brincat, Thomas Borg Barthet, Janice Borg, Thomas Calleja, Ermira Tartari, Claire Farrugia, Michael Angelo Borg

5 **The application of Six Sigma in health care: examples from Emergency Departments in Germany and Malta**
Sandra C. Buttigieg, Wilfried von Eiff, Patrick Farrugia, Dorothy Gauci

6 **An investigation into the use of standardised outcome measures in Maltese physiotherapy practice**
Andrew Cassar, Harriet Shannon, Sarah Rand

7 **Formal carers' knowledge, educational needs and attitudes towards older residents living with dementia**
Roberta Farrugia, Roberta Sammut, Anthony Scerri

8 **Inter-rater reliability of Doppler waveform analysis amongst health care professionals**
Cynthia Formosa, Christian Ellul, Anabelle Mizzi, Stephen Mizzi, Alfred Gatt

9 **A critical evaluation of diabetes foot screening guidelines**
Cynthia Formosa, Alfred Gatt, Nachiappan Chockalingam

10 **Two polymorphisms in the *RANK* gene are associated with bone mineral density and increased fracture risk in Maltese postmenopausal women**
Melissa M. Formosa, Angela Xuereb Anastasi

Malta Journal of Health Sciences

Aim and scope

The Malta Journal of Health Sciences (MJHS) 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.

MJHS 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, Environmental Health, Food Science, Health Services Management, Medical Physics, Mental Health, Midwifery, Nursing, Occupational Therapy, Physiotherapy, Podiatry and Radiography.

Call for Papers

MJHS invites submissions on aspects of the above mentioned allied health disciplines. To be considered for publication in Volume 3 Issue 2, planned for publication in December 2016, papers must be submitted by email to the Editor-in-Chief on mjhs@um.edu.mt by **15th June 2016**. Manuscripts need to be prepared according to the guidelines listed under the Manuscript Submission and Notes for Contributors links on the Journal website at http://www.um.edu.mt/healthsciences/mjhs. Failure to abide by these guidelines may lead to immediate rejection. Submissions will be evaluated through the Journal's peer review process.

Abstracts

Oral Presentations

The nature and nurture of professional excellence

Ian Curran
Assistant Director of Education and Professional Standards, General Medical Council, UK

This presentation will explore the nature of professional excellence by presenting a range of original concepts, principles and models that will invite delegates to challenge their current view of professional education in healthcare. Through a narrative discourse, current or potential paradoxes and confusions in healthcare education will be highlighted. These innovative concepts will be applied to the challenge of nurturing healthcare professionals. An attempt to highlight areas for potential development and improvement will be made.

Biography

Professor Ian Curran is the Assistant Director of Education and Professional Standards at the General Medical Council, where he leads policy development and quality assurance of UK postgraduate medical education and training.

Previously Professor Curran worked at Barts Healthcare NHS Trust where he was a consultant anaesthetist with a special interest in chronic pain management. He was Clinical Academic Group Director of Education & Workforce at Barts, Senior Examiner for Medical Finals at Barts School of Medicine and Dentistry and made Professor of Innovation and Excellence in Healthcare Education at Queen Mary University of London.

From 2010-13 Professor Curran was Postgraduate Dean of Educational Excellence, where he led London's multi-award winning £36 million innovation programme including London's Simulation and Technology enhanced Learning Initiative (STeLI). He has also been a clinical adviser to the Department of Health, NHS England and NHS Health Education England. He is a Harvard Macy Scholar and visiting member of faculty.

His academic interests include transformational leadership, professional excellence, disruptive innovation, education policy and regulation, poor performance, behaviour change, debriefing and faculty development.

The effect of smoking, alcohol and coffee consumption on inflammation and the risk of Myocardial Infarction

Ritienne Attard[1], Philip Dingli[1], Karen Cassar[2], Carine Doggen[3], Rosienne Farrugia[1], Stephanie Bezzina Wettinger[1]
[1]Department of Applied Biomedical Science, Faculty of Health Sciences, University of Malta, Malta
[2]Department of Medicine, Faculty of Medicine and Surgery, University of Malta, Malta
[3]Health Technology and Services Research, MIRA, University of Twente, The Netherlands

The aim of the study was to investigate the effect of smoking, alcohol and coffee consumption on the risk of myocardial infarction (MI) and on the generation of an inflammatory response. Data on 423 cases with MI and 465 controls was obtained through an interviewer-led questionnaire as part of the Maltese Acute Myocardial Infarction (MAMI) Study. Regular alcohol drinkers were subjects who had at least one drink/week for one year. Binge drinkers were those having ≥6 drinks on one occasion this last year. The effect of smoking and alcohol consumption on inflammation was investigated through hs-CRP levels and white blood cell (WBC) counts. Odds ratios are adjusted for the conventional risk factors of MI (AdjOR). Regular alcohol drinkers were protected against MI [AdjOR 0.6 (95% Confidence Interval (CI) 0.4-0.8)]. The risk of MI associated with binge drinking varied with the frequency. Current smokers had a 3.5-fold (95% CI 2.3-5.4) increased risk of MI. While no risk of MI was associated with ≤20 pack years, a higher number of pack years increased this risk. Ex-smokers had a lower risk of MI [AdjOR 1.8 (95% CI 1.2-2.6)]. The benefits of smoking cessation increased with increasing duration of smoking cessation. Hs-CRP and WBC counts were highest in current smokers. Regular alcohol drinkers tended to have lower WBC counts. Smokers who were regular alcohol drinkers had a 12.0% reduction in WBC counts compared with smokers who were non-drinkers. High consumption of daily cups of coffee was a risk factor of MI in smokers [AdjOR 7.4 (95% CI 1.7-31.5) vs AdjOR 1.2 (95% CI 0.4-4.1) in non-smokers and ex-smokers]. The effect of alcohol consumption on the risk of MI varies from protective to extremely deleterious depending on the frequency of drinking. Smoking is a strong risk factor of MI. This risk decreases with years of smoking cessation. At least part of the risk of MI associated with smoking is mediated through a higher inflammatory state. Regular moderate alcohol consumption has an anti-inflammatory effect. Smoking synergistically interacts with high coffee consumption, drastically increasing the risk of MI.

Dietary and physical activity assessment in 5-6-year-old Maltese children

Roberta Zarb Adami, Petra Jones, Claire Sillato Copperstone
Department of Food Studies and Environmental Health, Faculty of Health Sciences, University of Malta, Malta

Most countries worldwide, including Malta, have increasing prevalence of childhood obesity. In fact, the European Childhood Obesity Surveillance Initiative (COSI) found Malta was one of four countries with a high prevalence of overweight. The aims of the study were to investigate anthropometric measures and lifestyle habits in 5-6-year-old Maltese children and explore potential associations with parental body mass index (BMI). Stratified sampling from 15 schools (state, church and independent), conducted between March-June 2015, yielded a sample of 66 participants. The researcher measured anthropometric data in schools. Food, physical activity and sedentary behaviour diaries were completed by the children's parents. The BMI-for-age was calculated using International Obesity Task Force (IOTF), Centers for Disease Control (CDC) and World Health Organisation (WHO) criteria. Mean waist circumference (WC) was calculated. The diaries were analysed and coded for energy intake, macronutrients and activity, using WISP software and physical activity and sedentary behaviour protocols. Multiple regression and Spearman correlations related the diaries with BMI and WC and associated parental and child BMI. Compared to IOTF and CDC criteria, WHO showed the highest prevalence of overweight and obesity (22.7%). Mean WC ($p = 0.039$), but not mean daily screen time ($p = 0.656$), differed significantly between schools. A significant positive correlation ($p = 0.000$) was found between the children's BMI and WC. Multiple regression showed a positive relationship between free sugars and both BMI and WC and a negative relationship between physical activity and BMI and WC. Parental and child BMI were positively correlated, with paternal BMI showing a significant association ($p \leq 0.005$). This study confirms the impression that obesity in Maltese children starts at a young age, could be associated with specific macronutrients, and appears to be related to parental BMI. These results warrant investigations using a larger sample to develop nutritional recommendations on a national basis.

The design and validation of a framework of competencies in spiritual care for nurses and midwives: a modified Delphi study

Attard Josephine
Department of Midwifery, Faculty of Health Sciences, University of Malta, Malta

This study was instigated by an effort to counteract incidences of dissatisfaction in the provision of nursing/midwifery care reported in stories of undignified care, clients' suffering and the demands of clients requesting a more personalised, sensitive and compassionate care. On reflection, the roots of dissatisfaction with care can be traced to the neglect of the spiritual dimension in care such as shown by nurses'/midwives' lack of caring attitudes and values and lack of compassion in practice. These reinforce the importance of nurses/midwives adopting a holistic client-centered care through competencies that define the expectations for performance and scope of nursing/midwifery practice. Hence, the aim of this study was to design and develop a valid and reliable framework of competencies (knowledge, skills and attitudes) in spiritual care to guide pre-registration nursing/midwifery education. The study adopted a mixed methods approach, using an eclectic framework through three main phases. In Phase 1, an in-depth literature review and focus group discussions with stakeholders and clients were undertaken. The literature review examined the current evidence underpinning the education of the spiritual dimension of care in nursing/midwifery and scrutinised this data in order to elicit competencies in spiritual care for pre-registration curricula in nursing/midwifery education. An eight-point criterion for quality appraisal of the literature was developed for the purpose of this study. The use of focus group discussions in this phase of the study using 'real life scenarios' clarified the perceptions of the participants' experiences of spirituality, spiritual needs and spiritual care in times of illness, loss and other life stressors, while supporting the information generated from the literature review. Using adapted content thematic analysis frameworks, competencies in spiritual care were identified, categorised into seven domains, and then validated through a modified Delphi approach in Phase 2 of the study.

Developing content of health care curricula using a multi-stakeholder research-based approach

Joseph Castillo[1, 2], **Carmel J. Caruana**[3], **Paul S. Morgan**[4], **Catherine Westbrook**[5], **Adrian Mizzi**[2]
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[2]Medical Imaging Department, Mater Dei Hospital, Malta
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[4]Medical Physics and Clinical Engineering, Nottingham University Hospitals, UK
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TUNING Educational Structures in Europe emphasises that higher education curricula should be matched to current and emerging market needs and developed through a multi-stakeholder research-based approach. This presentation describes such a methodology for developing the physics content of a curriculum for Magnetic Resonance Imaging (MRI) radiographers as a specialty area and summarises the results to date. A Delphi process was used to forecast the MRI service portfolio for the year 2020. A nominal group technique was used to optimise the care pathway and identify the quality criteria at each stage. The results of the service portfolio and care pathway were used to develop an MRI competence profile which was also validated using a Delphi technique. In the Delphi studies, levels of agreement were quantified using median values on a 6-point Likert scale (LS), while extent of consensus was quantified using the inter-quartile-range (IQR). The multi-stakeholder expert group agreed (LS = 6.0, IQR = 1.0) that the current MRI service catalogue should be maintained, while introducing specific new services such as guided breast biopsies (6.0, 1.0), tractography (5.0, 1.0) and oncology planning (5.0, 1.0). The care pathway was evaluated by participants through a ranking process. They attached the highest importance (>70) to benchmarking, defining quality, setting a safety checklist and Magnetic Resonance (MR) education. Documentation of patient pain levels prior to MRI and a radiographer technical report were novel themes proposed by the participants. A high level of agreement and consensus (LS ≥ 5.0, IQR < 1.0) was obtained for 37 of the 43 competence statements categorised under seven key activities – image acquisition, education, risk management, service unit management, facility management, quality assurance and research. It was concluded that this approach for developing curricular content is sufficiently generic to be adapted by educators, policy makers and professionals in other health care professions.

Predicting wound healing after minor amputations of the diabetic foot using different physiological tests

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[1]Department of Surgery, Mater Dei Hospital, Malta
[2]Department of Podiatry, Faculty of Health Sciences, University of Malta, Malta
[3]Department of Surgery, Faculty of Medicine and Surgery, University of Malta, Malta

The purpose of this study was to identify any significant differences in physiological test results between healing and non-healing forefoot amputation sites. A single-centre prospective non-experimental study design was conducted on 50 subjects living with type 2 diabetes mellitus and requiring a forefoot or toe amputation. Subjects underwent non-invasive physiological testing preoperatively. This included assessment of pedal pulses, preoperative arterial spectral waveforms at the ankle, absolute toe pressures, toe brachial pressure index (TBI) and ankle-brachial pressure index (ABPI). After six weeks, patients were examined to assess whether the amputation site was completely healed, was healing, or had developed complications or did not heal. There was no significant difference in ABPI between the healed/healing and the non-healing groups. Mean TBI (p = 0.031) and toe pressure readings (p = 0.014) were significantly higher in the healed/healing group compared to the non-healing group. A significant difference was also found in ankle spectral waveforms between the two groups (p = 0.028). Results showed that TBIs, toe pressures and spectral waveforms at the ankle are better predictors of the likelihood of healing and non-healing after minor amputation than ABPIs. The ABPI alone is a poor indicator of the likelihood of healing of minor amputations and should not be relied upon to determine need for revascularisation procedures before minor amputation. The originality of this work lies in the use of a combination of physiological tests to predict minor amputation healing. Its findings may contribute to the development of a clinical algorithm using a combination of toe pressure, TBIs and spectral waveforms to better predict wound healing or non-healing after minor amputations.

Speech perception skills in Maltese adolescent cochlear implant users

Jackie Busuttil , Helen Grech
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The ability to understand speech across different listening environments presents a constant challenge for hearing impaired (HI) individuals. Its measurement, therefore, has an important role in assessment and the subsequent rehabilitation process. The aim of the study was to investigate the speech perception (SP) difficulties faced by bilingual Maltese adolescent cochlear implant (CI) users, when compared with typically hearing (TH) peers. Prior to this study, no data was available for Maltese HI individuals, neither was there any normative data with which to draw comparisons. The participants were a group of 12 HI individuals who had received their CIs by the age of 2 and had been consistent users for at least five years. This group included four individuals who also received a second CI sequentially. In order to be able to draw comparisons and determine the extent of the difficulties experienced by the HI individuals, a control group of TH peers was recruited and speech perception skills were evaluated. Data was obtained from word and non-word repetition tasks, presented in both English and Maltese, in quiet and noisy listening conditions. The key findings were in line with results from similar speech perception studies, with scores attained by the CI users being significantly lower than those of their TH peers, in terms of percentage correct phonemes produced. This pattern was consistent for both English and Maltese material, in quiet and noisy listening conditions. The Maltese Word Test of Hearing (MWTOH), developed specifically for the purposes of this study, showed a high correlation with the English word test, an established tool which has been validated, standardised and is widely used. This means that the MWTOH effectively measures SP of bilingual Maltese adolescents, and is a useful clinical tool which can be used as part of a comprehensive test battery. Data collected gives an indication of trends in SP skills.

Biochemical measurements of total serum calcium, alkaline phosphatase and albumin in relation to bone mineral density and fracture susceptibility in Maltese postmenopausal women

Melissa M. Formosa, Angela XuerebAnastasi
Department of Applied Biomedical Science. Faculty of Health Sciences, University of Malta, Malta

Osteoporosis is a progressive multifactorial skeletal disease characterised by low bone mass and strength, thereby increasing fracture risk. A number of environmental, physiological, biochemical and genetic factors have been reported to increase susceptibility to osteoporosis and fractures. The aim of the study was to focus on the measurement of three biochemical parameters including total serum calcium, total serum alkaline phosphatase (ALP) and serum albumin, and assess these levels in relation to bone mineral density (BMD) at different anatomical sites and with all-type of low trauma fractures in Maltese postmenopausal women. Levels were also correlated with anthropometric variables and physical activity. A case-control collection of 1045 Maltese postmenopausal women was used. BMD measurements of the lumbar spine (LS) and femoral neck (FN) were obtained by dual X-ray absorptiometry. Cases were women who sustained a low-trauma fracture (fall from height or less) whereas controls included women without a fracture history. Controls were further subdivided into three groups (normal, osteopenia, osteoporosis) according to their BMD measurements. Blood samples were obtained from all research subjects following good standard practice. In the case of fresh-trauma fractures, specimens were collected within 18 hours of fracture. Biochemical measurements were performed using spectrophotometry. Levels of total serum calcium and ALP were weakly correlated with BMD levels at the FN (calcium rho: 0.111, $p < 0.01$, ALP rho: 0.089, $p < 0.05$). No correlation was observed with LS BMD levels. Fracture cases had the lowest levels of all three biochemical parameters when compared to the control groups. Furthermore, biochemical levels in fracture cases continued to decrease with increasing age, possibly increasing fracture risk. Levels were lowest in women with a hip fracture history and in those who sustained more than one fracture. Women who performed low levels of physical activity had the lowest levels of BMD at LS and FN ($p < 0.01$), as well as lower concentrations of serum calcium, ALP and albumin ($p < 0.05$). Levels of serum calcium and albumin are suggestive of increased fracture risk, whereas levels of serum calcium and ALP could possibly be used as indicators of hip BMD.

The lived experiences of caregivers of persons with depression: an interpretative phenomenological analysis

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The responsibilities of providing care to a person with depression, in addition to the pressures of maintaining a family, may have detrimental effects on caregivers, which may lead to stress and burnout. Despite this, there is a dearth in the literature regarding the lived experiences of long-term caregivers of persons with depression. The aim of this study was to explore the lived experiences of Maltese caregivers of persons with depression. A qualitative phenomenological design was used. A purposive sample of nine long-term (more than 10 years) caregivers providing support to individuals with depression was recruited. Data were collected from semi-structured interviews, and verbatim transcripts were analysed using Interpretative Phenomenological Analysis. Two superordinate themes emerged. 'Existing but not living' described the psychosocial and emotional impact of the caregiver when striving to fulfil the needs of persons with depression. 'Rowing to keep afloat' described the coping strategies used by caregivers to manage the situation. Caregivers described learning to keep afloat through self-preservation strategies. Whilst this may lead to greater 'harmony' in the home, the burden on the caregivers remained heavy and this affected their overall quality of life. Thus it is crucial to provide support to long-term caregivers of persons with depression since the findings revealed that their quality of life was being negatively affected. Available literature mainly targets the impact of providing care to persons with severe mental illnesses collectively. In addition, such studies tend to target caregivers who have provided support to persons with a mental illness for a diverse number of years. This is the first study (both local and international) that explores the experience of long-term caregivers of persons with depression from a phenomenological perspective.

Characterisation of the interactions between a biofilm-forming bacterium and fungi related to pear fruit diseases

Davide Sardella[1], Pantelis Natskoulis[2], Elina Gkana[2], Efstathios Panagou[2], Vasilis Valdramidis[1]
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[2]Department of Food Science and Human Nutrition, Agricultural University of Athens, Greece

Bacteria and fungi can coexist and interact in many environments and bacterial-fungal interactions often have important ramifications for the biology of the interacting partners. Fungi and bacteria can form interdependent consortia that harbour properties distinct from those of their single components. There are instances where bacteria provide fungi with compounds that enhance the production of fungal virulence determinants, while other bacteria produce factors that are likely to inhibit pathogenesis by repressing fungal filamentation. Mixed bacterial-fungal biofilms can result in antagonism or enhancement of fungal growth, bacterial utilisation of fungi as nutrient sources as well as more complex interactions involving horizontal gene transfer mechanisms. The objective of this study was to investigate *Erwinia*'s biofilm behaviour when grown in concomitance with different fungal strains (*Alternaria alternata*, *Aspergillus* spp.*, Botrytis cinerea*, *Penicillium expansum*) and how the presence of the biofilm could affect the fungal growth. These studies were supported by fluorescence microscopy imaging and molecular characterisation of the eDNA extracted from the biofilm's matrix.The most significant growth differences were observed in *Alternaria alternata* and *Botrytis cinerea*, whose growth was limited by the concomitance of *Erwinia* spp. Growth inhibition was also seen in *Aspergillus* spp., while no significant differences in the growth of the other fungi were seen. Fluorescence studies also highlighted how the fungal structures in the case of *Botrytis cinerea* and *Aspergillus* spp. were affected by the presence of the biofilm as opposed to *Alternaria alternata*. Furthermore, differences in the rpoB gene expression were found amongst biofilm extracellular DNAs developed from co-cultures with all the fungi in comparison to the genomic counterpart. Overall, these findings provide more information about fungal-bacterial interactions through the use of molecular and microscopic tools. Current literature lacks information about the bacterial biofilm's behaviour in concomitance with fungi as well as the eDNA characterisation extracted from the biofilm matrix.

Maltese patients' satisfaction with the Nurse-led Heart Failure Clinic: a mixed methods study

Anne Marie Sapiano, Roberta Sammut
Department of Nursing, Faculty of Health Sciences, University of Malta, Malta

Heart failure prevalence is on the increase on a global stage. Heart failure requires the person to self-manage the condition to prevent repeated hospitalisation due to decompensation. Nurse-led clinics have an important role in achieving this goal. The objective of the current study was to assess Maltese patients' satisfaction with the Nurse-led Heart Failure Clinic. A sequential mixed methods design that included the collection of quantitative and qualitative data was used. The study took place in the Nurse-led Heart Failure Clinic situated in the Outpatients Department of an acute general hospital in Malta. Phase 1 included the total population of patients who were attending the Heart Failure Clinic at the time of data collection (N = 325). Phase 2 of the study included four patients who attended the clinic. In Phase 1, a modified version of the Leeds Satisfaction Questionnaire was used to explore the satisfaction of persons attending the Clinic. Questionnaires were distributed by post and reminders were sent out after a week. Data were analysed using descriptive and inferential statistics. In Phase 2, four patients were invited to semi-structured interviews which sought to clarify areas of satisfaction and dissatisfaction identified in Phase 1 of the study. Data were analysed using thematic analysis. Participants were generally satisfied with most aspects of care provided by the Nurse-led Heart Failure Clinic. The aspects of care that participants were least satisfied with were 'giving of information' (mean = 3.82), and 'access and continuity of care' (mean = 3.96). Participants were most satisfied with 'technical quality and competence' (mean = 4.44). Younger patients (59 years or less) were more satisfied than those older in age. Those who had lived with heart failure for less than two years were less satisfied than those who had been living with this condition for a longer period. The themes 'accessibility', 'good quality of service' and 'continuity of care' emerged from Phase 2. The findings of this study indicated that participants were overall satisfied with the service provided, but some aspects of care in the Clinic in relation to information giving and accessibility of services could be improved, possibly through the use of telephone consultations outside clinic hours. Further research is needed locally to identify adjustments required so that the needs of older persons and those newly diagnosed with heart failure can be met. This is the first study to have explored satisfaction with a nurse-led clinic locally.

The effectiveness of intermittent electrical stimulation on lower extremity arterial perfusion and walking capacity in patients living with diabetes and intermittent claudication

Christian Ellul, Alfred Gatt
Department of Podiatry, Faculty of Health Sciences, University of Malta, Malta

This study aimed to investigate whether calf muscle electrical stimulation improves arterial perfusion and functional walking capacity in claudicants with peripheral artery disease and diabetes mellitus. A prospective, one-group pretest-posttest study design was employed on 40 participants with bilateral limb ischemia (ankle brachial pressure index (ABPI) < 0.90), diabetes mellitus and calf muscle claudication. Participants received a fixed programme of calf muscle electrical stimulation with varying frequency (1-250Hz) on both ischemic limbs (N = 80) for one hour per day for 12 weeks. The ABPI and absolute claudication distance (ACD) were recorded at baseline and following intervention to evaluate for a therapeutic response. The mean ACD increased significantly by a mean of 137 meters (Wilcoxon signed-ranks test, p = 0.000) while the ABPI also improved significantly by a mean of 0.04 (paired samples t-test, p = 0.001) at follow-up relative to baseline. Despite both parameters improving significantly in response to the 12 weeks of electrical stimulation, improvements in claudication distance did not correlate with improvements in the ABPI (Pearson's correlation test, $p \geq 0.05$). Results showed that intermittent, one-hour daily electrical stimulation of varying frequency for 12 consecutive weeks registered statistically significant improvements in outcome measures assessing arterial inflow and walking capacity in claudicants with diabetes mellitus. The significantly higher mean ABPI scores following electrical stimulation is a novel finding in this population. Coupled with increases in claudication-free walking distance, these results favour the use of electrical stimulation as a therapeutic modality to reduce functional walking impairment and improve blood flow in patients with peripheral artery disease.

How is the European Union perceived to influence health systems? The Malta case study

Natasha Azzopardi Muscat[1, 2], **Kristine Sorensen**[2], **Christoph Aluttis**[2], **Roderick Pace**[3], **Helmut Brand**[2]
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Literature suggests that there is a strong resistance from Member States for the EU to take up an active role in health systems but little is known about the way in which the EU is perceived by domestic health system stakeholders in small states. The central aim of this study is to evaluate the influence of the EU on the Maltese health system. A qualitative case study was conducted using 33 semi-structured interviews amongst key domestic stakeholders. Inductive analysis was carried out with codes and themes being generated from the data. Salient themes from the Maltese perspective are included in this presentation. The EU accession process was a powerful stimulus for reform in the Maltese health system. Through EU membership, the health workforce experienced the several benefits including networking and capacity building. Overall, domestic health system stakeholders in Malta have a positive experience of EU membership and actively seek to use the EU as an opportunity to implement desired norms. The EU was viewed positively where there was a high level of alignment between EU and national policy objectives, coupled with a supportive effect from the EU to counteract lack of capacity. Conversely, Euroscepticism is associated with imposition of administrative burden on limited resources and a lack of alignment of values between domestic and EU objectives. Maltese stakeholders exhibit considerable support for the EU to assume a larger role in health systems. This is linked to the need for capacity enlargement to tackle serious public health problems as well as to overcome local resistance to health system reform. This is the first empirical study on the experiences and attitudes of domestic stakeholders regarding health system Europeanisation. It dispels myths about the role of the EU in health systems and paves the way for further research at a time when the future of European health policy appears uncertain.

Abstracts

Poster Presentations

An evaluation of two novel techniques for estimating the spatial resolution (SR) of Positron Emission Tomography (PET) scanners from daily uniformity images

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Daily monitoring of spatial resolution (SR) would make it possible to assess changes in scanner performance over time. The purpose of this study was to propose and carry out an initial evaluation of two novel techniques for obtaining SR from the daily uniformity quality control image of a cylindrical Ge-68 phantom. The SR was measured using the two novel techniques and the values obtained compared to the value obtained using a reference protocol. The first technique applied Fourier analysis to a transaxial image of the Ge-68 phantom while the second applied an edge spread function to a coronal image of the same phantom. The measure of SR was the Full-Width-Half-Maximum (FWHM); the measure of repeatability was the Coefficient-of-Variation (CoV). Image processing and analysis were performed using MATLAB. The mean FWHM ± standard deviation for the Fourier technique was 5.39 ± 0.09 mm, whilst that for the edge spread function was 9.67 ± 0.47 mm. The reference method gave a SR of 5.57 mm. The CoV of the Fourier technique was 1.7 %, whilst that of the edge spread function technique was 4.9 %. Both techniques are sufficiently repeatable for use in daily quality control procedures. However, the Fourier technique gave the closest value to the reference value and also the lower CoV. Further studies would be necessary to investigate the sensitivity of the techniques to changes in scanner performance. The reference National Electrical Manufacturers Association (NEMA) test is cumbersome to carry out and is only performed annually. The Fourier technique provides a surrogate method for obtaining a good estimate of SR suitable for trend analysis, using data available from daily quality control.

Combined effect of smoking and the -148C>T fibrinogen polymorphism and the risk of Myocardial Infarction in the Maltese population

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Fibrinogen is a soluble glycoprotein that acts as a clotting factor and acute phase reactant. Plasma fibrinogen levels are affected by environmental and demographic factors including gender, advancing age and seasonality. Polymorphisms within the three fibrinogen genes, *FGA*, *FGB*, and *FGG*, encoding the Aα, Bβ and γ chains respectively, also influence plasma fibrinogen levels. The fibrinogen genes have been extensively studied. However, there are conflicting results on whether individual single nucleotide polymorphisms (SNPs) within these genes confer an increased risk of Myocardial Infarction (MI). The -148C>T SNP (rs1800787) is a promoter SNP in *FGB*, the rate-limiting gene in fibrinogen synthesis. In this study, 1062 samples from the Maltese Acute Myocardial Infarction (MAMI) Study were tested for the -148C>T SNP using PCR-RFLP (polymerase chain reaction and restriction fragment length polymorphism) with *Hind III*. The allele frequencies for the wildtype -148*C and the mutant -148*T were 78% and 22% respectively. In the MAMI collection, this SNP alone did not have an effect on fibrinogen levels or risk of MI [C/T: Odds Ratio (OR) 1.11 (95% Confidence Interval (CI) 0.82–1.51); T/T: OR 1.59 (95% CI 0.86–2.94)]. However, amongst those who never smoked, the risk of MI increased with increasing number of the T allele [C/T: OR 1.91 (95% CI 1.10–3.33); T/T: OR 3.40 (95% CI 1.05–11.00)]. In smokers, the -148CC and CT genotypes were associated with a three-fold increased risk of MI [C/C: OR 3.54 (95% CI 2.12–5.93); C/T: OR 3.09 (95% CI 1.78–5.38)] and this risk doubled in those with the -148TT genotype [OR 5.90 (95% CI 1.73–20.10)]. These observations suggest that smoking status modifies the risk of MI associated with the -148C>T genotype and may, in part, account for the conflicting data reported in other studies.

Nursing students' response to simulated deterioration

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Clinical experience within a critical care unit, as well as the literature, suggest that a considerable proportion of patients who are transferred from general medical/surgical wards to a critical care unit are in a severe state of deterioration. The majority of these patients could have been identified and managed in a timelier manner. This is of concern, because acute deterioration is not a sudden event and is potentially reversible if detected early. The inability of clinicians to provide a prompt response leads to questioning about why this may be so. This study addressed the gaps in present knowledge by exploring student nurses' preparedness in responding to simulated patient deterioration. The reason for researching nursing students rather than qualified nurses was to see whether they are being prepared adequately during their course of studies, given that, at the point of qualification, they are expected to provide immediate care in medical emergencies. Local studies in relation to this topic are limited, making it even timelier to address the gap in the literature and explore this area from a local perspective. A mixed-method sequential exploratory design was employed. The final sample included 166 (50%) 2nd and 3rd year diploma and degree nursing students registered with a university in Malta. In phase 1, the students' response was investigated using a virtual platform named FIRST2ACTWeb (Feedback Incorporating Review and Simulation Techniques to Act on Clinical Trends) in collaboration with the programme administrators at Monash University, Australia. Phase 2 involved eight structured interviews that explored the students' views, reflections and experiences in relation to their participation in the simulation, and their preparedness for managing patient deterioration in a real-life setting. A learning effect was observed, with a statistically significant improvement resulting in the students' knowledge after carrying out the simulation program ($p < 0.001$). The participants' knowledge was confirmed to be weakly correlated with their scenario performance. The benefits of repetitive practice in improving performance were reported. During interviews, the participants identified the barriers to their scenario performance and viewed simulation as a learning opportunity. The students' knowledge improved after the simulation exercise. However, it appears that although students are being theoretically prepared, they fail to apply their knowledge to their practice. Our findings support the use of simulation as a means of bridging the current theory-practice gap, by enhancing clinicians' preparedness in managing such life-threatening situations if they had to occur in reality.

Compliance with Carbapenem Resistant Enterobacteriaceae (CRE) at Mater Dei Hospital: a pressing concern

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Carbapenem Resistant Enterobacteriaceae (CRE) are a growing concern in Malta. These organisms are often resistant to practically all antibiotics currently available. Therefore, the emphasis must be on effective infection prevention and control (IPC), particularly through staff compliance with contact precautions in known CRE cases. Adherence to IPC protocols in CRE patients was examined within Mater Dei Hospital (MDH). Fifty three patients, colonised or infected with CRE, were followed up four times over a 14-day period. A 10-point survey tool was used to assess adherence to the MDH IPC policy, including direct observations of health care workers having contact with these patients. Facilities for compliance were generally available; alcohol rub, aprons and gloves were present in >95% of observations, but availability of dedicated equipment was only noted in 13%. Only 35% of doctors and nurses donned the proper Personal Protective Equipment (PPE) and then 64% and 58% respectively did not remove them after exiting the room. When PPE was removed, 87% of doctors and 67% of nurses failed to perform proper hand hygiene afterwards. Cleaners were aware and able to explain correctly how the room should be cleaned in 76% of cases. The findings of this study suggest that, despite adequate facilities and guidance, health care workers at MDH are failing to comply with evidence-based IPC procedures and exposing patients to potential harm from cross infection. These results would explain the recent marked increase in CRE cases and highlights the need for more intensive IPC efforts to correct these practices. Little is known about the scale and severity of CRE colonisation and infections in MDH, and even less about what is actually happening in clinical practice. This study sheds light on both facets of this issue.

The application of Six Sigma in health care: examples from Emergency Departments in Germany and Malta

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Disruptions in quality and efficiency of medical treatment processes can usually be retraced to the phenomenon of variation. This variation seems to be the key cause of errors, unnecessary costs and patient dissatisfaction. Furthermore, this variation is generally not rare, and is predictable and therefore preventable. Six Sigma is an operationalised, problem-solving strategy that deploys five phases: define, measure, analyse, improve, and control (DMAIC). It aims to optimise work processes by utilising a minimal error strategy. Its application is demonstrated in two case studies in Emergency Departments in Germany and Malta. Six Sigma was applied to operationalise improvements in both case studies in terms of yield and defects following the introduction of new technologies as compared to baseline. The benefit of this approach is to provide a strategic dimension to hospital management so as to improve processes and functions, as well as to attain zero-error hospitals. It is a quality improvement approach aimed at optimising patient safety by reducing process variation, and eliminating waste and non-value-added steps/tasks.

An investigation into the use of standardised outcome measures in Maltese physiotherapy practice

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The use of standardised measures by physiotherapists in Maltese state hospitals is sparse. This study aimed to identify the factors limiting the use of standardised measures and to facilitate the introduction of the 66-item Gross Motor Function Measure in the two main outpatient paediatric centres in Malta. The 66-item Gross Motor Function Measure is a standardised instrument widely used during physiotherapy assessments of children with cerebral palsy. Participating physiotherapists (N = 14) completed a questionnaire about their familiarity and use of standardised measures. A training session ensued in which participants were taught about the use of the 66-item Gross Motor Function Measure and had the opportunity to use it in their practice for a three-week period. In a subsequent focus group, participants shared their experiences and perceptions of using this outcome measure. Results were analysed using thematic analysis. All of the 14 participants completed the questionnaire and 10 of these used the outcome measure and also participated in the focus group. The findings of this study are consistent with key studies investigating the introduction of this outcome measure in physiotherapy practices in other countries. All 14 participants were familiar with at least one standardised measure, although their previous use in clinical practice was sparse since they lacked organisational support and resources. The 10 physiotherapists in the focus group had used the 66-item Gross Motor Function Measure at least once and were willing to have it implemented in their respective centres for future use. This study outlined the need for further organisational support and resources to ensure longevity of such standardised measures' use by physiotherapists in Maltese state hospitals.

Formal carers' knowledge, educational needs and attitudes towards older residents living with dementia

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Dementia is a progressive condition requiring support and care in its final stages, very frequently in specialised residential settings. A good level of knowledge, the ability to identify educational needs and positive attitudes are essential for the formal carers (nurses and nurse assistants) in such settings to provide high quality care to residents living with dementia. The aim of this study was to explore the knowledge level, attitudes and educational needs of formal carers working in a long-term residential institution in Malta. The total population of 207 formal carers in the research site was included. A pencil and paper questionnaire was used to collect data. This included the Alzheimer's Disease Knowledge Scale (ADKS), the Educational Needs Scale and the Dementia Attitude Scale (DAS). Overall, the formal carers' knowledge was found to be low. Knowledge was strongest in relation to the 'life impact' of dementia and poorest on the 'risk factors' sub-scale. Overall attitudes towards persons living with dementia were found to be positive. Better knowledge and positive attitudes were associated with occupation, that is, nurses were more knowledgeable than nurse assistants and had a more positive attitude towards persons living with dementia. The clinical area was also related to knowledge and attitudes, with participants working in a specialised dementia unit demonstrating better knowledge and attitudes. Dealing with challenging behavior and the use of technology were the educational needs most frequently identified. Better knowledge was related to better attitudes in relation to dementia but not to educational needs. This study showed that formal carers in specialised units have better knowledge and attitudes towards persons living with dementia. This would suggest that the development of specialised services for dementia care should be encouraged as this should translate into better care for these persons. The importance of adequate nurse staffing in such settings is also highlighted by this study, since nurses had better knowledge and more positive attitudes.

Inter-rater reliability of Doppler waveform analysis amongst health care professionals

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Hand-held Doppler ultrasound examinations of pedal arteries is today one of the most frequently used non-invasive assessment methods employed by health care professionals for the diagnosis and ongoing monitoring of people who are at risk of developing, or are living with, peripheral arterial disease. The aim of this study was to determine the inter-rater reliability of the interpretation of this testing method. An inter-rater reliability study was conducted amongst five experienced qualified podiatrists at a University of Malta Research Laboratory. A research officer at the University of Malta, who was not a rater in this study, randomly selected 229 printed Doppler waveforms from a database held at the same university. Each rater was asked to classify the qualitative spectral waveforms independently as monophasic, biphasic, triphasic and monophasic continuous. Inter-rater reliability of the visual Doppler waveform interpretation amongst the five experienced podiatrists was excellent (K = 0.98). The intra-class correlation test showed a high degree of correlation in waveform interpretation across raters (p = 0.000). This study concludes that when Doppler waveform reports are interpreted by experienced clinicians in the field, accurate interpretation of the patients' lower limb arterial status is accomplished. Careful scrutiny of the current foot screening guidelines do not refer in any way to Doppler waveform analysis in their recommendations, which has been shown in studies to be an important modality for the diagnosis of Peripheral Arterial Disease, when Ankle Brachial Pressure Indices are falsely elevated in calcified arteries. If interpreted correctly, the information obtained can provide a detailed map of lower limb arterial disease early diagnosis and management of this condition.

A critical evaluation of diabetes foot screening guidelines

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The purpose of this study was to critically evaluate the current guidelines for foot screening in patients with diabetes, with a view to examine their completeness in terms of advancement in clinical practice, improvements in technology and changes in socio-cultural structure. A structured literature search was conducted using the keywords '(Diabetes) AND (Foot Screening) AND (Guidelines)' from 1st January 2011 to 1st January 2015 within Medline, CINAHL, the Cochrane Register of Controlled Trials and Google. Ten sets of full diabetes foot screening guidelines were identified. Six of the identified guidelines were the full-process guidelines recommended by the International Diabetes Federation. Four other guidelines were also identified. Evaluation of existing sets of diabetes foot screening guidelines showed substantial variability in terms of different evidence-based methods and grading systems used to arrive at their recommendations, making direct comparison difficult. In some of the guidelines, it is unclear how the authors derived various recommendations, making it difficult for users to understand them. Given the dynamic nature of this topic, it is suggested that more attention should be directed to the limitations of guidelines and underlying evidence on which they are based. This might be the reason for the current gap between recommendations, standard practice and development of complications. The novelty of this study lies in its identification of an urgent need for a paradigm shift in how to screen for risk factors in the diabetic foot using high quality evidence. This could help improve the risk of foot ulceration and its devastating consequences.

Two polymorphisms in the *RANK* gene are associated with bone mineral density and increased fracture risk in Maltese postmenopausal women

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Osteoporosis is a complex hereditary skeletal disease characterised by low bone mass, architectural deterioration and decreased bone strength leading to an increased fracture risk. Bone mineral density (BMD) is the most widely used predictor of fracture risk. The Receptor activator of nuclear factor Kappa B (RANK)/RANK ligand (RANKL)/Osteoprotegerin system is one of the major bone pathways regulating bone remodelling thereby influencing bone microarchitecture and BMD. The polymorphisms rs3018362 (A>G) and rs884205 (G>T) in the 3' translated region of the *RANK* gene have been reported to alter gene expression and protein activity resulting in increased bone resorption. The aim of the study was to evaluate the association of the rs3018362 and rs884205 with BMD at lumbar spine (LS) and femoral neck (FN), and with different types of low-trauma fractures. One thousand and forty-five Maltese postmenopausal women were recruited and BMD measurements were performed by dual-energy X-ray absorptiometry. Women who suffered low-trauma fractures were classified as cases whereas subjects without a fracture history were included as controls subdivided into normal, osteopenic or osteoporotic according to their BMD measurement. Genotyping of the rs3018362 variant was performed by polymerase chain reaction (PCR) followed by restriction enzyme digest, whereas real-time PCR High-Resolution Melt analysis was used for the genotyping of the rs884205 polymorphism. Odds ratios (OR) were computed using logistic regression analysis adjusted for age and any other confounders. Results showed that women carrying two copies of the minor allele G for the rs3018362 variant had a low FN BMD (adjusted OR = 2.2 [95% confidence interval 1.1-5.1], p = 0.02), and to a lower extent reduced LS BMD (OR = 1.9 [1.1-3.4], p = 0.04) relative to research subjects with a normal BMD. Homozygosity for the rs884205 T allele was associated with an increased fracture risk (OR = 2.6 [1.1-7.1], p = 0.04), especially that of the hip (OR = 3.2 [1.2-8.0], p = 0.02) and humerus (OR = 2.9 [1.1-7.9], p = 0.04). Haplotype-based analysis revealed that the alleles were not in linkage disequilibrium (LD) with each other. The study concluded that polymorphisms in the *RANK* gene predispose to reduced BMD or increased fracture susceptibility in Maltese postmenopausal women.

The cost implications of a healthy diet

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A balanced diet is an essential element of a healthy lifestyle. The cost of healthy food may affect consumer purchase. The aim of this study was to compare the prices of healthy and less healthy foods in Maltese supermarkets and to determine whether the former are really more expensive. A list of 102 food items, consisting of 51 healthy and 51 less healthy food items were selected from previous literature and also taking the Healthy Eating Index-2010 (HEI-2010) into consideration. Food price data per 100g was collected from five supermarkets across the five geographical districts of Malta to ensure a representative sample. Foods were classified into distinct food groups and the Mann-Whitney non-parametric test was carried out to test for price differences between healthy and less healthy foods in each food group. An overall analysis of the price differences was done using an unpaired *t*-test. The results of this study indicate a small, statistically insignificant price difference between healthy and less healthy foods, with the mean prices being €0.63/100g (±0.55) and €0.60/100g (±0.36) respectively. There were price differences in the distinct food groups, with healthy grains, protein sources, dairy products and miscellaneous food items being more expensive per 100g than the unhealthier groups. Such differences were statistically insignificant. Meanwhile, fruits and vegetables were significantly cheaper than processed foods by €0.40/100g (p = 0.034). In view of the fact that specific healthy items in some groups were more expensive than others compared to the less healthy items and vice versa, the overall price difference was statistically insignificant. This study therefore suggests that the cost barriers of consuming healthy foods in Malta are not insurmountable, implying that it is possible to include lower cost healthy foods such as nuts, legumes, reduced fat dairy and fruits and vegetables in favour of the higher priced lean meats and processed foods.

Population allele frequencies of the 5-HTTLPR Serotonin Transporter gene polymorphism

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The Serotonin Transporter protein (5-Hydroxytryptamine transporter; 5-HTT) is an important reuptake receptor of serotonin from the synaptic cleft. The protein is encoded by the *SLC6A4* gene. A size polymorphism, the 5-HTT Linked Polymorphic Region (5-HTTLPR; *SLC6A4*, 44-BP INS/DEL), exists within the promoter of this gene. The presence of this polymorphism has been associated with an increased susceptibility for a variety of neurological conditions including Parkinson's disease, chronic pain, anxiety and depression related phenotypes. This 5' regulatory promoter polymorphism consists of a 44–base pair insertion resulting in a long or short allele. The short allele is linked to a pronounced reduction in transcriptional efficiency producing lower numbers of transporter protein and a reduced rate of serotonin reuptake. Allele frequencies for this polymorphism show significant variation in different populations. The frequency of the 5-HTT linked polymorphism in the Maltese population was determined in 606 cord blood deoxyribonucleic acid (DNA) samples. Allele size difference of the 5-HTTLPR was detected using Polymerase Chain Reaction (PCR) and agarose gel electrophoresis. In total, 288 samples were found to be heterozygous (L/S) carrying one copy of the short allele and one copy of the long allele, while 129 samples were homozygous for the short allele (S/S) and 189 samples were homozygous for the long allele (L/L). Unexpectedly, two samples were found to carry a copy of the extra-long allele (XL) which is reportedly only found in African and Asian populations. Allele frequencies for L, S and XL alleles are 54.86%, 44.98% and 0.16% respectively. These local frequencies are very similar to those of other European populations, with the exception of the occurrence of the XL allele. This could be a reflection of the changing genetic structure of the Maltese population due to gene flow from other populations brought about by increased immigration and emigration.

The effect of *KLF1* variants on HbA_2 and HbF

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This study revisited the unique family with HPFH Malta type due to KLF1 haploinsufficiency and two new families with the same p.K288X mutation. The data revealed the master regulatory role of *KLF1* in erythropoiesis and the developmental biology of globin gene expression and a new type of autosomal recessive microcytic and compensated anaemia. The GlobinBank was searched retrospectively for additional *KLF1* mutations among non-anaemic samples (haemoglobin more than 10g/dL) with borderline or elevated HbA_2 and elevated HbF. Four hundred and thirty four samples were found, of which 135 were Hb AA (no mutation in the β globin) while 295 were β thalassaemia heterozygote (228 were IVS 1,6C; 37 Codon 39, 17 were IVS 1, 110A while 13 where IVS 2, 1A). Haematological parameters were measured using an automated haematology analyser while HbF and HbA_2 were determined by high performance liquid chromatography (HPLC). The β globin and *KLF1* gene was sequenced. The common single nucleotide XmnI was detected by direct digestion while High Resolution Melting (HRM) assays were used to genotype the HbF-associated SNVs in *BCL11A* and *HBS1L-MYB*. The study identified 11 single nucleotide variants in *KLF1*. Three variations were found in the *KLF1* gene promoter. One was located within the 5' UTR region of the *KLF1* and only 10bp away from the transcription start site. All the others were found in exon 2 and 3 of the gene. These data demonstrate the high value of the GlobinBank in the discovery of new sequences that may have a role in developmental globin gene switching.

Comparison of hearing aid outcome measures in Maltese hearing aid users

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Hearing aid outcome measures are becoming an essential part of audiological intervention. This study aimed at exploring hearing aid benefit in Maltese hearing aid users through subjective and objective outcome measures. The *Profil Imqassar dwar il-Beneficcju tal-Hearing Aids* (PIBHA) was translated from the Abbreviated Profile of Hearing Aid Benefit (APHAB) and was used to examine subjective hearing aid benefit in 56 adult hearing aid users aged 20 to 60. Twenty nine of these subsequently participated in two clinical tests: real ear measurements (REMs) and two non-word repetition tests, the Maltese Non-Word Repetition Test in Quiet and in Noise. Analysis aimed at identifying factors that are related to hearing aid benefit and to explore to what extent subjective perception of benefit correlates with performance in non-word repetition testing and REMs. Daily use was associated with gender and hearing aid type. Reported benefit on the PIBHA was not associated with daily hearing aid use, hearing aid type or fitting. In non-word repetition testing, scores in quiet were found to be significantly different from scores in noise. Word likeness, syllable length and consonant clusters had an effect on non-word repetition scores. Non-word scores in quiet using a phoneme-based analysis were positively moderately correlated with benefit scores on the PIBHA. Non-word scores were not affected by hearing aid type or fitting. Fifty percent of REMs did not meet prescribed targets by more than 10 dB. Overall, hearing aid type did not affect REMs results; digital hearing aid users only scored significantly better at three frequencies at 50 dB. Non-word repetition scores were correlated with scores on the PIBHA and with REMs. REMs were not correlated to the PIBHA. Despite inconsistencies between subjective and objective measures, implications for including both subjective and objective measures in hearing aid fitting protocols are addressed.

Characterisation of fungal contaminants affecting preservation properties of *Pirus communis* var. *bambinella*

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Fungal pathogens cause premature fruit spoilage of *Bambinella*, a fruit endemic to the Maltese islands, leading to the loss of fruit during the post-harvest phase. The objective of this study was to characterise and describe the growth kinetics of fungal contaminants of the Maltese June Pear and to produce a *quasi*-in-vivo model of *Bambinella* fruit to understand the growth dynamics of fungi on fruit. A sample of 284 fungicide-free *Bambinella* fruits was collected over two consecutive summers. Fruits were washed in a mild detergent solution and the liquid was plated onto Sabouraud Dextrose Agar with Chloramphenicol (SDC) medium. The isolated fungi were identified and counted. 10μL of conidial suspension were used to point inoculate SDC plates. Seven different temperatures per species were studied and their kinetics were recorded. Spore germination studies were also performed for each isolate on in-house prepared *Bambinella* medium and the percentage of germination at optimal temperatures was calculated. Fungi isolated from *Bambinella* included *Cladosporium ramotenellum*, *Penicillium lanosum*, *Penicillium expansum*, *Alternaria arborescens* and *Aspergillus sydowwi*. All isolates are known to be causative factors of fungal disease in pears. Based on kinetic studies, the order of most to least aggressive fungus is: *A.arborescens*, *P.expansum*, *P.lanosum*, *C.ramotenellum* and *A.sydowwi*. Optimal temperatures lay at around 20°C, while growth was markedly slower at temperatures below 10°C and above 30°C. The rate of germination on *Bambinella* medium appeared to be similar to the rate of germination on SDC, suggesting that the fruit provides ample nutrients for fungal growth. Understanding the growth dynamics of *Bambinella* fungal pathogens can help in reducing the use of agricultural fungicides, which have been proven to cause clinical azole resistance in some fungal (e.g., *Aspergillus*) infections, due to their chemical similarity.

Construction of the Maltese Speech-in-Noise Test (M-SINT)

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Although hearing loss results in audibility and clarity difficulties, conventional assessments only quantify audibility. These fail to account for functional difficulties caused by hearing loss, offering an incomplete audiological analysis, possibly resulting in poor amplification and management choices. Speech perception in noise is vital for participation in conversations. Speech-in-Noise (SIN) testing quantifies this ability and drives realistic goal-setting and management. The Maltese clinical context lacks language-specific speech assessments. For this reason, the Maltese Speech-in-Noise Test (M-SINT) was constructed. During the construction of the M-SINT, sentences from the Bamford-Kowal-Bench (BKB) sentence list were translated and assessed for naturalness. Two hundred and seventy sentences were recorded in an anechoic chamber by a female native speaker. The background noise was based on the long-term average spectrum of several talkers. A computerised programme enabled instant scoring and delivered the test stimuli binaurally at three fixed Signal-to-Noise Ratios (SNRs): -6.5, -9 and -11.5 dBSNR (generating 25, 50 and 75% correct scores). Maltese native speakers with normal hearing, aged between 19 to 35 years (N = 27), were tested to estimate a psychometric function (PF) for each sentence. One hundred and fifty five sentences were selected in terms of PF slope steepness and Speech Reception Threshold (SRT). To increase reliability, correction factors were implemented, equalising sentences at the 50% point (SRT). The M-SINT sentences were ultimately assigned to 10 lists of 15 sentences. Each list was homogenous in terms of SRT, PF slope and phonemic content. The final M-SINT sentence corpus fulfils theoretical criteria for reliable adaptive SIN testing, but requires further development to be used clinically. The M-SINT must be administered on a normal hearing population, using an adaptive method for the specification of norms which could be a reference point in the clinical environment. Ensuring list equivalence will conclude whether the M-SINT is repeatable, allowing the M-SINT to gain viability as a clinical tool.

Molecular typing of the Cartwright blood group antigen in Malta

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The Cartwright blood group antigens, Yt^a and Yt^b, are two of the main surface markers which are found on the red blood cells' membrane. The antigens are found on the protein acetylcholinesterase, an enzyme which helps break down acetylcholine and expressed by the gene AChE. The determination of whether a donor or a recipient has the Yt^a and/or the Yt^b antigens is crucially important in order to have a successful transfusion without the development of adverse incompatibility-related reactions. This research was performed to determine for the very first time the molecular frequency of the Cartwright antigens in the general Maltese population and in the blood donor target population. All molecular work was conducted using Allele Specific Primer Extension, with a known negative and positive control in each Polymerase Chain Reaction (PCR) run. After extracting deoxyribonucleic acid (DNA) from blood samples, a total of 405 samples were representative of the general Maltese population, whilst a total of 106 samples were representative of the Maltese blood donors. Allele Specific Primer Extension analyses were carried out. The amplified PCR products were visualised on a 1.5% agarose gel, allowing a quick and easy separation of the Yt allele specific fragments. The genotypes were noted and recorded for each case. The results of all molecularly tested samples showed that there was no difference between the target blood donor population and the general Maltese population (93.0% Yt^a and 7.0% Yt^b; 93.7% Yt^a and 6.3% Yt^b respectively). Both the target blood donor and the general Maltese population were in Hardy Weinberg Equilibrium (χ^2 = 0.53 and 0.14). Moreover, results from both populations show that the phenotype frequencies (blood serological typing) in the Maltese population are as follows: Yt^a + Yt^b + 11.74%; Yt^a + Yt^b - 88.06%; Yt^a - Yt^b + 0.2%. The PCR-Allele Specific Primer Extension method was confirmed as a suitable alternative laboratory technique that can be used to determine efficiently the Cartwright blood group of both donors and recipients, in an accurate manner without the limitations encountered in the case of haemagglutination. This research further facilitates the introduction of molecular-based techniques in molecular blood transfusion.

Factor analysis of a questionnaire for auditory processing skills

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Studies show that between 0.5 to 5% of individuals complain of listening difficulties irrespective of normal audiometric results. This suggests a possible auditory processing disorder (APD). However, research shows that listening difficulties are also manifested in other recognised diagnoses such as language impairment, literacy difficulties and autism spectrum disorders, since sound processing entails complex connections between auditory, language and cognitive (encompassing attention and memory) structures. Given these comorbidities, it is of interest to evaluate the types and situations where listening difficulties emerge in these specific neurodevelopmental disorders. The objective of the study was to assess the factors underlying listening difficulties by carrying out an exploratory factor analysis of results for the Questionnaire of Central Auditory Processing (QCAP), developed as part of an APD test battery for Maltese children, in order to extract relationship patterns between these by grouping them under one or more factors. The questionnaire was given to the parents of 142 typically-developing children (age range 7;00 - 9;11 years; 76 male, 95 female) and 29 children diagnosed with various diagnosed neurodevelopmental disorders including language impairment, dyslexia, dyspraxia, and attention deficit hyperactivity disorder (ADHD) (age range 7;00 - 9;11 years; 17 male, 12 female). All children with neurodevelopmental disorders were reported to exhibit listening difficulties and were therefore suspected of having auditory processing difficulties. Factor analysis was employed to analyse these results using varimax rotation. Factor loadings of >0.5 were considered for inclusion in a factor. Five factors were extracted, consisting of one clear strong factor displaying an eigenvalue of 8.497 (auditory attention and memory) and four other factors with eigenvalues just above 1 (following conversations, sensory stimulation, noisy situations, and social aspects). Further research would explore how children with different neurodevelopmental disorders would perform in each factor.

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