People Centeredness

1

Cardiotoxicity of Immune Checkpoint Inhibitors

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Objectives: Immune checkpoint inhibitors (ICPI) are monoclonal antibodies which inactivate the inhibitor molecules of checkpoints, restoring the cytotoxic T-cells. They showed improved clinical outcomes in different types of cancer, but high-grade, immune-related adverse events may occur, namely myocarditis. This study aims to review the cardiotoxicity related to ICPI therapy.

Methods: Search of articles that correlate cardiotoxicity and immune checkpoint inhibitors therapy, published from 2016 to 2017 in PubMed's electronic database. Data analysis of FDA Adverse Events Reporting System (FAERS) was also accomplished.

Results: Ipilimumab had 11 051 reported adverse events and of those 4.52% (n = 499) were cardiac disorders. Of the 4.52%, 99% (n = 494) were serious cases and 40.1% (n = 200) resulted in death; myocarditis represented 10.4% cases (n = 52) of which 57.7% (n = 30) ended in death. Nivolumab had 16 213 reported adverse events and of those 5.99% (n = 971) were cardiac disorders. Of the 5.99%, 99.5% (n = 966) were serious cases and 34.5% (n = 335) resulted in death; myocarditis represented 10.3% (n = 100) cases of which 53% (n = 53) ended in death.

Conclusions: Myocarditis is a rare but potentially fatal T-cell–driven drug reaction. Cardiac monitoring is not performed routinely in most immunotherapy treatments, being the true incidence of ICPI-induced myocarditis unknown. It is important to be aware of this cardiotoxic effect because immune-mediated myocarditis has an early onset, nonspecific symptomatology and a fulminant progress making it important to be monitored by ECG, troponin levels and other tests.

Keywords: Myocarditis, Cardiotoxicity, Immune checkpoint inhibitors.

2

How Do the Different Tribes in Hospitals Describe Hospitality?

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Objectives: Hospitality becomes more and more important in sectors not belonging to the traditional hospitality areas such as the hotel and tourism industry. In his book 'If Disney ran your hospital' Lee asserts that courtesy, here as metaphor for hospitality, is more important than efficiency in hospitals. With this he caused a landslide in patient-centricity discussion, which traditionally focussed on the medical side of healthcare services. Since then we have seen an increase in hospitals running their own hospitality program in order to improve their patient journeys hence patient satisfaction.

Discussion: Departing from the hotel industry there is no doubt whatsoever about who 'the guest' is. The whole staff treats guests hospitable whatever the function of the staff-member may be. The definition of 'the patient' in the healthcare sector is, however, blurred: some hospital staff members look at patients holistically, others focus on the bodily function of the patient Clearly, not every hospital employee has the same idea about 'the patient'. We assume that these varying perspectives exist also about the connotation of hospitality.

This article seeks to investigate the way the various hospital 'tribes' (facility staff, nurses, and doctors) perceive 'hospitality'.

Methods: We commenced with a literature study of hospitality in general and more specifically of hospitality in the healthcare sector. Next we conducted a qualitative research with semi-structured interviews among approx. 450 hospital employees in 8 different hospitals regarding aspects of hospitality based on hospitality attributes and dimensions of Pijls et al.

Results: There was a clear distinction between the three 'tribes' about their connotation of hospitality.

There was no relevant distinction about the meaning of hospitality among the members belonging to the same tribe at varying locations.

Conclusions: Findings indicate that the absence of an unambiguous and shared idea of hospitality impedes the successful implementation of hospitality programs in hospitals and therefore patient satisfaction will not or only gradually improve.

Lessons Learned: To implement hospitality programs in hospitals successfully, there should be a shared understanding of connotations. Furthermore, the goals of hospitality programs should be clear to all stakeholders involved.

Limitations: The most important limitations are:

There was a limited number or respondents interviewed.

Appreciation of the running hospitality programs nor the success-rate or impact were part of this discussion.

Suggestions for Future Research: Obtain more data of and include more different employees (f.i. management). Feasibility study to the usefulness of hospitality impact programs.

Keywords: Hospitality, tribes, hospitals.

3

Stakeholders' Views on Public Involvement in Policy Making in the Portugal

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Objectives: Successful governance for health requires co-production of health, i.e., sharing governance and involving citizens in producing knowledge to inform decision-making. Nevertheless, in Portugal, public involvement has been insufficient and selective, even though individuals and civil society organisations have shown interest to participate in health care decision-making. The recognition of public involvement value by other stakeholders has been considered key to promote citizen representatives involvement in decision-making and health policy.

Our goal is to understand how various stakeholders' see the participation of patients and public in general in the policy making process.

Methods: The views, attitudes and experiences of various health stakeholders (decision-makers, policy makers, doctors, nurses, and hospital managers) were assessed through an online questionnaire and analyzed in face of the public perspective to identify drivers and barriers to a greater and meaningful public involvement in the Portuguese NHS.

Results: there were 246 questionnaires filled in online, 60% of the respondents were male and mean age was 43.6 years old. The majority worked in the public sector (68%), mainly in primary care or hospitals and around 20% were physicians. Half of the respondents had post-graduated studies (PG or MSc equivalent). Our respondents were members of associations such as professional boards, unions, scientific associations or patient associations. Around 15% had participated in petitions as citizens or in their professional role. In our sample, people did not think that pharmaceutical or device companies or insurance companies had a role to play in the development of the Portuguese health policy. Our respondents (80%) considered that the most important factor for public involment in health policy was empowering the citizens to do so. The second factor highlighted was an existing culture of collaboration between government institutions and civil society.

Conclusions: From the answers gathered it was clear that our respondents saw the participation of citizens as important in the development of health policy. In order to have the patient in the centre of the system it is key to have public involvement informing policy-making on governance for health.

Keywords: Patients' involvement, Portugal, empowerment.

4

Refocus the Spotlight on the Sick. Change the Paradigm

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Objectives: "*Organizations don't exist to serve themselves of their customers, but rather to serve them*". This axiom justifies the prevalence of customer interests over corporate interests.

Methods: In Portugal, the engine of change in the hospital sector is the search for the ideal management model for greater efficiency and effectiveness.

The business management of hospitals (in 2002) constituted an initiative that introduced ruptures in the organizational structure. It was assumed that the traditional management model was unable to achieve the goals of efficiency and quality. The new models should:

– Be based on quality of care and focus on performance;

– Ensure the prevalence of patients' interests over corporate interests;

– Have a clear command and accountability order.

Results: The process of Business Management backed the development of hospitals as isolated islands of productivity and efficiency, against the need to be framed as part of the system.

The new status was expected to be gradually allocated to the remaining hospitals. However, different systems remain, generating differences in responsiveness and development.

Hospitals (public undertaking) offered salaries relatively freely, establishing irreconcilable and discriminatory remunerations.

The lack of doctors is pointed out as the cause of emergency dysfunction. Despite the fact that this professional group is the only one without a normal work activity scheduled in the evenings and at weekends. And Portugal is one of the countries with the highest number of doctors per capita.

The main problems remain:

– Dysfunction of emergency services;

– Lists and waiting times;

– Deficit in "accessibility" and "universality in coverage";

– Costumer and professional dissatisfaction;

– Unbalanced expenditure growth.

Conclusions:

A new Paradigm with the following scale of priorities:

– Reorient focus to the Patient;

– Integrated vision of care delivery at different levels;

– Organizational structure adjusted to the strategy;

– Integrated management of resources.

Seven measures – two groups:

– Consensual

₤ Integrated vision of the system with greater link of the hospitals to the primary, continued and palliative care;

₤ Financing model that focuses the results and the retribution by objectives, without prejudice to the exceptions associated with the geographical area or demographic structure;

₤ Monitor activity with reliable indicators, not only in terms of quantity, but essentially, of quality.

– Controversial

₤ Reconcile the legal statute of public hospitals;

₤ Eliminate the pay discrimination of professionals;

£ Adapt the medical work regime to the other professional groups;

£ Framing of health services in the system, with the prevalence of clients' interests over corporate interests.

Keywords: Organizations, management, patients.

their heterogeneous needs, it is recommended that ED, primary care and social service communicate effectively and work together to meet each person of this limited group and his/her needs, in order to provide the most appropriate care to address them.

Keywords: Emergency Department, Very Frequent Users, Patient Centered Care.

5

Can We Know the Needs of Emergency Department Very Frequent Users by Looking at their Clinical and Social Characteristics?

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Objectives: Very frequent users (VFU) of emergency department (ED) have been shown to suffer from increased health and social problems. Without assessing the needs of VFU, initiatives to contain ED utilization risk decreasing access to appropriate care. This study aimed to characterize the very frequent users of an emergency department in an urban public hospital, from a clinical and social point of view.

Methods: Retrospective single-center study (highly differentiated ED) of adult patients visiting the ED in 2016. VFU were patients with >10 ED visits. After ethics committee approval, one researcher used an abstraction form to collect data from the medical records, complemented with the ED visits database. Clinical characterization considered chronic conditions, mental health conditions, and alcohol or drug dependence. Social characterization included working status, housing conditions, economic or family problems, and use of social services. We considered patient death and exemption from moderating fees. Primary and acute care use were studied from family doctor availability, number of primary care visits, triage status, and disposition of ED visits. Descriptive analyses of VFU characteristics were conducted.

Results: A total of 169 VFU were identified (0.3% of patients; 3.0% of ED visits). Each patient visited the ED an average of 16.9 times (2850 ED visits). VFU were mostly men (56.2%) and aged above 65 y (48.0%). Patients had in average 4 chronic conditions and mental conditions were frequent (27.6%). Alcohol dependence was present in 17.2% of patients and drug in 5.2%, but clinical support for addiction was recorded for only 1.5% and 0.7%, respectively. Nearly 1 in 5 VFU were unemployed (19.4%), while 37.3% were retired. Family and economic problems were found for 28.3% and 14.2%. Most had a family doctor assigned (63.9%) and 34.3% were also frequent users of primary care (>4 visits). Mortality rate was 15.6%. Most patients were not exempted from moderating fees (57.9%). Their ED visits were triaged mainly as "standard" (green; 36.4%) and most left ED without planned follow-up (58.0%).

Conclusions: Our results showed that VFU had poor health and substantial social problems, with limited support from social services and follow-up after ED visit. However, they are a heterogeneous group, since many were triaged as non-urgent. To address

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6

Evaluation of Emergency Department Performance at Greek Hospital: A Cross Sectional Study

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Objectives: Many healthcare organizations have been developing key performance indicators (KPIs) for monitoring, measuring, and managing the performance of their emergency departments (EDs) to ensure effectiveness, efficiency, equity and quality of care. The aim of this study was to investigate the performance of emergency department based on implementing valid and reliable KPIs.

Methods: A retrospective cross-sectional study was carried out examining KPIs developed and classified into the three components in the context of structure-process-outcome conceptual model of patient flow at the ED of a General Hospital of Attica, Greece. The KPIs examined in this study were derived from literature review, expert consensus process and current availability of the elements. All selected KPIs were piloted in November-December 2016 and measured afterwards in systematically sampled patients and days for one year based on currently available ED data-capturing systems.

Results: The annual emergency department volume was approximately 55000 patients, with a hospital admission rate of 16.3%. Ambulance and aero-medical transport services made up 14.2% of arrivals. Acuity of patients by Emergency Severity Index score of 1, 2, 3 and 4 was 3.6%, 15.6%, 56.1% and 24.7%, respectively. The mean time interval calculation of 3841 patients for door to first assessment time by advanced nurse practitioner was 36 min, for door to imaging time was 232 min, for door to admission time was 275 min and boarding time was 79 min. All intervals were significantly longer when numbers of ED presentations per hour increased (p = 0.003), triage category worsen (p = 0.001) and the arrival department was different from admission department (p = 0.013). Overall, 36% of the patients were admitted within the four-hour standard performance. The percentage of left without being seen patients and discharge against medical advice was 11.1% and 5.2%, respectively. The prevalence of diverting patients to another emergency department with more resources was only 1%. The annual mortality rate was 0.36%.

Conclusions: KPIs are an invaluable tool that contributes immensely to the ED performance monitoring process. A quality performance framework will vary according to the priorities of an institution and the feasibility of collecting data using available resource. However, KPIs is necessary to determine exactly what they are intend to measure and the reliability of the data analyzed to promote accountability and achieve comparison.

Keywords: Key Performance Indicators, Emergency Department, Quality of care.

7

Antihypertensive Drugs in Patients with Chronic Renal Failure Undergoing Haemodialysis

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Objectives: Several antihypertensives require dose adjustment in renal insufficient patients on haemodialysis. Given that this information is somewhat dispersed, it would be desirable to bring together the required dose adjustments in order to increase the efficacy and safety of antihypertensive therapy. The objective of this work is to review the required dose adjustments of antihypertensives in patients with chronic renal insufficiency undergoing haemodialysis.

Methods: The drug databases of the Nacional Authority of Medicines and Health Products (INFARMED, in Portugal) and of the European Medicines Agency (EMA, in Europe) were consulted. The Summary of Product Characteristics (SPCs) of antihypertensives authorized for use in Portugal was analysed to highlight those requiring adjustment in haemodialysis patients.

Results: Depressors of beta-adrenergic activity can be used on patients undergoing hemodialisys, e.g., atenolol can be used if monitored very closely. Carvedilol a beta-adrenergic-blocking drug with vasodilating properties is more efficient than the calcium channel blockers. Regarding this latter group, lercanidipine is contraindicated, and nivaldipine as well as felodipine can be administered under strict supervision. The use of isradipine should also be monitored because it can cause many adverse effects in renal failure. During the administration of candesartan, an angiotensin II receptor antagonist, the blood pressure should be closely monitored in patients on haemodialysis. Concerning the subgroup of angiotensin-converting enzyme inhibitors, they can cause anaphylactic reactions when used concomitantly with high flow membranes. This occurs with captopril, cilazapril, enalapril, fosinopril, imidapril, zofenopril and quinalapril. Possible alternatives consist of changing dialysis membrane or the class of antihypertensive medication. A handout with the dosage adjustments and precautions to be taken with these drugs in the mentioned patients was developed.

Conclusions: The developed handout is a useful tool to healthcare professionals and patients, providing a summary of the main precautions with antihypertensive therapy in patients on haemodialysis.

Keywords: Antihypertensive therapy, Haemodialysis, Chronic renal failure.

8

Outcomes Research Lab – "Leveraging Evidence for Better Care"

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Objectives: Nowadays, hospitals have a huge amount of data available in electronic format. Our institution isn't an exception, mainly because, in the last decade, we have made a large investment in information technologies (IT), including electronic prescribing and electronic medical record. Moreover, since 2007 we are organized into integrated practice units, putting the patient at the center of the healthcare provided. So, it was time to produce information and knowledge from the data available by analyzing the care provided to the patient in a holistic manner, including patient reported outcomes, by measuring their quality of life. We defined the following strategical goal: improving care by leveraging the evidence available. Specific objectives were: monitoring and evaluate the health technologies offered by our institution, mainly the innovative ones; dissemination of trustworthy information for the stakeholders, allowing decisions based in value; implementation of Patient Access Schemes; and increasing/improving research produced from real world data.

Methods: In 2016, we created a new functional unit: Outcomes Research Lab (ORLab). Its mission is to produce knowledge in the following areas: cost, safety and effectiveness of health technologies (including quality of life), and to promote the scientific research in these fields. The ORLab is ruled by two fundamental principles: multidisciplinarity and collaboration. It is only feasible to improve the care we provide to patients if we act based on outcomes data. Therefore, since the beginning we brought healthcare professional on board. They have to trust on the outcomes we provide in order to take decisions based on them.

We developed two computer tools which pool the data from several databases: Vision and MedVision. The first one provides a holistic view of the patient clinical pathway and the second a deep understanding about the cost, safety and effectiveness of innovative drugs.

Results: ORLab made possible to achieve the following results: 53 ongoing observational studies about innovative drugs (39 drugs, 784 patients, about 22 million euros); monitoring of existing Patient Access Schemes; publication of articles in international journals; oral communications and posters presented at national and international conferences; and participation in projects with external entities (national and international scope).

Conclusions: Evidence-based medicine, outcomes-based performance evaluation and value-based management have been demanding the implementation of Outcomes Units in hospitals. Its implementation was feasible at our institution and can be replicated in other organizations. Involvement of the several decision-makers, development of the necessary IT tools and selection of the relevant information are key success factors.

Keywords: Outcomes, RWE, PROM.

9

A National Program to Assess and Improve Healthcare Humanization in Hospital Through a Partnership Between Citizens and Healthcare Professionals

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Objectives: The attention to person-centered care has played a crucial role in the international scientific debate over the last 25 years. Its relevance has been acknowledged in Italy by the "Pact for Health 2014–2016", a three-year plan agreed jointly by central and regional governments, and by the new framework for Accreditation of healthcare facilities. The Italian National Agency for Regional Healthcare Services (Agenas) has launched in 2011 a National program aimed at evaluating and improving healthcare humanization in hospitals through a participatory methodology based on a partnership between professionals and citizens.

Methods: The program is coordinated by Agenas experts and carried out in cooperation with the Active Citizenship Network and the Italian Regions. A participatory procedure and a checklist for humanization enhancement has been developed, validated and used in Italian hospitals. The checklist is composed of 142 items which explore four areas of interest: Person-oriented processes; physical accessibility and comfort; access to information and transparency; patient- professional relationship.

Trained équipes composed of citizens and professionals fill in the checklist during an on-site visit then the collected data are sent to a National database. The National results are analyzed and sent back to Regions, hospitals and équipes for local public dissemination. Improvement plans are then jointly identified and carried out by hospital professionals and citizens.

Results: A first Nationwide Program carried out in 2013/2014 to assess and improve humanization of care in hospitals involved 287 (public and private – accredited) Italian hospitals. About 600 citizens and professionals were properly trained on the use of the checklist and on the participatory method. Within the second national program launched in 2017 (currently underway) more than 400 hospitals have been evaluated and Plan-Do-Check-Act cycles have been implemented. An additional checklist for the participatory assessment of patient safety in hospitals was introduced.

Conclusions: The Italian national program has shown the effectiveness of the partnership between organizations, professionals and citizens to promote humanization of care and spread a person-centered culture within the healthcare organizations. Moreover Agenas has recently launched a program for improving humanization of care in nursing homes.

Keywords: Person-centered care, Healthcare humanization.

10

Qualitative Interview Study of Primary Health and Social Care Professionals' Perceptions and Experiences of Barriers to Effective Integrated Care for Elderly Patients in London

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Objectives: Integration of primary health and social care is proposed as a method for reducing unnecessary costs in health care as well as improving patient experience of care for elderly patients. While European models such as Spain's Ribera Salud are progressing towards integrated health and social care, Britain suffers from institutional fragmentation of its health (NHS) and social sector, since many integration pilots fail to engage key stakeholders – front-line professionals in contact with patients.

The aim of this study is to explore the barriers to successful integration of primary health and social care in London for the elderly population, as experienced by front-line health and social care professionals.

Methods: Semi-structured interviews were carried out with health and social care professionals working in London to explore their views and experiences about barriers to integrating social care and primary health care. 18 General Practitioners, 6 Primary Care Managers and 6 Social Care workers were interviewed in a mixture of face to face and telephone interviews. Interviews were transcribed and thematically analysed to produce recurring themes. NHS Health Research Authority granted ethical approval for this study.

Results: Thematic analysis of interviews revealed 3 main themes about barriers to health and social care integration:

(1) Weak inter-professional relationships: GPs describe a lack of multidisciplinary team (MDT) meetings between primary care and social care for complex elderly patients and cultural barriers between professionals (social workers being uncooperative with doctors) lead to fragmented care for the elderly. Similarly social workers also describe a difficulty in organising MDT meetings due to busy schedules and GPs being dismissive of social care workers.

(2) Weak infrastructure to support integration: a lack of allied health professionals due to NHS funding cuts and a lack of funding available for enhanced IT systems, preventing interoperability of health and social care data for elderly patients, poses a huge challenge for progress towards integration.

(3) Inaccessibility of Services: GPs and social workers both described poor communication between the two sectors, due to inadequate training and a lack of standardised referral systems between health and social care across London boroughs.

Conclusions: Primary health and social care professionals describe system wide challenges to health and social care integration, such as cultural barriers, poor communication, inadequate IT systems and lack of standardised services which must be considered when developing new models of integrated care.

Keywords: Healthcare, Social-care, Integration.

11

Process Improvement in Hospital Outpatient Clinic

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Objectives: The board management team defined, amongst other key strategic areas for improvement, the time spent by the patient in the hospital as the main challenge to address; other issues identified during the improvement process shall be addressed accordingly.

Methods: We started our approach with a "gemba walk" observational study in several different days of the week, in order to understand how the admission to medical consultation was made. We used the IT tool Attendance Management to measure both maximum and average time of waiting for the two major patient care flows: admission consultation and the booking of complementary means of diagnosis.

Then, we designed patient, documentation and IT flows to help identify waste and look for improvement opportunities. After this, a Process Mapping was co-designed by the multidisciplinary team, staff from front and back consultation offices, nurses, physician and consultation managers. With all this data, it was possible to identify wastes such as time and transport.

Afterwards, as a result of team work, the principal improvements to implement were mapped. The longest waiting time was post-consultation, during which time the patient had to return to the external consultation office to schedule further X-Ray and clinical analysis. A measure was implemented, removing the patient as the carrier of simple exam requests, with the aim of reducing the post-consultation flow of patients. On the other side, the processing time for booking these exams was also reduced.

Results: A decrease was obtained in admittance's maximum waiting time, in the post-consultation's maximum and average waiting time, as well as in the flow of patients returning to admission for further exam scheduling. The maximum admission's flux waiting time decreased from 62 minutes to 32 minutes and the after-appointment flux from 170 minutes to 58 minutes. The processing time for X-ray and clinical analysis booking was reduced thanks to a greater reliance on back office work as opposed to waiting for the patient's presence to conclude the task. The processing time for this task decreased from a median of 3.07 minutes to 1.30 minutes.

Conclusions: An improvement was gained as far as attendance times were concerned, due to the implementation of the following indicator: "no more than 30 patients waiting". The communication flow between different teams with responsibilities throughout the external consultation admittance process was also greatly improved. The number of returning patients for X-ray and blood sampling scheduling (exams without preparation) was also reduced.

Keywords: Clinic, lean, outpatient.

12

The Impact of the Nursing Professional Practice Environment on Patients Outcomes

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Objectives: To classify the nursing professional practice environment and to test the relation with the perception of the safety climate and the quality of care provided to the patient.

Methods: A cross-sectional study, with a quantitative approach, performed in a public hospital in Brazil, of great size and reference for high complexity care. The sample consisted of members of the nursing team who provided direct assistance to the patients and worked in the unit for a period equal or superior to three months. The Brazilian version of the Practice Environment Scale (scores of the subscales ranged from one to four points), the safety climate subscale of the Safety Attitudes Questionnaire and one question, in characterization record, was used to evaluate the perception of the quality of care offered to the patient by the team, on the last shift. The data were tabulated in the Microsoft Excel for Windows® program and analyzed by the Statistical Analysis System (SAS) for Windows®, version 9.2. Absolute and relative frequencies of the categorical variables and position and dispersion measures of the continuous variables were calculated. To correlate the variables, the Sperman correlation coefficient was used.

Results: 525 nursing professionals participated in the research and as regards the assessment of the environment, the averages obtained was 2.3 points for the subscale Nurse Participation in Hospital Affairs; 2.3 for Staffing and Resource Adequacy; 2.6 points for Nursing Foundations for Quality of Care; 2.6 points for Nurse Manager Ability, Leadership, and Support of Nurses and 2.8 points for Collegial Nurse-Physician Relations. In the evaluation of the relationship of these subscales with the safety climate and the quality of care, the following correlations were, respectively, obtained: Nurse Participation in Hospital Affairs (r = 0.55 and r = 0.30); Staffing and Resource Adequacy (r = 0.38 and r = 0.43); Nursing Foundations for Quality of Care (r = 0.57 and r = 0.38); Nurse Manager Ability, Leadership, and Support of Nurses (r = 0.58 e r = 0.32) and Collegial Nurse-Physician Relations (r = 0.43 and r = 0.33). All correlations reached values of p < 0.0001.

Conclusions: The hospital environment was classified as mixed and a positive correlation of the professional practice environment with the perception of the safety climate and the quality of care was obtained, demonstrating that investments in the environment where nursing develops its activities contribute to better patient outcomes.

Keywords: Health Facility Environment, Patient Safety, Quality of Health Care.

13

Validation of Practice Environment Scale Between Nursing Technicians and Assistants

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Objectives: To validate the Brazilian version of the Practice Environment Scale (PES) between technicians and nursing assistants.

Methods: Methodological study. The sample calculation was based on the methodology of a Pearson correlation coefficient with test power of 80%, a significance level of 5%, an estimate for the correlation coefficient equal to 0.30, and a correlation coefficient of 0.00 as a null hypothesis were assumed, which resulted in 84 mid-level nursing professionals. In order to evaluate the construct validity of the Brazilian version of PES, the following instruments were used: the emotional exhaustion subscale of the Maslach Burnout Inventory, the job satisfaction and safety climate subscales of the Short Form Safety Attitudes Questionnaire and a characterization record, in which two questions were included to evaluate the perception of the quality of the care and the intention to leave the job. To evaluate the validity, the correlations were analyzed using the Sperman correlation coefficient and to evaluate the reliability, the Cronbach's alpha coefficient was calculated. The level of significance was set at $p < 0.05$. The research followed ethical standards governing research involving humans.

Results: 89 nursing professionals participated in the study and in the evaluation of the correlation of the PES subscales with the emotional exhaustion subscale, job satisfaction, safety climate, perception of the quality of care and intention to leave the job, the respective coefficients were found: Nurse Participation in Hospital Affairs ($r = -0.40$, $r = 0.48$, $r = 0.67$, $r = 0.25$ and $r = -0.31$); Staffing and Resource Adequacy ($r = -0.48$, $r = 0.53$, $r = 0.46$, $r = 0.39$, $r = -0.24$); Nursing Foundations for Quality of Care ($r = -0.43$, $r = 0.52$, $r = 0.57$, $r = 0.34$, $r = -0.31$); Nurse Manager Ability, Leadership, and Support of Nurses ($r = -0.42$, $r = 0.53$, $r = 0.69$, $r = 0.28$, $r = -0.36$) and Collegial Nurse-Physician Relations ($r= -0.43$, $r = 0.43$, $r = 0.58$, $r = 0.22$, $r = -0.22$). All correlations reached values of $p < 0.05$.

Conclusions: The Brazilian version of PES is a valid and reliable tool to evaluate the characteristics of the professional practice environment of nursing assistants and technicians. It is important to carry out studies with these professionals since they constitute the largest contingent of nursing professionals in the Brazil and know and implement strategies to improve the environment in which nursing develops its activities contribute to the achievement of better outcomes.

Keywords: Validation Studies, Health Facility Environment, Nursing.

14

Course Management of the Patient with Chronic Obstructive Pulmonary Disease (COPD)

Edite Maria Carvalho Nunes De Brito, Carla Sofia Sales Leal Araújo, Adriana Sofia Veiga Taveira, Luís Rego Costa Matos, Alexandra Manuela De Abreu Martins, Rui Jorge Da Costa Henriques Carneiro, Sónia Bogas Ferreira, Eduardo Alves De Castro

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Objectives:
• Improve the patient's access to health care;
• Improve the patient's access to the complementary diagnostic and therapeutic means (CDTM-cardiology and pulmonology), in the scope of Primary Health Care;
• Reduce costs with CDTM;
• Promote the integration of intra/interinstitutional care;
• Invest in health literacy of health professionals/citizens;
• Reduce direct and indirect costs to the NHS (better coordination between the various levels of care with sustained reorganization of the practice by the different professionals; early diagnosis through the internalisation of CDTMs with HSMM; reduction of the number of external consultations, emergency episodes and hospitalizations; increase in QALYs): Initial Investment of 79,928€; Operating Costs of 214,335€. Payback materializes as early as Year 1, as a result of annual revenues of 289,206€.

Methods:
• Standardization of performance standards, through the elaboration of a guidance manual of Good Practices – the Manual of Procedures;
• Establishment of interinstitutional partnerships, formalized by protocols based on mutual agreements and benefits, between Agrupamento Centros de Saúde Cávado III Barcelos/Esposende (ACES) and Hospital Santa Maria Maior E.P.E (HSMM);
• Promotion of a multifaceted approach, based on the follow-up cycle of COPD;
• Requalification of service spaces in ACES; development of training plans for health professionals; promotion of self-management of the patient's health/illness and adequate use of health services, using an Individual Care Plan (ICP) for the person with COPD.

Results: Given that, during the year 2018, the project is still in the implementation phase, we have so far assumed the following outcome indicators:
• Manual of Procedures technically validated, disclosed and implemented by ACES Functional Units;
• Course of patient with COPD defined (follow-up consultations, respiratory rehabilitation, smoking cessation, nutritional support and psychology)
• Establishment of production lines (cardiospirometry/Respiratory Rehabilitation) between ACES/HSMM;
• Interinstitutional protocols are formalized/validated;
• ICP technically validated/implemented by ACES;

Conclusions:
• The implementation of good health care and organizational practices is a reality, which ensures high levels of access, quality and efficiency in the NHS, putting the patient in the center of the interventions of all care providers. It catalyzes the active role of the

patient/family in the health/disease process, centered in their life course, through closer, efficient and humanized care responses.

• A self-sustaining and replicable organizational culture is fostered, as it creates a synergy of care, eliminating isolated acts of care: overcoming interinstitutional barriers; promotion of quick and convenient services towards the patient; and maximization of installed capacity in ACES/HSMM.

Keywords: People Centeredness, Care Integration, Acess.

Clear governance and the need for senior buy is very important. Although often stated, it is not always apparent in actions. Regular communication with key stakeholders and the buy in from grass roots is key to success.

The strength of the framework is its dynamic nature; to use the on-going real time feedback to implement and measure changes at local levels.

Keywords: Co-design, Person centred coordinated care.

15

Your Voice Matters, a Pilot Qualitative Study of Patient Informed Integrated Care in Ireland

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Objectives: The Patient Narrative Project was initiated in 2016 to position the voice of patients and service users centrally in the design and implementation of Integrated Care. This paper presents the findings from Phase Two; the piloting of a qualitative survey tool called 'Your Voice Matters' (YVM) to capture a high volume of patient experiences across Ireland and analysing these to find out the extent to which the person centred coordinated care indicators were made real during 2017.

Methods: YVM utilises the SenseMaker® software tool and is underpinned by a partnership approach between those who use health and social care services and those who provide them.

The Your Voice Matters framework consists of:
• An online survey that utilizes the SenseMaker® software programme
• Engagement plan to maximize service user participation, knowledge and empowerment
• Analysis of data by staff and service users together
• Identification of key themes and actions to influence the design and delivery of services

The survey was available online, in a paper copy or through an app for smartphone or tablet.

Results: There were 584 responses. 52% patients/service users and 45% were carers, family or friends. 63.8% of respondents were female.

A national workshop of was held to review, analyse and interpret the data from the pilot together and identify key themes using a Qualitative Quantitative Evaluation Matrix (QQE).

The key issues identified were:
• Poor joined up communication between patients healthcare staff and healthcare settings.
• Limited evidence of partnership approach in healthcare
• Limited Access to services.
• Patient Experience is a valuable driver to development and improvement of sustainable quality health and social care services.
• Person-centred co-ordinated care is not yet a lived reality for many.

Conclusions: The results give a clear direction of travel for and also show that the approach being taken is attempting to address the issues raised.

The journey has only begun and although much progress has been made, there is much more to be done. This work needs to be accelerated and there is excellent buy-in.

16

Change of Paradigm of the Home Respiratory Care in Portugal (2013–2017): An Exploratory Study Comparing the Portuguese and Spanish Care Models

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Objectives: Chronic Respiratory Diseases are becoming the dominant causes of death and disability worldwide with consequent increasing of Home Respiratory Care (HRC), mostly Long-term oxygen therapy (LTOT), mechanical ventilation (MV) and continuous positive airway pressure (CPAP) ventilation. The aim of this study is to increase the knowledge and understanding of home respiratory care models in Portugal and Spain in order to ensure optimal care for respiratory patients.

Methods: The general organization for HRC was evaluated between specialists in chronic respiratory care for Spain and Portugal. Market public information was researched and the Praxair (Portugal) and Oximesa (Spain) generic data was also assessed. The information recovered was then categorized: (i) Information on home treatments; (ii) Equipment provided;(iii) Regulation of prescription; (iv) Organization of supply of service; (v) Home supervision and (vi) Reimbursement system. The trends of the last five years (2013–2017) were also evaluated.

Results: It is believed that 800.000 patients currently attend to HRC in Portugal (18.8%) and Spain (81.3%) with similar prevalence in both countries (1.460 and 1.427 patients per 100.000 populations, respectively). Analogous therapies are available, essentially LTOT (19.87%), MV (4.85%) and CPAP (67.74%). The National Health Service is the mainly responsible for the reimbursement and clinical guidelines, despite in Spain there are different protocols according to the autonomous communities. Significantly, a national tender have been implemented in Portugal in 2014 with economic and clinical standard which allowed a geographical equity of access and free choice of provider by the patient. Additionally, *innovative technology has been implemented*

(electronic prescription, dematerialization and telemonitoring) with significant improvements in delivery healthcare.

Conclusions: Important differences were identified. An innovative model has been successfully implemented in Portugal, representing a change of paradigm in this therapeutic area. The upcoming challenge is the need to move from service-delivery models to integrated healthcare systems. Future studies should help to identify Quality of Care indicators based on *Patient*-Centered Care, including Safety, Effectiveness and Patient Experience.

Keywords: Home Respiratory Care, Quality of Care Indicators, Patient-Centered Care.

Integration of Care

17

Improving Care to Avoid Readmission of Heart Failure Patients: When and for Whom?

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Objectives: An effective chronic care management of patients with heart failure involves both acute (general cardiology and heart failure subspeciality) and primary care providers. Readmissions are frequent in heart failure patients, but can be avoided through improvements in care provision, encompassing both the predischarge and postdischarge periods. However, reducing readmissions requires knowing the "when" and the "who", not only to decide how providers at different settings may be involved, but also to target groups of priority patients. This study aimed to analyze the temporal distribution and the risk factors for readmission of patients with heart failure.

Methods: We included admissions of adult patients with principal diagnosis of heart failure (ICD-9-CM code: 428.X) discharged from Portuguese mainland public hospitals in 2014. The frequency of 30-day readmissions and their distribution across each day of that period were computed. For multivariable analysis of the factors influencing time to readmission, the Cox regression model was used. Considered risk factors were age group (<65; 65–84; 85+), number of secondary diagnoses (<9 or 9+), admission type (urgent or not), DRG type (medical or not), and the presence of specific comorbidities from the Charlson Comorbidity Index (cerebrovascular disease, dementia, diabetes, renal disease, and peripheral vascular disease). A hazard ratio (HR) significantly >1 means an increased risk of readmission. A level of significance of 5% was considered.

Results: A total of 13,857 admissions of adult heart failure patients were included (54.9% female; median age: 80 y). Readmission in the first 30 days after discharge occurred for 13.4% of admissions (n = 1861). From these, 29.7% were readmitted in the first 7 days, and 55.8% in the first 14 days. There was an increased risk

of readmission in the group of patients admitted urgently (HR: 2.41; confidence interval: 1.81–3.21), with peripheral vascular disease (1.59; 1.23–2.06), over 85 years old (1.36; 1.15–1.62), with renal disease (1.34; 1.21–1.48), and more than 9 secondary diagnoses (1.25; 1.14–1.37).

Conclusions: The period immediately after discharge accounts for a considerable proportion of readmissions of heart failure patients. Older patients with multimorbidity, both cardiovascular and non-cardiovascular, are at higher risk of readmission. Our results draw attention to the need of predischarge interventions involving multidisciplinary teams of acute and primary care providers, collaborating in a safer transition of care for these patients after hospital discharge.

Keywords: Heart failure, readmissions, risk factor.

18

Therapeutic Reconciliation Tools in Clinical Practice

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Objectives: To develop prescribing tools that aid the physician in identifying and avoiding potentially inappropriate medications in older people in a hospital setting. The aim is to improve the prescription of medicines and their use, minimizing the risk of adverse drug reactions and other drug-related problems.

Methods: The potentially inappropriate medications and therapeutic groups in elderly of Beers Criteria 2015 were analyzed, with special regard to the ones that are available in Portugal. The human drug database of the Nacional Authority of Medicines and Health Products (INFARMED, in Portugal) and the Summary of Product Characteristics of the medicines of interest were consulted.

Results: A list of potentially inappropriate medications to avoid in the elderly was created and distributed through the hospital's physicians to raise awareness. Furthermore, several handouts, specified for each hospital service, were elaborated in which it was indicated not only the potentially inappropriate medications more often prescribed, but also possible alternatives, their rationale and recommendations.

Conclusions: The implementation of the mentioned strategies in the clinical practice will help reduce polypharmacy and will enable clinicians to prescribe safer and more effective drug regimens, while simultaneously improving patients' quality of life and avoiding unnecessary healthcare related costs.

Keywords: Therapeutic reconciliation, Elderly, Potentially inappropriate medications.

19

Do Regional Networks Matter? Examining the Role of Hospital Networks and Service Innovations in Patient Care Outcomes Across Regions

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Objectives: Hospitals are increasingly facing challenges to improve service provision from rapidly evolving healthcare markets. Apps, artificial intelligence, robotics and ICPs are revolutionizing healthcare service delivery, and the age of digitalization is redesigning the way the service "healthcare" is being provided. Particularly challenging is also the provision of comprehensive care to patients with dementia, who often suffer from multiple diseases. In addition, impaired cognitive function limits their ability to manage their care and actively be involved in their care process.

The challenges facing hospitals are numerous both internally and externally. Internally, they seek to adopt technological advances to improve patient care, design integrated care pathways, harness digitalization to improve processes and patient documentation. Externally, they are called upon to improve their management of the patient discharge process to secure continuous care of the patient upon discharge. Latently, this requires hospitals to maintain a network of healthcare service providers beyond their organizational borders in order to secure appropriate patient care in the short and longer term after a patient has been discharged. However, the impact of such regional network structures on patient outcomes and costs are unclear.

Methods: We conduct a multi-method study in order to determine whether regional network structures and local innovations may play a role in influencing cost of care and patient outcomes. In a first step, we collect network data on the regional network structures of ten hospitals in different regional settings, i.e. urban and rural locations, which belong to the same hospital provider system. We then combine this information with data on the innovation activities of these hospitals, occuring both internally within the hospitals and in collaboration with external partners. Finally, the dataset is supplemented with patient-level data from patients in our target group of interest, dementia patients with multiple comorbidities who have had an inpatient hospital stay due to a femur fracture, to determine whether we can identify regional differences in patient costs and outcomes. This patient group is particularly dependent on seamless care between inpatient and outpatient care, and is particularly vulnerable during the discharge process.

Results: Our initial network analysis points to substantial differences in regional embeddedness of hospitals.

Conclusions: As we are still conducting our analyses, it remains to be seen whether the analysis of the patient data reveals any tangible regional differences in cost and care outcomes, and whether or not regional differences in network structures and innovations can be determined.

Keywords: Networks, Service Innovations.

20

The Integration of Care in Oncology: The View of Hospital Specialists – A Pilot Study

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Objectives: In Portugal colorectal cancer (CRC) is the second most common cancer. In Western countries CRC survivors represent the third largest group of cancer survivors. With the increasing number of cancer survivors, follow-up is perceived as a chronic disease, with a significant impact on hospital care.

To analyse hospital specialists' views regarding the integration of care in oncology and the role of primary care (PC) physicians in the follow-up of patients with CRC.

Methods: We conducted a structured online survey with hospital specialists (oncologists (77.8%), others (22.3%)) involved in cancer treatment. The questionnaire was distributed by a snowball sampling method. 54 physicians responded to the survey. The study has been approved by the Ethics Committee of the CHLN, EPE.

Descriptive statistics were computed based on frequency tables. We used the Chi-square test of independence to determine if there was a significant relationship between variables and in case of 2x2 tables Fisher's exact test. We looked at the normality distribution using the Kolmogorov-Smirnov test with Lilliefors correction. We measured the degree of association between variables using the Spearman rank correlation test. The correlation between binary variables was analysed by ordinal logistic regression. We performed a hierarchical cluster analysis with dendrogram. All the tests were bilateral and with a level of significance of 5%. All data were analysed using IBM SPSS® Statistics (version 24).

Results: 59.3% physicians think that in Portugal there is a satisfactory level of organization for oncologic care delivery, however 55.6% think that the coordination between PC and hospital is deficient. 85.2% totally agree with the reformulation of roles and responsibilities. 31.5% believe that this reformulation of roles could apply in all stages of the oncologic disease. 92.6% of responders considered that PC physicians should play an important and active role during the follow-up of cancer patients. 85.1% considered that the intervention of PC in the follow-up of CRC patients is relevant and of add value. Physicians who believe the most in this intervention are the ones who agree totally or partially with the redefinition of roles and responsibilities between the two levels of care delivery (p = 0.019). The probability of seeing a small or no benefit in PC follow-up of CRC patients is 8:1 when the speciality is a non-medical oncology speciality (p = 0.028).

Conclusions: Hospital specialists perceive very positively the possibility of the integration of care in this context and believe that family physicians can play an important role. .

Keywords: Integration of Care, Disease Management.

21

Patients' Multiple Use for Ambulatory Care Sensitive Conditions in Portugal

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Objectives: Hospitalizations for ambulatory care sensitive conditions (ACSC) are defined as a set of conditions which, with timely and effective primary care, can be avoided. There are several studies about ACSC but evidence is scarce on patients' multiple use for ACSC. The aim of this study is to describe the characteristics of multiple admissions for ACSC, compared to the single admissions. In addition, we examined the relationship between multiple admissions for ACSC and sociodemographic factors.

Methods: We used the administrative discharge dataset made available by ACSS that included data on all inpatient admissions for Mainland Portuguese NHS hospitals during the years 2013–2015, of patients 18 years or older. A unique patient identifier allowed linkage of all episodes for each patient and to classify patients' use in the period. A patient was classified as a multiple user for ACSC if between January 2013 and December 2015 was admitted more than once for any ACSC. Admissions for ACSC were identified using Prevention Quality Indicators (AHRQ). The relationship between multiple use for ACSC and sociodemographic factors was tested for patients' age and gender, purchase power parity, unemployment, divorce, early leaving of education and training, availability of community pharmacies, mortality and comorbidities.

Results: 1,977,804 admissions were considered, with 15.3% being identified as admissions for ACSC. Of the sample, 7.3% were multiple admissions for ACSC (with an average of 2.7 admissions per multiple user between 2013 and 2015). These showed a higher length of stay (+0.81 days), the patients were, on average, 3 years older and presented more comorbidities than the patients with only one avoidable admission. Geographic variation of the distribution of multiple admissions for ACSC was identified. Preliminary results have shown that multiple admissions for ACSC are influenced by age (OR = 2,623; $p < 0.001$), purchase power parity (OR = 1,102; $p < 0.001$), unemployment (OR = 1,153; $p < 0.001$), divorce (OR = 1,136; $p < 0.001$), early leaving of education and training (OR = 1,146; $p < 0.001$), availability of community pharmacies (OR = 1,313; $p < 0.001$) and presence of comorbidities (OR = 4,834; $p < 0.001$), when comparing with single admissions.

Conclusions: Amongst patients with potentially preventable admissions, multiple use of inpatient services was frequent and associated with specific factors: patients with multiple avoidable admissions were older, had more comorbidities and stayed longer in the hospital compared with patients with a single avoidable admissions. Geographically, the frequency of the phenomena was unequally distributed: regions presenting lower socioeconomic levels, higher prevalence of unemployment and divorce, lower education level and fewer health resources presented higher frequency of multiple admissions for ACSC.

Keywords: Ambulatory care sensitive conditions, avoidable hospitalizations, Patients' multiple use.

22

Emergency Room Utilization on Local Health Units

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Objectives: The rationale for creation vertical healthcare organizations is based on the evidence that more integration of care could improve access, quality, efficiency and patient satisfaction. In Portugal, between 1999 and 2012, eight vertically integrated healthcare units were created, merging hospitals and primary care providers into Local Health Units (LHU).

This study aims to evaluate the vertical integration effect on utilization of hospital services, in mainland Portugal, focusing on emergency room (ER) utilization, contributing for the existing gap in the empirical evidence. We tested the ER utilization in LHU and non-LHU organizations and identified explain factors of the ER utilization in each unit.

Methods: An observational and retrospective study was carried out focusing on primary care enrolled patients aged 18 or over, residing in mainland Portugal, that used any type of ER in 2015 until 10 times – 2.3 m users and 4.3 m ER visits.

The global ER use was tested by a comparative analysis between LHU and non-LHU. Frequent users (4 or more ER visits per year), complex patients (2 or more health conditions) and elderly utilization were also tested.

An individual multiple linear regression was performed, considering as dependent variable the standardized value of patient number of ER visits, and variables on demand and supply characteristics, as predictors.

Results: The difference in ER mean utilization between patients in LHU and non-LHU was 0.09 (1.93 ± 1.483; 1.84 ± 1.411) – in 100 patients, there were 9 more ER visits by LHU users than the remaining.

Overall a higher use was observed by the patients in the LHU, although exceptions are found in some categories of supply variables. Frequent users, complex and elderly patients in the LHU, have also a higher ER use.

Controlling for gender, age, health problems and risk behaviors, a high use of primary health care (10 or more appointments per year) is the most strongly associated factor with the ER utilization in both contexts – 0.7 (p = 0.00).

Conclusions: The vertical integration supposes a prioritization in the scope of the primary care, being expected a decrease of the ER utilization. The present study does not confirm this reduction for the analysed year, even for complex or elderly patients.

The performance of primary care in the existing LHU in mainland Portugal, may not have been able to reduce ER patient visits in this context, however, there are other variables to be controlled in a future development of this study for greater conclusion.

Keywords: Vertical integration, hospital services utilization.

23

Case Management Program, the First Experience of a Health Care Unit

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Objectives: Our case management program initially emerged as a possible solution for our chronic patients, whom were constantly circling through the system, with frequent Emergency Department visits (>4 admissions in the previous year) as well as other health care services. Therefore, the program came to light in order to offer these patients a different support. It's based on a multidisciplinary approach, with a primary care nurse as the case manager, supported by a team comprised of doctors (Internal Medicine and Family Medicine), other nurses and social workers.

The primary goal is to improve patients' quality of life, monitoring and training them and their caregivers to recognize early signs of a possible health status deterioration, and consequently reducing the use of the standard health care services, already submerged in various difficulties.

Analyse the program's impact in health care services utilisation.

Methods: Retrospective, comparative analysis of the use of health care services by the patients, previously and after the program implementation.

Results: 57 patients were included, of which 29 are women, with a mean age of 75.8 years. In the prior year, these patients had a cumulative total of 397 admissions in the Emergency Department, 89 inpatient care, 339 primary care physician evaluations, and 210 out-patient hospital admissions.

Following their integration in the program, we've seen a global decrease in the usage of standard healthcare services.

After 423 case manager home visits, emergency department admissions decreased to 77, hospitalizations to 23 and out-patient evaluations to 139 in hospital visits and 84 in Primary Care. It is important to highlight that the patients were admitted in the program in different periods of time, therefore the statistical analysis can't be linear.

Nonetheless, when analysing the 29 patients that were admitted for at least 6 months, we can maintain these reductions particularly in emergency department admissions with a reduction of 75% (previously 206 admissions; afterwards 51).

Conclusions: This case management program allows coordination and simplified contact between the key players in the management of the Individual Care Plan of the patients with multimorbidity.

The monitoring and guidance of these patients and their caregivers allow an early detection of the warning signs and their adequate and timely correction.

Despite the inherent limitations, the results obtained in one year show a decrease in the usage of health services (Emergency Service, avoidable hospitalizations and consultations). We hope that the inclusion of more patients and longer temporal analysis confirms the results.

Keywords: Chronic disease, Patient Care, Delivery of Health Care.

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Course Management of the Patient with Acute Disease/Chronic Disease Aggravation, Integration of Care and Literacy in Health

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Objectives:
• Improve the access of the patient with Acute Disease/Chronic Disease Aggravation to the Open Consultation (OC) of the ACES;
• Improve the patient's access to complementary means of diagnosis (clinical analysis), in the scope of Primary Health Care;
• Reduce the cost of the Clinical Analyzes prescribed by ACES physicians;
• Invest in health literacy;
• Reduce direct/indirect costs to the NHS (through the integration of care levels – 13% decrease in avoidable emergencies and the internalization of clinical analyzes): for an initial investment of € 382,607, with operating costs of €250,597 in Year 0 and 210,160 in Year 1, the payback materializes in Year 1 as a result of annual income in the order of 569,478 euros.

Methods:
• Standardization of performance standards, through the elaboration of a guidance manual of Good Practices;
• Extension and organization of the standard timeline for OC in ACES;
• Non-urgent patients referral of the HSMM Urgency Service for the ACES OC;
• Establishment of interinstitutional partnerships, formalized by protocols based on mutual agreements and benefits, between ACES and Santa Maria Maior E.P.E Hospital (HSMM);
• Use of Information Systems (for articulation/integration of care);
• Monitoring patient access to the ACES OC;
• Establishment of production lines (internalisation of clinical analyzes with the HSMM);
• Requalification of service spaces in ACES; development of training plans for health professionals; promotion of self-management of the patient's health/illness and adequate use of health services.

Results: Given that, during the year 2018, the project is still in the implementation phase, we have so far assumed the following outcome indicators:
• Manual of Procedures implemented in ACES;
• Interinstitutional protocols formalized;
• Internalization of clinical analyzes with the establishment of two collection points at ACES;
• Integration of clinical analysis results into CSP information systems;
• The HSMM US patients referral process for the ACES OC is implemented.

Conclusions:
• In a vision centered on the patient's life courses, we see a change in the institutional response of the entire ACES and HSMM. Now, it's closer, more effective, efficient and humanized.

• A single collaborative process between ACES and a Hospital Unit is achieved at the national level, which has a care integration alliance. These are collaborative and care contexts that support the concept of the project innovation (a pioneering strategy for transforming paradigms, overcoming interinstitutional barriers, and of sharing resources/capacities in order to generate value in the NHS)

Keywords: Integration of care, Acess, Patient Centeredness.

25
Identifying High Users of Care in the Azores Islands: The Impact of Comorbidities

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Objectives: The Azores is an archipelago of Portuguese territory with a strategic geographical position situated in the middle of the Atlantic Ocean. Composed by 9 islands, it has a population of approximately 250,000 habitants. The Azores run an autonomous health system, composed by 3 hospitals, 9 primary care centers ("island health units") and a global budget of approximately 300 million euros. The Azores have high prevalence and incidence of chronic diseases, poor health status and higher costs when compared to the mainland. Other than geographical and volume constraints, the factors explaining healthcare use are still unknown. There is a lack of research about the health system, patient characteristics and other explanatory factors. The aim of this study is to identify high users of care/services/resources and their relation with supply and demand factors.

Methods: A descriptive, retrospective study was designed to achieve these aims. We merged individual-level information (anonymised) at primary care level and estimated individual use and costs per enrolled patient. For the descriptive analysis, we did risk stratification of patients by individual level of use and costs. We then ran a multiple linear regression model to explain individual costs. Independent variables used included sex, age, enrollment with a primary care physician, user fees and number of diagnoses.

Results: We found, as expected, an asymmetric distribution of healthcare use and costs. Ten percent of users are responsible for 50% of primary care costs. The average cost per patient enrolled per year is 179 euros. Increasing chronic conditions from 2 to 4 or more doubled average individual costs (from 302 to 861 euros). We also found statistically significant differences (CI 95%) between islands, sexes, age groups, the presence of a family physician and number of comorbidities.

Conclusions: The first conclusion is that individual level data can be very useful for risk stratification, health planning and management. Results show a high concentration of costs in a small group of patients. These results are consistent with the literature and should lead to different actions for different profiles of patients, prioritizing and focusing interventions. The identification of cost explanatory factors can also support decision making, with an influence on the whole of the regional health system.

Keywords: Azores, Costs per patient, Comorbidities.

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Multiple Avoidable Hospitalizations for Ambulatory Care Sensitive Conditions in Local Health Units of Alentejo Region

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Objectives: Alentejo Region is one of the five health regions of the Portuguese NHS, covering approximately 33% of the territory and 5% of population. Around 68% of the population is covered by vertically integrated units, Local Health Units (LHU). These organizations, created in the last decade, seek to provide more integrated care, driven to enhance efficiency, access and quality of care. With this new approach, more patient oriented with comprehensive care and focus on primary prevention, it is expected that a better control of chronic diseases and a decrease of unnecessary hospitalizations would be achieve. Research on the impact of vertically integrated system in Ambulatory Care Sensitive Conditions (ACSC) and its multiplicity is scarce. The aim of the study is to identify and characterize multiple avoidable hospitalizations for ACSC in LHU of Alentejo region.

Methods: Retrospective and descriptive study was designed to achieve study aims. We used national discharge database provided by ACSS that includes all in-patient admissions of Alentejo patients in NHS hospitals during years 2013–2015. The same patient number in the period, allow to merge episodes per each patient. Admissions for ACSC were identified using Prevention Quality Indicators method from AHRQ and selected population focused on adult people (+18). Chronic Conditions were identified from AHRQ methodology. A patient was classified as a multiple user for ACSC if between January 2013 and December 2015 was admitted more than once for any ACSC. Financial impact of ACSC were estimated considering DRGs price table. Patients' characteristics were controlled by sex, age and charlson index. Descriptive analysis and statistics tests where produced, comparing geographical areas, each ACSC and per organizational models (LHU vs non-LHU).

Results: We found 5.609 episodes corresponding to 2.228 patients that had multiple avoidable admissions in Alentejo. LHU presents higher number of episodes per each patient (2.54) and per 10.000 capita (55.6) when compared with non-LHU (2.45; 44.1). Direct financial impact of avoidable admissions is relevant: 9.9 million euros in LHU and 3.8 million in non-LHU (average costs of 6.184 euros in non-LHU and 5.804 in LHU). Regarding avoidable hospitalizations conditions, Alentejo region follows the national standards, presenting higher volume of multiple avoidable in circulatory, endocrine, respiratory and mental systems.

Conclusions: Results shows that in Alentejo region, LHUs still face challenges to improve the control of chronic diseases, avoid-

ing multiple hospitalizations. Healthcare integration level, proximity to communities, earlier diagnoses capacity and primary care coverage, are factors that could contribute to explain this evidence.

Keywords: Local Health Units, Multiple avoidable admissions, Alentejo Health Region.

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Identifying Barriers to Implementation of New Care Models, a Multi-Stakeholder Engagement Study

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Objectives: In 2010, the National Clinical Programmes in Ireland were established with the aim of Nationalising best practice to improve quality, access and cost for patients. The aim of this study was to gain insight into the barriers key stakeholders faced in terms of implementing these new models of care.

Methods: A Multi-Stakeholder Engagement Process was conducted with 59 key stakeholders involved in the Clinical Programmes including clinicians, managers, academics and patients. An inductive approach using qualitative thematic analysis of the outputs was used to determine themes. Descriptive statistics were computed to assess the frequency of barriers and perceived challenges.

Results: The most common barriers to implementation identified were; lack of business alignment and engagement, unclear governance, challenges with allocation of resources (in particular HR, Finance and ICT, including data management), recurrent restructuring and poor communications. Poor engagement by GPs was also identified as a barrier as well as the need to have a consistent systematic programme management approach to implementation.

Conclusions: This participatory approach was an effective way to engage multiple diverse stakeholders to collaborate in identifying barriers to implementation to inform the next phase of the Clinical Programmes. Having a clear vision, a prescribed methodology and clinician buy and involvement in the design of new models of care is not sufficient to ensure implementation. A whole system approach to the design and implementation of new models of care must be supported by essential enablers such as policy, financial and HR models and knowledge management systems. The second phase of the programmes will seek to overcome the barriers identified in this study and work with operations and policy makers to improve outcomes for patients by implementing person centred evidence based models of care.

Keywords: New care model, implementation, Barriers.

28

The First Nationwide Home-Based Pulmonary Rehabilitation Program for Chronic Obstructive Pulmonary Disease (COPD) Patients in Portugal: The Possible Combination of Patient's Empowerment and Add Value to the System

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Methods: The demographic changes, namely the increase of average life expectancy with the associated growth of chronic conditions and multiple co-morbidities brings to the Healthcare organizations additionally challenges. The Pulmonary Rehabilitation (PR) is a intervention based on exercise training, education, and behavior change that promote the long-term adherence to health-enhancing behaviors and reduces patients' symptoms, improves their exercise tolerance and health-related quality of life. The aim of this study was the development and implementation of a Home-Based model of care in pulmonary rehabilitation.

Methods: A Home-Based PR Program (ReabilitAR) was designed by our team according with Best Practices and available Guidelines. For educational and exercise training the evidenced-based _Living Well With COPD_ International program, that promotes the COPD patient's knowledge and empowerment, was translated, reviewed and adopted for the first time in Portugal. A prospective cohort study was made between June 2017 and February 2018. Clinical parameters were evaluated (initial evaluation _Vs_ 12w), namely: (i) Safety and comorbidity-blood pressure, heart rate, oxygen saturation, Borg, GOLD (ii) Cardio metabolic and anthropometric risk-weight, height, BMI, abdominal perimeter (iii) needs and interest scales-mMRC, CAT, Short Berg Balance Test, HADS, LCADL an Mini mental state examination and (iv) physical parameters -1'sit to stand, number of steps.

Results: 29 patients were referenced by 14 physicians. Of these patients 17 (59%) has integrated the ReabilitAR program. The patients have between 47–84 years (72 years, SD 9.12), 4 are smokers and 2 have NIV therapy. The patients were mainly GOLD B (35%) but also D (26%), C (22%) and A (17%) were considered. 11 (64.7%) patients have already completed the intensive phase and remain in the maintenance program. Clinical promising results were achieved, including the decrease of hospital emergencies and non-programed medical appointments. No drop outs or safety incidences have occurred.

Conclusions: The Home-based Pulmonary Rehabilitation Program "ReabilitAR" constitutes an innovative and effective model of integration of care for Chronic Obstructive Pulmonary Disease patients. The implementation results prove that it can be a Safe and

Value-added model of care and can reduce the gap between the evidence and the clinical practice.

Keywords: Pulmonary Rehabilitation, Home Care, Chronic Obstructive.

Innovative Provision Models

29

Public-Private Partnerships in Health Care Services: Do They Socially Outperform Public Hospitals?

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Objectives: Public-private partnerships (PPPs) are widely spread long-term arrangements between governments and strategic private partner(s). One of their objectives is to reduce the financial pressure on the public treasury about new investments. PPPs have been employed within the health care sector, which carries a huge social burden. In Portugal, for instance, PPPs in health care concern bundling hospital infrastructure and clinical services management. Notwithstanding the need to ensure sustainability and efficient use of hospital resources, it is clearly compulsory to guarantee that patients receive appropriate and timely care, with maximum security, and equitable manner. Still, little (or even none) attention has been paid in the literature to the clinical response capacity of PPP hospitals and to the populism arguing that these entities have a lower social performance than typical public hospitals.

Methods: This study uses robust benchmarking tools to compare two groups of hospitals: PPPs and public hospitals. It uses nonradial Data Envelopment Analysis (DEA), with correction for bias and environmental effects, through a subsampling procedure. DEA constructs an empirical frontier that describes the technology associated with each group of hospitals, as well as a metatechnology regarding the entire sample. Gaps between each cluster's frontier and the metatechnology's frontier disclose potential differences in terms of social performance. To do so, we apply a set of powerful bootstrap tests using a metatechnology ratio that determines those gaps.

Results: In this study we demonstrate that hospital PPPs can deliver health care services with social performance levels at least as good as public hospitals. This does not mean that the two groups of hospitals are good performers in terms of meeting socially acceptable, as considerably low social performance levels were observed for both groups. Sources of these levels were also identified.

Conclusions: We demystify the imprecise though widespread idea that hospital PPP arrangements with vertical bundling of infrastructure and clinical management are bad options and should be avoided. These results assume, then, a great importance for policy makers, regulators, health care managers and economists, project managers, and citizens in general.

Keywords: Public-private partnerships, Public hospitals, Social performance.

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The Implementation of a Cross-Jurisdictional Clinical Network for Congenital Heart Disease

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Objectives: The development of an All-Island Congenital Heart Disease (CHD) Network is intended to provide high quality and timely access to specialist cardiac services for all children and young people on the island of Ireland.

The core objectives of the All-Island Congenital Heart Disease (CHD) Network are:

a) Appropriate CHD treatment for all children and young people on the island of Ireland as close to home as deemed appropriate.

b) Timely access to quality treatment through the creation of a single waitlist that is aligned to international wait times.

c) Provision of a safe and sustainable model that serves the needs of children and families into the future.

d) Development of a research and innovation hub that delivers best practice solutions utilising a unique genotype on an all-island approach.

Methods: In 2014, an International Working Group Report recommended the cessation of surgery in Northern Ireland (NI) for children with CHD. This resulted in children from NI travelling to Great Britain (GB) to receive life-savings surgical intervention, a significant risk to the child and at great cost to the health services and families. There was Ministerial acceptance of the recommendations, which resulted in the creation of an All-Island CHD Network to enable the CHD services in NI and Republic of Ireland (ROI) collaborate with each other and work as a single Network to achieve essential national and international standards for CHD service provision. The basic concepts of such a network are of partnership, service integration and formal arrangements.

Results: To date, all NI Cardiac Catheterisations are carried out in ROI. In addition, all NI emergency and urgent surgical cases have been transferred to ROI, thereby eliminating the need for children and families to travel to Great Britain to have their surgery performed. During 2018, it is planned to commence the transfer of elective surgical patients to the ROI waiting list, with the plan that there will be an all-island surgical waiting list in 2019. The Network model of care includes the development of services in regional centres, implementation of an all – island CHD research strategy and the development of a joint training and education programme for health care professionals.

Conclusions: The all-island CHD Network is a linked groups of health professionals and organisations from primary, secondary and tertiary care, working in a co-ordinated manner, to ensure equitable provision of high quality, clinically effective services to this complex cohort of patients.

Keywords: Cross-jurisdictional, Integration, world-class.

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Transforming Healthcare Using Medical Imaging as the Driver for Change

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Objectives: To improve the clinical management and financial profitability by deploying innovative models of care across three medical conditions (suspected scaphoid fracture, chronic headache and suspected colorectal cancer).

Methods: Three research studies evaluated the provision of models of care based on the innovative use of medical imaging. These varied from randomised clinical trials to observational studies. However distinct in nature, all these new models constitute a holistic transformation of existing care pathways. The transformation framework combined the use of Lean and Health Economics methodologies. Firstly, supported by the Virginia Mason Institute and the internal senior leadership, an organisation-wide Lean training scheme was developed in-house and rolled out to support different teams. Secondly, the use of health economics methodologies provided a rigorous evaluation methodology. Four key outcome domains were evaluated: clinical care; access to care; staff satisfaction/engagement; and financial sustainability. Some outcome measures are project specific whilst others are standard, such as the outcome cost per Quality of Life Adjusted Years (QALYs).

Results: The results for three innovative models of care are summarily presented in the interest of space. If selected, a detailed results section will be presented.

Firstly, a randomised controlled trial evaluated the use of Magnetic Resonance (MRI) in the acute management of suspected scaphoid fractures. The intervention is associated with improved clinical (increased diagnostic accuracy, reduced number of surgeries and NHS appointments) and financial outcomes (the intervention dominates the conventional model that relies on conventional radiography, with an average 6-month cost of £376 vs £605).

Secondly, an observational study evaluated the use of direct access to MRI as opposed to conventional referral to Neurology for patients presenting with chronic headache. The intervention is associated with improved access to care (time from referral to the initial appointment reduced in 50%, 109 vs 49 days) and financial outcomes (the intervention dominates the Neurology-based model, with an average 12-month cost of £605 vs £307).

Thirdly, an observational study evaluated the use of virtual colonoscopy as opposed to optical colonoscopy as the initial investigation for patients with low to intermediate risk of colorectal cancer. The intervention is associated with improved access to care (time from referral to the initial test 7.7 vs 15.1 days) and financial outcomes (virtual colonoscopy dominates, with an average 6-month cost of £619 vs £860).

Conclusions: The holistic transformation and creation of innovative models of care using medical imaging as the driver for change was associated with improved clinical and financial outcomes.

Keywords: Care Transformation, Clinical Pathway, Health Economics.

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The Implementation of a Cross-Jurisdictional Clinical Network for Congenital Heart Disease

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Objectives: The aim of the study is to evaluate devised and implemented multiple factors of digitized technologies and to find out if applied IT solutions have shortened waiting times for patients in homecare. Patient waiting time is acknowledged as an important criterion in the assessment of healthcare quality. Long waiting time is not acceptable and in some cases it might be even critical.

Reduced waiting time makes homecare equitable and far reaching, which are the goals in the management of homecare services.

Methods: From September 2016 to September 2017 a cross-sectional analysis was carried out. The research took place at homecare clinic of Centro poliklinika (Vilnius, Lithuania).

Waiting time refers to the time a patient waits at home before being visited by one of the homecare team member. Serial correlations between the number of recipients and delivered services were revealed as well as correlations between waiting times and staff working hours.

Results: The average waiting time from assignment to homecare specialist visit was a 187 minutes or 3 hours and 7 minutes. Often longer waiting times were caused by the physician's assignment made at the end of working hours. There were a total of 1,736 patients (38.2% males and 61.8% females) involved in this study. Average waiting time improved from 254 minutes (4 hours and 14 minutes) to 187 minutes (3 hours and 7 minutes) after launch of innovative technologies.

Conclusions: Implemented innovative IT solutions enabled better planning and resource distribution for healthcare providers. It granted to achieve higher accessibility for homecare patients meanwhile shortening waiting times. Since it affected waiting time it is important to note, that digitized technologies were also able to streamline the medical care process, with an option to co-ordinate and supervise our staff.

Further research is needed to examine whether the distribution of waiting time among patients is equal. Supplementary the conduct analysis will be run to determine patient's waiting time experience as homecare patient.

Keywords: Homecare, Waiting time, Innovative solutions.

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The Dynamics of Patient Visits to a Public Hospital Pediatric Emergency Department (PED): A Time Series Model

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Objectives: 1) Descriptive analysis of the flow of a PED. Furthermore, understand its yearly, weekly and daily rhythms related to human resource's needs. 2) Fit a time series model and forecast the daily number of patients seeking the PED according to calendar variables and ambient readings and validate the model.

Methods: A model was developed for PED patient visits using the total daily counts of patient visits to Hospital Prof. Doutor Fernando Fonseca PED, Portugal, from January 2010 to December 2017 resulting in a total of 670379 admissions. Calendar (school day/holiday) and ambient (bio-climatic index) variables were added as explanatory variables. A seasonal autoregressive integrated moving average (SARIMA) model was fitted.

Results: There was a significant variation of number of visits comparing different months, weekdays and daily hours. The most relevant differences were: yearly, higher activity was registered from October to January, and lower activity in July and August; weekly, higher activity on Monday and Tuesday, lower on weekends; daily, from 10 am to 9 pm a higher activity was recorded, while lower from 12 to 8 am.

Respiratory diseases were responsible for the higher numbers of visits in winter; trauma was more frequent in May and October, gastroenteral diseases registered a more constant yearly distribution. Episodes requiring hospitalization had a less degree of variation than the ones with no hospitalization. The distribution of the Manchester trial System priorities was different in yearly, weekly and daily scales. In human resources needs these differences implied that PED clinicians had a different work load variation from surgeons, laboratory and XRay professionals.

The time series periodogram, auto correlation function and partially auto correlation function display strong yearly and weekly seasonal variations, corresponding to 1 cycle in 365 days, its first 3 harmonics (1 cycle in 6 months, 4 months and 3 months) and 1 cycle per 7 days and 3.5 days. Application of statistical tests shows that these cycles are significant. Calendar variable and humidity index are strongly correlated with the number of patients admitted to the PED. The errors were modeled as an auto regressive moving average moving (ARMA) process. Statistical tests were applied to validate that the resulting residuals can be regarded as white noise.

Conclusions: The proposed forecasting model based on calendar and ambient variables detected patterns of variability in PED volume and thus was used for developing an automated system for better planning of professional resources.

Keywords: Time series, pediatric emergency department.

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Protocol Compliance Improvement Through the Use of a Digital Patient Simulation – A Software-As-A-Service Solution (SAAS)

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Objectives: Amongst healthcare professionals there are different levels of compliance with clinical protocols and guidelines, either internationally or locally developed, even when patient variability is taken into account. This can jeopardize patient safety, harm patient outcomes and lead to misuse of resources. We developed an electronic health records simulator to train physicians for clinical pathways and to measure their compliance in standardized patient cases.

External assessment was performed to measure compliance variation and to infer the software's effectiveness.

Methods: A SaaS patient health records simulator was developed and tested in a private reference hospital in Portugal. Simulated scenarios were developed based on current guidelines and internal protocols for colorectal cancer and sepsis, which were validated by a scientific team appointed by the hospital. Physicians (n = 30) were asked to solved those simulated scenarios. Participants had immediate access to their results and to a written feedback explaining how they complied with the defined standards. Their compliance with each phase of the protocol was measured and registered by the software. A questionnaire was conducted before and after the simulation to assess protocol knowledge.

Results: Baseline compliance measured with external questionnaires increased 20% after a single simulation session (average time 30 minutes).

Hospital managers considered this SaaS of great value as a training tool with great potential to induce protocol learning. Participant also enjoyed the experience of training in an unbiased environment.

Results obtained will allow to further improve training activities targeted to specific groups or teams with lower compliance status within the institution.

Conclusions: This patient simulator software for training and analysis led to an immediate improvement of protocol knowledge by healthcare professionals. This improvement, as compliance itself, can have an important impact on patient safety, patient outcomes and resources optimization. In the future, on-job compliance variation can be studied through electronic health record (EHR) analysis.

Keywords: Compliance, Patient outcomes, Standardisation of care.

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Papageorgiou General Hospital: An Effective Approach to a Greek Hospital Transformation Project

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Objectives: This document sets out the progress that has been made in Papageorgiou General Hospital, the most popular hospital in North Greece, where the top management, comprehending the necessity to transform the organizational culture, took immediate action in a multilevel (strategic and operational) project, applying organizational commitment to transformational change. The project undertaken can best be described by the term: Looking ahead!

Methods: The project highlights included:

1. Interdisciplinary teams, such as Continuous Improvement Team.

This work team consists of executives with different professional and educational background. Its' aim is to point out the complex interdisciplinary problems and to implement proposals in order to improve the hospital's daily operation. The main element of the culture of the group is the continuous, nonstop improvement, which leads to excellence.

2. Strategic management practices (Balanced Scoredcard)

Balanced Scorecard translates Hospital mission and strategy into tangible goals and measures. The strategic map of the Hospital is planned, balancing and combining economic and non-economic indicators. The model is organized in five prospectives: Mission, Clients, Internal Business Processes, Learning & Growth, Financial. The implementation team has developed for each of these prospective a set of realistic strategic goals with detailed indicators and supportive initiatives.

3. Engagement and empowerment, through Strengthened Social Responsibility

Social responsibility is a matter of holistic perception and approach. As a "socially responsible organization, Papageorgiou Hospital", seeks to develop employees with organizational culture, governed by ethics and principles of social transparency, who in their turn, will contribute to the culture's diffusion at all levels.

Results: Top management's commitment, inspirational leadership, effective communication and teamwork (High Performance Working System' elements) have identified as the key performance indicators at Papageorgiou Hospital case study.

Conclusions: Current health organizations need to be re-oriented from the bureaucratic, rule based approach, towards efficiency and effectiveness management.

Keywords: Transforming organizational culture.

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The Importance of Education and Formation in the Recruitment of Top Leaders for Public Hospitals – Analysis of the Appointments from 2009 to 2016

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Objectives: During the last decades, developed countries made several reforms to improve the governance effectiveness of public hospital boards of directors. Some of the reforms in the public sector put the focus in the selection/appointment of board members with the goal of getting better leaderships with skills, knowledge, experience and competences. Specific formation/education or leadership training can be considered a systematic intervention to change the organizational culture of hospitals and thus improve their performance.

In the end of 2011, Portuguese government created a commission (CReSAP) to select public managers. In this context two main questions arise: (1) What is the advanced and professional education/training presented by the top hospital leaders?; (2) What differences are there in education/formation before and after CReSAP intervention?

Objectives: The aim of the study was to analyze the academic/professional qualifications presented by the members appointed to boards of directors under the scrutiny of CReSAP in order to assess their impact on the type and level of training provided by the nominees.

Methods: Analysis of individual curricular notes, published in Diário da República (national official journal), related with 216 appointments (45 hospitals) prior to CReSAP and 230 appointments after the CReSAP intervention (44 hospitals) from 2009–2016. Selected data was related with advanced and professional education/formation, namely undergraduate, postgraduate, MSc or PhD courses, in the areas of health services management and/or management. The technical opinions (type and comment on education/training) of CReSAP were also collected and crossed with the curricular notes.

Results: Only about 40% of those nominated, before and after CReSAP, present any advanced training in health services management, being the executive vowels with the highest percentage and clinical directors with the lowest percentage. In the post CReSAP phase there is a higher percentage of nominees with professional qualification courses related with health services management. About 17% of CReSAP technical opinions have recommendations for the need of specific education/formation related with the activities they will perform in the board of directors.

Conclusions: Advanced and professional formation, before and after CReSAP, is not present in the majority of the nominees and is not transversal to all positions. The current model of recruitment gives importance to some skills and competences that are acquired with specific education/formation and training, and in this context, some CReSAP's opinions show recommendations for

education/formation frequency because they consider that the personalities evaluated do not have post-graduate formation and related learning for the activities they will carry out.

Keywords: Leadership, Formation, Training.

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Development of National Ehealth Infrastructure in Hungary

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Objectives: In recent years, nation-wide Electronic Health Record (EHR) systems have been implemented by an ever increasing number of countries around the world. The Hungarian eHealth Strategy and detailed actions, as a part of the plan of improving health care system in Hungary, were published in 2011 by Ministry of Human Resources. The strategy aimed to develop and implement a common IT infrastructure ("EESZT") for sharing patients' health records and connecting local EMR systems of health care providers in Hungary.

Methods: The concept of EESZT is based on a service-oriented architecture (SOA). The core components of the middleware layer are fully integrated, connected by an enterprise service bus (ESB) and controlled by a centralised governance. The system is hosted by the governmental IT infrastructure using the strongest data protection methods and georedundant disaster recovery mechanisms.

One of the most critical elements of the architecture is the authentication and access management subsystem (IAM). Based on a strategic governmental decision, medical professionals must be authenticated with their general-purpose RFID-based personal identification card before using the services of EESZT. Services could be used by registered health care agents (hospitals, GPs, pharmacies, authorities, etc.) via certification-based secured channels.

Besides the IAM the centralised terminology service is the other key component of the system. Registries of physicians, health care providers, pharmacies, and other code tables uploaded regularly by health authorities via standard interfaces. The terminology service is the official central source of indices, code systems and terminologies of the health care system.

Functional medical services of EESZT focus on sharing of EHRs, handling medical episodes, e-referrals, e-prescriptions and e-appointments, as well as sharing of digital images. Data required by these services are automatically generated by the local information systems and sent by invoking webservices, without user interventions.

Results: The planning and development phase has been started in 2014 and has lasted for 2 years. In November 2017, after an 8-month length pilot period, the use of EESZT became mandatory for every state reimbursed hospital, outpatient clinic, GP and pharmacy. Since then nearly all state reimbursed health care providers in Hungary have joined and implemented webservices of EESZT to their local systems.

Conclusions: Introduction of EESZT is only the first step toward an integrated health care system. One of the main goals of improvement of Hungarian health care system is to develop new value-added eHealth services, redesign old-fashioned processes and connect that services to local system to build up smart hospitals.

Keywords: National infrastructure, EHR systems, eHealth services.

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The Impact of Changes in Patients Access to Hospital Care

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Objectives: The main objective of the study was to measure the impact induced by the changes in legislation regarding patient referral to North Lisbon Hospital Centre (NLHC) outpatient care in hospital's demand and supply.

Methods: As data sources, it was used the administrative data from NLHC medical appointments for the years 2013 to 2017. The area of influence was determined by the institution which submitted the request to NLHC outpatient care. For each appointment, it was considered whether the patient belonged to the hospital's direct area of influence or not and analysed the evolution of the distribution through the years, taking in account the demand for different specialities. It was used descriptive analysis to compare the results before and after the change in the referral legislation, namely the number of requests and waiting times for appointment.

Results: Our preliminary results show the number of referrals from other institutions to NLHC had an increase of 22.07% between the years of 2013 to 2017. The requests from other areas that were not the hospital's direct area of influence raised from 31.3% in January 2013 to an average of 52.3% after May 2016. The majority of requests were sent from the primary care institutions, with 45.1% from the ACES North Lisbon, 13.9% from ACES Sintra, 13.0% from ACES South West and the remaining from other ACES (23.4%) or hospitals (4.6%). The medical specialities which showed a higher demand on the number of requests from out of the area of influence of the institution were Gynaecology, Orthopaedy, Otorhinolaryngology, Psychiatry and Pneumology. Regarding the waiting days, before the change in legislation a patient waited an average of 123 days for an appointment, and after it increased to 131 days (8 days more, meaning a growth of 6.5% on waiting times). The hospital still managed to abide by the maximum waiting times defined by legislation (fixed in 150 days). There was an improvement in the waiting days of patients from out of the hospital's area of influence (a decrease of 20 days).

Conclusions: This study showed that the change in legislation had a significant impact on the hospital's demand and supply of outpatient care, which required an extra effort from the institution to satisfy the needs of the population, with timely and effective care. This data allows the institution to define new policies in order to decrease the waiting times for outpatient care and enhance patient's access.

Keywords: Outpatient care, access to care, patient referral.

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Matching Supply and Demand in Hospitals: A Descriptive Study of Portuguese Public Health Medical Doctors from 2007 to 2017

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Objectives: The Portuguese Order nr. 7216/2015 layed down provisions on the integration of Research, Clinical Epidemiology and Hospital Public Health Services in hospitals and the Portuguese Medical Association had already listed the essential skills to the professional practice of Public Health (PH) medical doctors. Therefore, we aimed to characterize PH medical specialists and interns from 2007 to 2017, in order to reach Human Resources' maximum potential through an effective planning.

Methods: We conducted a descriptive study on PH medical specialists and interns. The essential skills to the professional practice of Public Health medical doctors were established by the College of Public Health. Public Health Medical Specialists (PHMS) data was publicly available at Portuguese Medical Association's website. Public Health Medical Interns (PHMI) data was publicly available at Portuguese Central Health System Administration's website. We retrieved data from 2007 to 2017. The Research, Clinical Epidemiology and Hospital Public Health Services main competences were determined by the Portuguese Order nr. 7216/2015, published in the Official Gazette of Portugal.

Results: In 2007, 12 PHMI (6 female and 6 male) were admitted to the Public Health training and we observed an increase of 266.7% to 44 PHMI (19 female and 25 male) being admitted in 2017. In 2007 there were 458 PHMS (243 female and 215 male). This number increased to 524 in 2017 (285 female and 239 male), which represents a 14.4% increase. When analysing by age group the biggest increase was in the 61–65 years group, with a 406.7% growth. The age group 51–55 years featured a 84.0% decrease between 2007 and 2017. We highlight that in 2007 there were no PHMS below 31 years old whereas in 2017 this number grew to 4 PHMS. Adding to the increasing number of PHMI, this makes it possible to predict a Medical PH workforce growth.

Conclusions: We identified a rising number of PH medical specialists and interns between 2007 and 2017. These professionals receive specific training in health planning, research, epidemiologic surveillance, emergency preparedness and response and outbreak management and control. Plus, multi-level interaction would be more effective namely with local Primary Care. These skills are aligned with what is expected from the newly created hospital service and might be presented as a positive political opportunity for change, leading PH human resources to be acknowledged as a powerful asset.

Keywords: Public health professionals, human resources planning, Portugal.

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BED Management System of Sant Joan De Déu (BEDMA-SJD), an Innovative System for Efficient Management of Health Care Processes

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Objectives: There is abundant scientific literature that analyse the problem of overcrowding in Emergency Departments and their negative effects on the safety and quality of care provision. It has been well established that the main factor that determines overcrowding is the existence of inpatients admitted in the emergency room due to the lack of beds in the inpatient area. Our current bed management system it has as its main objective to minimize the periods of overcrowding in our hospital.

Methods: Tools:

QUIRPLAN platform: this is a computer tool that integrates diverse information from the Electronic Health Records related to scheduled surgical activity. It allows the establishment of a maximum number of daily beds that can be used for this surgical activity.

PREDIL Formula: It allows predicting the availability of daily beds, 24 hours in advance, by the difference between the admissions and the discharges that are predicted. It uses real-time information from EHR. It also makes an estimate of the variables necessary to obtain the expected balance sheet for which there is no certainty of what will happen: number of inpatient discharges and number of admissions from emergencies that will occur during the next 24 hours. This estimate is constructed by combining data from the recent historical with information extracted from EHR.

Results: Usefulness of the PREDIL Formula: when the PREDIL formula foresees that the balance of patient inputs and outputs will create a balanced situation (maximum of 6 patients without bed in our particular case given our set infrastructure) the accuracy is 97%.

Overcrowding indicators: despite the increase in the complexity of the activity carried out, with an increase in the average weight of our hospitalization case-mix (DRG APR32) from 1,0627 in 2011 to 1,1818 in 2017), the overcrowding indicators have improved in 2017.

Emergency department (Level II Triage <15 minutes: 78%; Level III Triage <30 minutes: 65%; EDWIN index: 7 days out of 365 with at least a measurement of the EDWIN index >2).

Inpatient area (Bed occupation: 81%).

Surgical area (suspensions on the last day due to the lack of beds it was 5 cases).

The Net Promoter Score indicator it was 58 for Emergency Department and 80 for the Inpatient Area.

Conclusions: The BEDMA-SJD is a good strategy to reduce the saturation of the hospital during the periods in which patients re-

quiring admission from the emergency department increase and is replicable in any hospital that combines programmed and urgent activity.

Keywords: Overcrowding, bed management.

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Defining Key Performance Indicators for Domiciliary Services

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Objectives: During the last year, it was implemented an organizational experience for providing domiciliary health care services in Alentejo Region. Alentejo is one of the five health regions of the Portuguese NHS, covering approximately 33% of the territory and 5% of the population (half million). This disperse concentration of the populations, reinforce the challenge to give proximity to health services and enhance domiciliary. Alentejo also presents poorest health, social, demographic, educational and economical results when compared with national performance.

This experience was considered a pilot for the Ministry of Health, mainly due to the introduction of two new characteristics in domiciliary services: the multidisciplinariety of the team and full day service coverage (24 hours). Although, the definition of performance assessment model for this experience is undeveloped. The aim of the study is the development of the performance assessment model for domiciliary services.

Methods: The first step to define performance assessment model was literature review. From this work, we selected by frequency and importance the group of dimensions and indicators used in other countries. In the second step, a Delphi panel was performed, composed by sixteen health care experts (doctors, nurses, psychologists, nutritionists, technicians and health managers). There were applied a pre-test and two rounds for a consensus level of 75%. Three characteristics were under evaluation for each indicator: relevance, scientific robustness and validity.

Results: Preliminary results of this research validated a panel of four dimensions: effectiveness, quality, efficiency and access. There were also selected 15 key performance indicators in these dimensions. It was achieved consensus of a minimum level of 75% in all characteristics, although there were identified some limitations on health information systems for implementing all of these indicators.

Conclusions: The development of new domiciliary services seeks to provide comprehensive care and comfort to patients. Supported in the literature review and qualitative methods, we developed and validated a performance assessment model for multidisciplinary domiciliary services, composed by key performance indicators. The challenges for appliance this model will be more significant than his own definition.

Keywords: Domiciliary services, Performance Indicators.

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Construction and Validation of an Instrument to Identify the Assistance Profile in Rooming – In Obstetric Accomodation

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Objectives: The obstetric rooming-in units are part of a hospital system in which the neonate and the mother remain together 24 hours a day in the same environment from birth to discharge. Such a system strengthens the affective bonds between mother and child, enables nursing to provide all care, as well as guide and stimulate exclusive breastfeeding.

Considering that the rooming-in nursing team provides comprehensive care throughout the hospitalization of the mother and the baby, it is possible to recognize the importance of a classification instrument that contemplates the specificities of the nursing care to puerperas and neonates to instrumentalize the daily operational planning and the management of human and material resources.

To construct and validate an instrument of classification of puerpera-neonate binomials in degrees of dependence of nursing care directed to binomials in rooming-in obstetric accommodation.

Methods: Methodological study. The construction was based on literature. The content validity was done in two stages. In the first stage judges suggested additions, exclusions of indicators and modifications in their writing; in the second stage the content validity index was evaluated. The construct validity was performed through exploratory factorial analysis and the internal consistency was evaluated by Crombach's Alpha.

Results: The binomial classification instrument consisted of seven care indicators. The content validity index of the seven care indicators were one. The validity of the construct allowed the extraction of three domains of evaluation of nursing care in an obstetric room with 81.28% explanatory variance. Crombach's Alpha was 0.89 for "Maternity Support"; 0.85 for "Preparation for discharge from hospital"; and 0.62 for "Technical assistance dimension".

Conclusions: Conclusion: The instrument for the classification of puerpera and neonate was validated to support nursing management in obstetric set accommodation.

Keywords: Workload, Organization and Administration, Personnel Staffing and Scheduling Information Systems.

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The Implementation of Telemedicine Monitoring in a Digital Era: the Impact in Adherence in Positive Airway Pressure in Obstructive Sleep Apnea Patients

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Objectives: Long-term conditions are associated with poor adherence and is especially prevalent in conditions where symptoms may fluctuate or may be hidden like Obstructive Sleep Apnea (OSA). Untreated OSA lead to high morbidity, such as reduced cognitive function, depression, infertility, increased risk of accidents, and it is associated with diseases such as hypertension, diabetes, myocardial infarction, and stroke. Chronic multimorbidity is a new challenge and must involve a change in the global organization of care and follow-up. We prospectively assessed adherence using daily telemonitoring of naïve Positive Airway Pressure (PAP) OSA patients' data and associated clinical parameters of cardio-metabolic risk during one year. The ultimate goal of this trial will be to develop an effective, extensible and cost-effective system to promote improved adherence to CPAP patients.

Methods: In a single center, 60 naïve PAP adult patients with moderate to severe OSA were randomized in two groups: standard care consisting in first, third and sixth month consultations and those with daily telemonitoring information (i.e., adherence, air leak, residual AHI) plus first and second week consultation and standard care (first, third and sixth month consultations). Subjects who used PAP for at least 5 hours per night for at least 90% of the days monitored were regarded as adherent. We also analyzed the correlation between adherence and cardio-metabolic clinical parameters.

Results: 52 patients were enrolled, 34 were randomized to telemedicine and 18 to standard care. The mean age was 54.2 yr, mean AHI was 38.3 events/hr, and 56% of patients were male. Only after 1 month, mean PAP adherence was significantly greater in the telemedicine arm versus the standard arm. After 3 mo. PAP adherence in the telemedicine arm was almost total sleep time (7h34) versus 3h47 in the standard arm.

Conclusions: Adherence can be improved with the use of telemedicine monitoring system at the beginning of the treatment. The implementation of new healthcare technological solutions, combined with standard care, can ensure financial sustainability and better clinical outcomes.

Keywords: Telemedicine, Patient-Centered Care, Adherence.

Sustainability

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Reprocessing of Single-Use Medical Devices: Clinical and Financial Results

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Objectives: The excellent results regarding clinical efficiency and costs reduction, obtained with the reprocessing of Single-Use Medical Device (SUMD), justify that its current practice in most of the hospitals in the United States of America and Germany. However, it's not common practice on a national level, as there is not any bibliography for a national experience. We present the results obtained with this practice in Centro Hospitalar de São João (CHSJ) in Porto.

To compare the clinical results and the financial impact of the reprocessing of two devices marked as single use, the linear suture machine and anastomosis and Harmonic® scissors.

Methods: A group of 733 patients operated in 2014 at CHSJ were evaluated. Out of these 316 were operated on with reprocessed SUMD, and 417 with non-reprocessed SUMD. Variables referring to the clinical and financial results were analyzed through clinical and management information provided by Unidade de Gestão Autónoma de Cirurgia. Comparison between groups was done using the Chi-square test and Mann-Whitney test.

Results: Indicators relative to the clinical efficiency proved that, the use of reprocessed SUMD professionally used in surgical interventions did not represent any added risk in comparison with the original devices.

In financial terms, there is a highly significant difference between the acquisition of a new medical device or a reprocessed one. In the case of the Harmonic® scissors and in linear suture machine and anastomosis entails savings superior to 50%.

Conclusions: This first study, in Portugal, confirms the economic advantages of reprocessing these two devices. The financial benefit was obtained with maintenance of the same clinical results as the ones achieved using original devices. These results are in line with those of published literature, and confirm the validity of using single use medical devices after professional reprocessing.

Keywords: Reprocessing, Clinical Effectiveness, Cost Reduction.

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Redesigning Care to Improve Cost-Effectiveness: The Elective Abdominal Aortic Aneurysm (AAA) Pathway in a Tertiary Care Provider in Central London

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Objectives: To improve the financial profitability associated with the elective AAA pathway.

Methods: Two clinical audits were performed. The first audit analysed a 2-year period data for patients (n = 292) undergoing AAA elective endovascular repair (EVAR). The second audit integrated a total of five clinical and financial databases during a period of 6 months (n = 109) to map the clinical pathway alongside the respective income generated and costs incurred. Both income and cost data are estimated based on patient-level data and visually depicted on a diagram using Lean-based waste identification techniques. Subsequently, based on the data provided, a multidisciplinary team engaged in a 3-month organisation-wide transformation programme to redesign the elective AAA pathway, focusing on opportunities to: i) maximise income; and ii) minimise costs incurred in the provision of care.

Results: Prior to any intervention, the NHS Trust presented a total deficit of £4,936 for the elective AAA pathway (total income of £2,198,314 and £2,203,250 in costs, n = 109). This is equivalent to a mean deficit per patient of £51 (IQR -£66,738 to £36,689). An in-depth analysis highlighted the variability associated with the type of procedure, as well as the financial impact of high-dependence unit beds and moreover vascular stents (represent 52.2% and 61.6% of the income and costs, respectively).

Following the redesign transformation programme, several initiatives aimed at maximising the income and/or curb the cost curve. First, a clinical coding training scheme for Vascular Surgeons (with particular emphasis in listing comorbidities), anticipated to generate an additional 2.5–5% of income. Second, the revision of the internal stent policy and enrolment in the national purchase system for high-cost devices. The latter means that, over a 3-year period, the vascular stents will have a neutral financial impact. Third, a set of localised and pathway-specific initiatives were considered. These include the: i) employment of a clinical nurse as the AAA Pathway Coordinator, responsible for setting up a telephone clinic for initial and follow-up appointments; ii) increase in the proportion of 'on the day' admissions, leading to the decrease in the overall hospital length of stay; and iii) decrease in the utilisation of high-dependence unit beds. The positive net contribution of these initiatives is estimated at £307,442- £362,400, or else 14.0%-16.4% of the total costs.

Conclusions: The holistic redesign of clinical pathways, with particular emphasis on patient-level financial data and considering simultaneously income and costs, has the potential to substantially improve the financial sustainability of healthcare providers.

Keywords: Efficiency, Income vs Costs, Health Economics.

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Impact of Iatrogenic Acute Kidney Injury on In-Patients in Hospital Vila Franca De Xira (HVFX)

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Objectives: Assess the number of nephrotoxic drugs in the development of acute kidney injury (AKI).

Verify the impact of this group of medications, as well as the deterioration of renal function, in the number of days of hospitalization.

Methods: A descriptive observational study was conducted with a longitudinal component of retrospective orientation in HVFX. This study included patients who were admitted to the Internal Medicine service from August 1, 2017 to August 31, 2017 and was based on the information contained in the clinical processes. Of a total of 247 hospitalizations, were included 118 patients whose admission and discharge occurred in August and whose pathology was not already associated with changes in renal function. The creatinine value of these patients was also collected, in order to evaluate renal function, through the calculation of Creatinine Clearance (ClCr), according to the Cockcroft-Gault formula. Whenever the development of AKI – characterized by the decrease of the ClCr below 30 mL/min – was found, it was possible to relate it to the number of prescribed nephrotoxic drugs and days of hospitalization.

Results: Of the 118 patients in our sample, 21 (18%) had at least one ClCr value less than 30 mL/min (GroupA). GroupA had an average daily number of drugs administered of 8.9, higher than the average of 7.7 drugs in patients who had registered only ClCr 30 mL/min (GroupB). Analyzing the group of nephrotoxic drugs, GroupA presented an average daily number of 6.2 nephrotoxic drugs administered, 14% higher than the average number of nephrotoxic agents (5.4) observed in GroupB. Regarding the days of hospitalization, Group A patients were hospitalized, on average, for 8.9 days, an increase of 17% when compared to GroupB (7.6 days). Finally, the impact of the number of nephrotoxic drugs in the time of hospitalization was evaluated. Patients with 3 or fewer nephrotoxic drugs administered per day were hospitalized, on average, for 5.7 days. The hospitalization time of patients with more than 3 nephrotoxic drugs administered increased 51%, corresponding to 8.6 days.

Conclusions: The frequency of AKI in this study is supported by what is described in the literature. It is estimated that the cost associated with the development of AKI is greater than the sum of the expense in the treatment of breast, lung and skin cancers. The commitment to optimize therapy improves the health care provided and contributes to the sustainability of the health system.

Keywords: Acute kidney injury, nephrotoxic medications, electronic health record.

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Costs Associated to Avoidable Hospitalizations in Portugal

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Objectives: Ambulatory Care Sensitive Conditions (ACSC) are health conditions for which the hospital admission could be prevented by timely and adequate outpatient care. The cost analysis provides valuable information for health managers and policy makers that can help on the decision making process. Indirect costs have not been included among the few previous studies that estimated costs associated to hospitalizations for ACSC. The objective of this study was to estimate direct and indirect costs of hospitalizations that were potentially avoidable in Portugal for the year 2015.

Methods: Direct costs were estimated using the official prices and the fixed cost per episode of urgent care published by the Portuguese National Health System (NHS), attributed to each inpatient stay and defined by diagnostic-related groups and severity of the condition. Indirect costs were estimated by the potential lost productivity due to length of the hospitalization and inpatient mortality, according to the human capital approach, taking into account the gender and municipality of residence of the patient.

Results: In 2015, nearly 100,000 hospitalizations were attributable to ACSCs in mainland Portugal. The estimated total economic cost associated to these hospitalizations amounted to €255 million, with a cost per capita of €371 (minimum €213, maximum €708, standard deviation €71). Most of the total estimated cost amount comes from the direct costs of the hospitalization itself (€215 million). Avoidable hospitalizations generated indirect costs of €2.6 million and €37.4 million in lost productivity for hospitalization and inpatient mortality, respectively. Bacterial pneumonia, congestive heart failure and urinary tract infection account for 78% of the total cost estimated for avoidable hospitalizations. The costs distribution follows the same distribution of hospitalizations by cause.

Conclusions: Hospitalizations for ACSCs involves high-costs for individuals, for the health system and the country as a whole. The costs presented are estimated. Values defined by the NHS do not reflect the actual costs of an inpatient admission. Individual and local characteristics associated to labor market and deaths after the hospital discharge are not taken into consideration due to data unavailability. Other unobserved costs include patient out of pocket expenses with transportation, medications and other needs associated to the hospitalization and its consequences. Despite the limitations of these estimates, results indicate that substantial financial resources could be saved if Portugal reduced hospitalizations for ACSCs. Reducing the number of avoidable hospitaliza-

tions can contribute to reduced hospital care use, with positive results for the population.

Keywords: Avoidable hospitalizations, Costs of hospitalizations, Lost productivity.

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Clinical and Economic Evaluation of the Enhanced Recovery After Surgery (ERAS) Multisite Implementation Program for Colorectal Surgery in Hospital Beatriz Ângelo (HBA)

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Objectives: ERAS Implementation Program main objective is the surgical patients' outcome improvement, placing the patient in the centre of all decisions.

ERAS intends to diminish complications rate, mainly the ones that most affect the patients quality of life, reduce the average length of stay, and promote a quicker and healthier recovery in order to allow the follow up treatment (chemotherapy or radiotherapy, if applicable) as soon as possible.

The changes in the treatment process must be financially sustainable.

Methods: The first group of patients participating in the ERAS Programme were the colorectal cancer patients submitted to elective surgery. HBA started its implementation in 2016 and is recognized as an ERAS Centre of Excellence (the only one in Portugal), since the beginning of 2017.

Changes were made at the Hospital concerning operational processes, clinical records and cost analysis.

Results: Comparison of 2 different patient groups – one group before the implementation of the ERAS Programme (67 consecutive patients) and the other after its full implementation in the hospital (137 patients).

All data were obtained through ERAS Audit Interactive System, a powerful database provided and developed by the company that initially promotes ERAS , and through a statistical analysis.

In what concerns clinical outcomes, we observed a decrease in severe medical and surgical complications (from 20.9% in the first group to 15.1% in the second) and a strong decrease in mortality (from 7.5% to 0.7%). Surgical reinterventions reduced from 19.4% to 15.1%.

ALOS also decreased: median reduced from 14.6 days to 6.4 days and mean from 7 to 5 days.

Financially, and concerning all costs due to the ERAS Implementation (such as training, personnel or new consumables), as well as the result due to less complications and the reduction of the length of stay, the positive result was above 42,000€.

Conclusions: The results achieved due to ERAS Implementation Programme in the colorectal surgery at HBA are completely compliant to a significant improvement concerning the patient safety and the quality of the healthcare services rendered, and have also a major financial benefit, as for every 1€ spent we achieved more than 2.1€ positive results.

The investment made in the Programme acquisition, the team members training and dedicated time, showed a relevant and rap-

id return, not only through the decrease in the average length of stay, but also, and more important, the improvement of the clinical outcomes, such as the reduction of major complication or the mortality rate.

Keywords: ERAS, Colorectal.

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Economic and Financial Information for Hospital Decision-Makers in Portugal: Economic and Clinical Rationality

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Objectives: In this paper we present the state of the art of the research on the importance of the economic and financial information for hospital decion-makers, which we have begun to develop in a research project. Our objective is to evaluate the use of economic and financial information in the decision making process of health professionals and the compatibility of economic rationality with clinical rationality, in the Portuguese hospital context.

Methods: As far as methodology is concerned structured questionnaires, integrated into a wider-ranging interviewing process, will be applied. First, we have selected Hospitals in three district capitals in the South of country, namely in Beja, Évora and Portalegre. In particular, we have chosen the same clinical service in each of them to carry out the analysis. Subsequently, we intend to extend the study to other hospitals in other regions of the country.

Results: Although we still have no results, we expect that the results of this research will contribute on three levels: to the academic research community in general, and in Portugal in particular; to raise the professional community's awareness of the use of financial information in its activity; and to help policy makers redefine the processes of communication of financial information in the Portuguese health sector.

Conclusions: Our conclusions are related to the need to control of public expenditure on professionals, medicines, medical devices, complementary diagnostic and therapeutic resources, equipment and consumables, in particular in the health services. This issue has come to take on increasing importance in the concerns of the entire Health Portuguese System management structure. This structure has sought to sensitize the main executors of health policy – its professionals, physicians, nurses and diagnostic and therapeutic technicians – to the need to consider, in their actions and decisions, not only the expected benefits but also the expenses associated with them, considering that there are, almost always, different treatment options with similar effectiveness.

Keywords: Hospital management; decision making; economic and financial information.

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Paving the Way for Advanced Hospital Logistics Through an Intelligent Dashboard with Improved Predictive Models and Machine Learning

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Objectives: Hospital logistics, including buying and handling pharmaceuticals or clinical materials, is responsible for a significant share of the hospital running costs. Despite the advances in managerial practices and processes, there is still room for improvement provided that: (i) detailed data are available; (ii) state-of-the-art operations research methods are employed; and (iii) changes are actively pushed through by hospital managers. Knowlogis, an intelligent dashboard for improved hospital logistics, serves all these purposes. It analyses real-time data from the hospital, applying state-of-the-art inventory management policies and finding potential for savings, while keeping or improving the service level; it incorporates advanced statistical and machine learning methods to forecast pharma and material consumption patterns with higher accuracy; and finally, it is actively looking for improvements, informing the hospital managers on optimizations to implement.

Methods: Knowlogis uses state-of-the-art periodic and continuous review inventory management policies with that are chosen depending on the item properties. Furthermore, it uses advanced parametric methods such as Holt-Winters Exponential Smoothing or ARIMA, but also machine learning methods, such as Neural Networks, Random Forests or Support Vector Machines, to equip its predictive models. It performs these tasks actively, meaning that it will routinely skim through the data to find candidates for optimization.

Results: Knowlogis has been tested using over 3 years of data from a large, multi-specialty hospital, serving an area of 700 thousand inhabitants. Results so far show that there are large gains to be obtained resulting from immediate savings due to better inventory management. Moreover, Knowlogis brought to light that even the most attentive manager may miss potential opportunities for improvement, which Knowlogis is able to capture. Furthermore, we have shown that there is no one-size-fits-all inventory management policy, and therefore one must be tailored depending on the category to which it belongs to. We explore and detail in which cases a given methodology is more adequate than others, generalizing the results.

Conclusions: Non-clinical activities that support the hospital's daily operations are critical to ensure an effective and efficient delivery of health care. Failure to provide the drugs or the material on time may put the care provided to patients in jeopardy. Modern IT systems capable of handling and processing large amounts of data coupled with state-of-the-art operations research methods may leverage some of the work performed by healthcare managers,

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ultimately improving health outcomes. Knowlogis was developed with this goal in mind, actively finding and proposing changes to improve hospital logistics.

Keywords: Hospital logistics, Predictive models, Machine learning.

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Detection of Drug-Drug Interactions (DDI) as a Tool for Reducing Hospital Costs

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Objectives: About one in every ten patients is harmed during health care (OECD, 2018). Adverse events in hospitals constitute a challenge for public health and have well known associated costs. Drug-drug interactions (DDI) are a known source of avoidable adverse events and prolonged hospitalization, so their prevention is a priority. Clinical decision support systems (CDSS) containing information about drug interactions are considered useful in DDI detection (Coleman et. al 2013). MedH, a CDSS that checks each prescription for DDI, stands as an opportunity for the optimization of expenses and reduction of costs arising from the use of medicines in hospitals while minimizing patient harm effectively and efficiently. Our aim is to evaluate the preventable costs associated with hospital stay due to drug interactions, as a measure of impact of a DDI detection tool.

Methods: In order to estimate the potential cost savings of the implementation of a DDI detection tool in hospitals, we gathered data concerning the number of hospitalizations (per year) and related costs (per day) in Portugal. Also, we conducted a bibliographic search to assess the prevalence of DDI in hospitalized patients and the expected prolongation of hospital stay in patients with DDI.

Results: In 2016, 857.400 hospital admissions were registered in the Portuguese National Health Service hospitals. In Portugal, each admission in a public hospital costs, on average, €880 per day (Entidade Reguladora da Saúde, 2014). The prevalence of potential DDI occurring during hospitalization ranges from 12%, considering only major DDI to 37% overall. Hospital stays for patients with DDI are prolonged on average for 7 days (Moura, C. et al., 2009). The annually cost of the additional days of hospital stay for patients that experience DDI during hospitalization is then calculated to range from 633 M€ (major DDI) to 1.954 M€ (total DDI).

Conclusions: The implementation of a DDI detection tool has the potential to reduce patient harm and additional days of hospital stay related to DDI, thereby reducing its associated costs. Based on the data we have collected, we have estimated that the implementation of a DDI detection tool can produce significant savings for the Portuguese National Health Service, based only on the prolongation of hospital stays. Our next steps include the calculation of other potential costs savings related to DDI, such as costs related to clinical outcomes, disease burden (morbidity and mortality) and indirect costs of harm (e.g., loss of productivity).

Keywords: Drug-drug interactions, hospital cost saving, clinical decision support systems.

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Advanced Analytics Supporting the Design and Implementation of a New Physician Allocation Model

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Objectives: There are different models of emergency team management worldwide. In Portugal, currently, one can find three models to organize the emergency team: i) a dedicated model, lately implemented in some Emergency Departments (ED), which consists mostly by internists that work full-time, ii) a classic model in which the emergency team is made up of physicians from the hospital of different medical departments and, lastly, iii) a mixed model where the two previous ones coexist, that is the ED allocation is ensured both by an internist dedicated team and by physicians working in other medical departments. The last two models are the most demanding regarding the planning and scheduling roles. The ED of the Hospital, mixed adult-children and tertiary-level hospital located in Portugal, applies the mixed model. Therefore, the integration of ED dedicated team schedule with hospital physicians' schedule has not been an easy process to manage. The aim of this study was to identify opportunities for improvement in physicians' allocation and propose reorganizations to the medical department.

Methods: As this scheduling challenge is a combinatorial problem it is a very hard one to solve manually. It is interesting to take advantage of an advanced analytics approach, in this case a mixed integer programming optimization algorithm, with focus on physicians' allocation to the ED.

Results: The new schedule allowed to reduce the number of shifts in ED outside the respective the physician' established day of the week and the number of overtime hours needed to meet the demand in ED. In addition, the new settings included a redesign of the teams to balance the expertise and the number of elements per team.

Conclusions: Through the application of the optimization algorithm it was possible to create a balanced scheduling regarding the number of shifts in ED, implying a higher satisfaction among physicians, which also brought costs saving to the hospital. With the same resources the new process enables the team to find a solution that minimizes the number of overtime hours required to the doctors while maximizes compliance with the number of doctors required each period. The new optimized scenario involved not only the Clinical Lead but also the head of Human Resources, the head of Production and the Executive Board which was a key to the success of the project. This process redesign can now be extended to other clinical departments.

Keywords: Analytics, Efficiency, Planning.

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Crisis Management or Management in Crisis? Lessons Learnt by the Greek Public Health Sector's Response to Economic Crisis and Austerity

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Objectives: To present best practices as well as failures of reforms' efforts through authors' personal experience in Public Health Management during the economic crisis; to examine the extent in which effective management succeeded in overcoming scarcity of resources and to identify critical contributing factors to the endeavor.

Methods: Selected interventions in the *Attica Health District* (includes 24 hospitals and numerous Primary Health Care Units), the *Institute of Child Health* (ICH), the *National Centre of Emergency Care (EKAB)*, the *Pyrgos Hospital* and the *Ileia Prefecture Physical Medicine & Rehabilitation Centre (IPPMRC)* were examined. Data collected by the mentioned health organizations and Hellenic Statistical Authority as well as laws, ministerial decrees and official reports were investigated.

Results: The annual operational cost of the Attica Health District was decreased from 757 millilon euros to 697 million € (8%) during a two years period (2011–2012), while a significant staff reduction was noticed. Nevertheless, a remarkable increase of attendance of out-patients had been achieved at the same period.

Regarding the ICH, from February 2012 to February 2013, having to overcome tremendous financial shortcomings due to decreased budget and non-regular grant flow, administration developed a "survival" plan which was successfully executed. As a result, at the end of this short period the critical needs had been covered and a European extra funding of 3.4 million € had been achieved through well designed health projects. Additionally, initiatives to strengthen the role of the Institute (e.g. legal establishment of the National Programme for Preventive Neonatal Screening) were performed.

In EKAB, in an 18 months period (March 2013 to September 2014) targeted interventions had been implemented for the transition to the digital era despite economic crisis and without any additional cost.

In Pyrgos Hospital, a 20.63% reduction at the cost of external services was achieved during a two years period (from 3.03 million in 2015 to 2.4 million in 2017) without compressing spending for paraprofessionals fees.

In IPPMRC, functional rehabilitation sessions increased by 384.34% from 2016 to 2017 while the number of beneficiaries in functional and psychosocial rehabilitation programs rose by 219,35% at the same period.

Conclusions: Interventions regarding reorganization, personnel's motivation and improvement of the financial management took place in the Public Health Sector during the economic crisis. Increased efficiency can be observed. However, useful changes were not fully implemented or even afterwards were being abandoned due to administration change or other chronic systemic deficiencies and the reform effort resembles the Sisyphus myth.

Keywords: Management, austerity, Greece.

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Management Accounting and Decision Making: State of the Art at Portuguese Hospitals

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Objectives: Management accounting is one of the most important tools for health managers. The use of cost accounting information is crucial to enhance efficiency, quality and create value in healthcare organizations. However, there is lack of information about practices, methods and the use of cost accounting by Portuguese hospital administrators. The aim of the study is to describe the current state of the art of management accounting system in the Portuguese public hospitals. This paper also intends to assess which are the conditioning and critical factors of success, which can, respectively, difficult or potentiate the best performance of management accounting in hospitals.

Methods: Study design includes the development and national application of an online survey presented to all Portuguese public hospitals. The survey dimensions and items were developed through bibliography revision. We included 7 dimensions and 28 items. To capture financial managers' opinions we used a Likert scale of 5 degrees (nothing important to very important).

Results: The results showed that in 39 of the 41 answers (82% response rate), management accounting is partially or totally implemented (59% and 37%, respectively). From these, 59% use the traditional costing method by sections, or cost centres, generally at a direct cost level (monthly, in 90% of cases). Other methods were also identified, such as variable costing method (18% of cases), Activity-based Costing (26%) and patient-level costing (38%). If they had the possibility to improve, or having a different method, 77% said that it would be the patient-level costing one.

Despite the respondents' perception that the cost information suits some quality characteristics, especially in terms of their comprehension (64%) and comparability (59%), it is verified that this information, mostly never, rarely, or only sometimes is used in some prediction, control situations (62%) and decision making (65%), being provided monthly to internal users (54%) and annually to external users (51%).

Lastly, there were identified some recommendations to improve cost accounting in hospitals. Creating a core team exclusively for cost management and technical training for internal users may impulse the implementation and maintenance of cost accounting systems. At a national level, it would be useful the definition and validation of methods for allocating health costs.

Conclusions: The Portuguese public hospitals are far from taking advantage of the real purpose of management accounting, to assist decision making. Perhaps only with the change of national strategy, focused on the concept of patient value, common concepts and methods, it would be possible.

Keywords: management accounting, costing method.

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Lean Process Management in the Emergency Department: The Five Forces of Success

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Objectives: In many European countries hospital emergency departments (ED) suffer from "crowding effects". Due to limited resources (medical staff, supporting devices), the average length of stay (ALOS) varies between three and seven hours. One reason for this uncontrolled situation is the high variation in the turn-around-time (TAT) of lab test results, fluctuating between 42 and 121 minutes (average TAT = 73 minutes). In addition, between 45 and 70% of the patients frequenting the ED do not really need urgent medical help. In consequence, expensive ED resources are blocked, medical quality deteriorates and patient satisfaction tails off.

This study aimed to identify the most important success factors for organizing an ED and to clarify to what extend principles of lean management (i.e. "one piece flow", "autonomation") contribute to avoiding crowding effects, to reducing ALOS of ED patients and to reduce direct and opportunity costs.

Methods: At a university-affiliated hospital with nearly 70.000 ED patient visits per year a before-after-comparison was conducted. In the first study phase blood tests were performed in a central lab setting. In the second phase a POCT solution was implemented. Based on the performance criteria "TAT for lab test results", "ALOS of patients in the ED" and "process costs" differences in efficiency and effectiveness between both settings were identified. Furthermore, the influence of implementing a primary care unit (portal practice) inside the ED was calculated.

Results: POCT was associated with an accelerated availability of test results (central lab: 70 min; POCT: 14 min), a shorter time to clinical decision-making (110 min; 40 min) and a reduced ALOS by 70 minutes. Furthermore, imputed cost savings of 178 Euro per day could be verified. Also, there was an exoneration of ED capacity equal to the service capacity needed for seven patients. The effect of implementing a primary care office inside the ED (portal practice) was a reduction of capacity load that equals the treatment demand of 11 patients per shift.

Conclusions: A POCT test environment for critical lab test parameters (e.g. Troponin) has clinical relevance for ED patients (e.g. patients with "non-specific thoracic pain"). POCT contributes to reducing "crowding effects", containing costs and increasing patient satisfaction. Furthermore, a portal practice supports appropriate steering of "bagatelle cases". Lean management principles are a powerful source to foster patient outcome as well as efficiency and effectiveness of ED processes.

Keywords: Patient Outcome, Point-of-Care Testing.

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Improving Healthcare Through Financial Incentives: Where Do We Stand and What's the Next Step?

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Objectives: The concept of payments to professionals through monetary incentives, known as "pay-for-performance" (P4P), has the theoretical objective of improving the quality of services provided in the health sphere. It has been applied in hospital environments, outpatient clinic and also in Primary Care through an additional stimulus that compensates for a certain implementation of favorable rules, procedures, behaviors or outcomes that have an implication in improving the health of a population. The application of this approach in recent years has failed to present results that demonstrate in a significant way that this idea can be successful. The complexity surrounding these incentives, especially in terms of structuring, planning and relevance are some of the major obstacles to the credibility and usefulness of this financial incentive model.

Methods: A systematic review of original articles, in English, in PubMed with the MeSH terms "pay for performance", "health quality", "physician incentive plans" and "reimbursement" between 2012 and 2018 was performed. Articles were extracted by two reviewers for their relevance through the title and abstract. Any disagreement between reviewers was resolved by consensus. We included articles on payment methods with incentives and P4P schemes according to Conrad and Perry.

Results: A total of 1858 articles were found with the initial search. After exclusion of articles older than 5 years, with no total

text available, review articles or meta-analysis 34 articles were considered. There seems to be some evidence that the P4P method may have positive effects on health in the short to medium term, but studies for long-term outcomes are yet to be conducted. Significant improvements were most evident in institutions where service quality was originally poor. The choice of criteria that define incentives is the major determinant of the efficiency of this concept in improving health outcomes. The disparity between studies does not allow for a definitive conclusion on the yield of these programs. Reducing costs may also be one of the advantages of applying incentives to improve healthcare.

Conclusions: Financial incentives undoubtedly motivate behavioral changes. Rewarding improvements in responses seems to be a way to eliminate malpractice and create a high-performance health system. Information is contradictory in current studies. While some articles find a positive relation between financial incentives and more favorable outcomes others reveal that the clinical complications and poor results do not seem to diminish with the application of these additional compensations. The frequency, quantity and duration of the rewards are still unclear.

Keywords: Health quality.

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Main Dimensions of Hospital Operations Management: An Exploratory Study with Hospital Management Professionals from Brazil and Portugal

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Objectives: This study aims to identify the key issues and dimensions related to Hospital Operational Management (HOM) based in Lean Healthcare (LH) by the professional perspective of hospital managers.

Methods: Based on literature review about Hospital Operations Management and Lean Healthcare, the authors designed and conducted four workshops with a total of 60 professionals of hospital management, with different backgrounds, in four public and private hospitals in Brazil and Portugal using the HOM dimensions adapted from Dobrzykowski; Deilami; Hong & Kim (2014): Introduction and key issues of operations management; Strategy of hospital operations; Design of hospital operations; Planning, scheduling and control of hospital operations.

Results: As a result, professionals have raised as the most important area of the Hospital Operations Management: Planning, Scheduling and Control of Hospital Operations with 91% of classification among professionals. Among the HOM sub-areas, the most cited among professionals would be: Planning, Scheduling and Control of Patient Flow (91%); Capacity and Demand Management (89%); Strategic Issues of Hospital Quality (81%); and Inventory Management and Control (79%). In addition to the areas predefined in the study, the participants raised the importance of additional areas, such as Finance and Cost Management, People Management and Communication, and Engineering and Maintenance.

Conclusions: The study concludes that the areas of Hospital Operations Management and Lean Healthcare are broad and require greater depth of study and that, among the professionals associated with Hospital Management, the area that has attracted the most attention is Planning, Scheduling and Control of Hospital Operations, for Patient Flow Management and Materials and Medicines Management.

Keywords: Hospital Operations Management, Lean Healthcare, Hospital Operations Strategy.

Management Matters

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Models of Mortality Risk to Support Decision in Patients with Acute Myocardial Infarction: Does One Fits All?

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Objectives: The development of new data analysis tools to support decision is vital to improve patient outcomes, which is particularly important to providers aiming to be leaders in innovation. Acute myocardial infarction is a serious health condition with high prevalence, as well as high morbidity and mortality. However, there certainly exists room for improvement, using available and retrievable data for patient management in order to reduce the mortality burden. Previous studies have identified age, shock, acute renal failure, high prothrombin time, chlorine and anemia as risk factors for increased AMI mortality. This study aimed to assess the validity of a model of mortality risk for AMI patients previously validated in a different population, and to recalibrate the model in case of worst results.

Methods: Patients with AMI discharged from an NHS hospital (approx. 1000 beds) in 2013–15 were selected and anonymized administrative and laboratory data (LD) were used. Logistic regression models were used. Calibration and discrimination were assessed with Hosmer&Lemeshow (H&L) statistic and area under receiver operating characteristic curve (c), respectively. At our hospital, considered mortality risk factors were age, gender, AMI type, 11 comorbidities, and 25 LD variables.

Results: 1749 AMI patients treated at our hospital were included. Mortality rate was 12.46%. Firstly, we used the original model risk factors with our patients' data and compared the new odds-

ratios (ORs), calibration, and discrimination with the original and the predictive ability reduced (c: 0.782 vs. 0.921).

Secondly, we developed a new model based on our patients' data and all the available variables and compared also the risk factors included. The new model identified risk factors not included in the original: age ≥70, albumin (below-level), eosinophils, INR and urea (above-level), cancer, shock, cardiac dysrhythmia, and respiratory infections. The new model presented an excellent discrimination (c: 0.871) and a good calibration (H&L: 0.566).

Conclusions: This work enabled the development of a new risk model based on the available data (administrative and clinical data) with similar performance to others already being used, in order to support the decision process in health care organizations. The results allowed us to conclude that these models need recalibration to each population in order to be applied in clinical practice. More research with more data needs to be developed in order to have a more sustainable and generalised model, that can be applied to larger populations with a potential impact in patient management and outcomes.

Keywords: Acute myocardial infarction, Mortality predictive models.

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The Future Distribution of Human Resources for Health in Europe: Using Scenario Modelling Targeting the Year 2050

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Objectives: In 2003, *The WHO Report: Shaping the Future*, addressed the discrepancy of the distribution of the HR in health throughout the world. The number of average physicians was 16.2 per 10000 people in 2015. However, in Africa, this number drops to 1.60. There are 30 out of 194 countries in the world below the 1 physician per 10 000 people threshold. Our main goal is to model a set of system scenarios considering the distribution and evolution of workforce rates and the migration of professionals, to look for conditions that ultimately will be more balanced for healthcare services globally.

Methods: We use scenario modelling, which includes an analysis of the demographic evolution, rates of graduation and retirement, factors that contribute to the evolution of the available healthcare professionals. First, the impact of those factors will be measured and projected for OECD countries, for the period between 2010 and 2050. Projections will be simulated in various scenarios, considering different policies on the migration of workers, comparing to the current non-limited situation. The projections of development in the number of currently working professionals, adding expected future graduates and subtracting possible retirements will be defined, per year, in the form of discrete-events. Furthermore, we believe to apply the model which will present the most promising results to all 194 countries. Modifications in the system regarding minimum rates of physicians and migration policies will be reflected on.

Results: For OECD countries, first results predict that the majority of European countries have a sustainable workforce, which shows no deficit in the number of physicians needed for the population projection until 2050. However, significant movement of professionals will occur. This is expected since, in Europe, demographic evolution tends to decrease due to the ageing of the population. In some countries like Germany, UN forecasts that the population will grow 14 million until 2050, and considering growth in retirement, while the number of graduating new members to the workforce is diminishing considerably, resulting in the lack of healthcare professionals in this country. With this result, we expect that other European countries will be supplying a significant number of physicians to overcome the shortage.

Conclusions: Only a scenario with strong regulations could face the challenge. The number of physicians working globally is not diminishing but will keep being poorly distributed. Therefore, from our scenarios, it is evident that strong regulations are needed to fairly regulate a balanced migration of the workforce.

Keywords: Human resources, migration, simulation.

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Improving Healthy Ageing Through the Assessment of Evidence-Policy Interactions and Knowledge Exchange

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Objectives: Collaboration and knowledge exchange across professional and organisational boundaries are widely recognised as key elements for innovation. In the field of public health, active and healthy ageing is an example of the need of multidisciplinary cooperation from a series of stakeholders (e.g. healthcare providers, social care, policymakers, urban planners, researchers, industry). Specifically, developing more effective feedback mechanisms between decision-makers/practitioners and researchers with the aim of enhancing the evidence base of policy on the one hand and improving the efficacy of research on the other is perceived as a key challenge towards the improvement of healthy ageing mechanisms. Although a significant number of studies have focused on exploring approaches to knowledge sharing, further research on how to effectively translate research on ageing into policy and practice is needed (Ellen et al., 2017).

Methods: Drawing on the existing knowledge translation literature, this paper evaluates a new tool which aims at assessing existing knowledge exchange processes and capabilities of both research producers and research users involved in the design and/or application of policies and programmes associated with healthy ageing and walkable environments.

Results: This tool has been piloted and validated in Curitiba (Brazil) and in Belfast (UK).

Conclusions: By assessing the current knowledge exchange dynamics and infrastructure capabilities, this tool can contribute to map the effectiveness of evidence-policy interactions and opportunities for knowledge exchange around healthy ageing as well as the identi-

fication of weaknesses and strengths. In doing so, this paper specifically contributes to gaps in the literature on the translation of research evidence into practice in the field of healthy ageing and urban planning, but also contributes to the development of the more general literature on knowledge translation. From a practitioner's point of view, information obtained from the application of the tool can help to improve knowledge exchange processes across stakeholders involved in healthy ageing; thus contributing to a better integration between research, policy-making and health systems management.

Keywords: Knowledge translation, policy-making, healthcare management.

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CEO Dominance Risk in the Healthcare SOE – The Case of Potugal

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Objectives: The aim of this research is to evaluate the "CEO dominance risk" in the Healthcare sector in Portugal among the institutions belonging to the state – the state-owned enterprises (SOEs). Previous researchers found that the average performance of firms is not affected by CEO dominance – the possibility to exercise their will despite or removing dissenting. However, they noted that the range of performance was wider when CEO dominance was present. Excellent and poor results would occur more often. In the public sector dominated by the balance of procedures and outcomes, there is a tendency to risk avoidance, thus considering CEO dominance a risk.

Methods: This research was based in previous models and questionnaires, but adapted to the particular conditions of SOEs and legal framework in Portugal during the analysis period (2011–2015). A practical power index model was developed.

Results: the results demonstrated that some Hospital CEO's may have a dominant position but also exposes some underpowered situations. Regarding the motivation for Physicians to become CEOs and how they are perceived by their peers, the research confirmed the five groups expected and highlighted that on one side the most senior professionals are supported by their peers, and the younger ones are regarded as not having the required expertise.

Conclusions: Hospital CEOs with a long and prestigious career, Physicians by profession, with good political connections, already experienced in Board roles as Clinical Director, would be the obvious case, of CEO dominance. What this research shows is, that this description is true in some cases, but not the whole truth, and there are several other cases of CEO dominance...

Having a balanced Board, with the right expertise, external prestige, a diversity that reflects the operational conditions, and sound clinical professions as part of the executive team, even in regions where the talent availability is not abundant, seems a rather tough task.

Keywords: Governance.

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The Burden of Hospital-Acquired Infections (HAI): Can the "Back to Basics" Be the Solution? – A 30 Years Overview of Hai by Klebsiella Pneumoniae in a Tertiary Care Centre in Portugal

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Methods: The rapid and complex evolution of resistance mechanisms in *Klebsiella* spp. are one of the most significant current threats to Public Health with significant economic and clinical impact. However, it remains somewhat unclear how pathogenic bacteria, its resistance and virulence, have evolved in the over the time. The aim of this study is to provide an overview of the virulence and resistant determinants of *Klebsiella* spp. isolates producing β-lactamases and carbapenemases since 1980.

Methods: A retrospective study was performed considering a total of 929 *Klebsiella* spp. isolates. Antimicrobial susceptibility resting was performed by disk diffusion and the results were interpreted according to EUCAST. The β-lactamases including OXA, NDM, CTX-M-, TEM, SHV, DHA, FOX, and CMY were screened for gene virulence factors: K2A, fimH, mrkDV1, mrkDV2-4, khe, rmpA, magA, iucC by PCR. Clonal relationship was evaluated by M13 fingerprinting and multilocus sequence typing (MLTS). Plasmid replicons were determined by PCR-based replicon typing scheme.

Results: A total of 100 isolates were studied. Group A: TEM-1 and SHV-1 (n = 15); Group B: TEM-10 (n = 7), -24 (n = 5); Group C: CTX-M-15 (n = 46) and Group D: KPC-3 carbapenemases (n = 27). The genes DHA, CM, IMP, VIM, NDM and OXA were not detected. The virulence profile (fimH, khe, mrkDV1) was shared by all β-lactamases, indicative of an important role of fimbrial adhesins type 1, type 3 and hemolysin. In addition, KPC-3 isolates also showed significative prevalence of the capsular serotype K2 and aerobactin iucC. The isolates mostly present the IncF, IncH1 and Inc A/C replicon typing. However, different profile of plasmids replicon typing was found between KPC-3 carbapenemase and CTX-M-15 ESBL.

Conclusions: The overlapping of multidrug-resistance and accumulation of virulence genes found in *Klebsiella pneumoniae* can constitute a serious threat to Hospital patients. Surprisingly, fosfomycin presented high efficacy (>85%) to the highest resistant strains (KPC-3 producers), which indicates that new therapeutic strategies are not directly correlated with expensive drugs and that the "old" and "common" antibiotics should be considered as therapeutic options to Antimicrobial Resistant Gram-negative Bacteria.

Keywords: Antimicrobial Resistance, Epidemiology, Hospital-Acquired.

Poster Presenation

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Redesigning Health Care Pathways, Through Daily Clinic Implementation at General Hospital of Volos

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Objectives: The need to improve the quality of the provided services, as well as the continuing pressure to reduce the cost of health care, has led modern health organizations to establish One Day Clinics. This study shows the profit in efficiency and cost effectiveness by developing new process as One Day Clinic (ODC) of the General Hospital of Volos as well as the satisfaction of the patients who received health care in it.

Methods: A study was carried out in G.H. Volos (period July 2017 to March 2018). In the ODC we have developed a five step methodology planning: practical approach to planning ergonomic and architectural redesign, focus on employment skills, provide individual services and implementation-monitoring and review. A 0–10 point questionnaire was used to assess patient satisfaction.

Results: The ODC was equipped with 6 beds and the operating days were Monday to Friday. In the clinic were occupied 3 nurses and the chief nurse, who worked in two shifts 7:00–15:00 and 9:00–17:00. The nursing interventions carried out in the department were therapeutic – diagnostic procedures, intravenous treatment and hydration, blood transfusion. The number of patients served by the One Day Clinic from July to March 2018 was 1322 and an average of 146 patients per month. The clinic patient completeness was on average 117.42%. The ODC is expected to reduce the occupancy in the main ward, in addition to that we reduce patient risk factors of adverse events while not involve with hospital environment. Also by operating this ODC are introduced new approaches for the administrative work by simplifying it. The patients' satisfaction during their daily hospitalization was measured with the assistance of 37 questionnaires which showed that, the ODC is patient-friendly for 100% of respondents, is 97.2% helpful and also helps save time for the 91.9%of the respondents.

Conclusions: The One Day Clinic acts like a bridge between patient and health services. It contributes to the functional improvement of the G.H. Volos by decongesting clinics from patients and reducing the patient's waiting time. At the same time, it offers patients a friendly environment, organized and well-equipped in order to provide the best possible care, improves the quality of care and gains impressive economic benefits. It is evaluated that dissemination and efficiency of this process will encourage this health organization to further develop new projects.

Keywords: ODC, evaluation, patients satisfaction.

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