INSTITUTO POLITÉCNICO DE LISBOA

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ALLIED HEALTH MEDICAL IMAGING AND RADIOTHERAPY TECHNOLOGISTS: STUDIES ON LEADERSHIP

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Mestrado em Gestão e Avaliação de Tecnologias em Saúde

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Abbreviations List

ACSS – *by portuguese*, Administração Central do Sistema de Saúde

AHMIRT - Health Allied Medical Imaging and Radiotherapy Technologists

AHP - Allied Health Professionals

ATARP – Portuguese Association of Radiology, Radiotherapy and Nuclear Medicine Technologists

EANM – European Association of Nuclear Medicine

ESCO - European Skills, Competences, Qualifications and Occupations

ESTeSL – Lisbon School of Health Technology

GATS - Health Technology Assessment and Management Master's Degree

ICHPO - International Chief Health Professions Officers

LP - Leadership Profiles

LPI - Leadership Practices Inventory

MLQ - Multifactorial Leadership Questionnaire

NMT - Nuclear Medicine Technologist

PI - Professional identity

POP - perceived organizational performance

RT - Radiology Technologist

RTT - Radiation Therapy Technologist

WE - Work engagement

WHO - World Health Organization

One key to successful leadership is continuous personal change. Personal change is a reflection of our inner growth and empowerment.

Robert E. Quinn

Dedicated to all professionals who want grow and empower.

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INTRODUCTION

In Portugal, Medical Imaging and Radiotherapy profession was created through the decree law number 9408/2014 (Diário da República, 2014) and results from fusion of three independent professions: Radiology Technologist (RT), Nuclear Medicine Technologist (NMT) and Radiotherapy Technologist (RTT). Recently, the evolution of technology and techniques allow combine hybrid techniques that promote decreasing of radiation dose to the patient with better clinical outcomes what support the fusion of this professions. Additionally, this fusion can also promote the employability at national and international levels (A3ES, 2013). Recently, this professional group was recognized by European Skills, Competences, Qualifications and Occupations (ESCO) as Major Group 2 professionals similar to other health professionals as Medicine and Nursing (ESCO, 2019). This fusion brings great professional changes on professional framework that raises crucial questions to debate as professional identity (PI) and work engagement (WE) on professions that had an individualized grade and new cummings to work field with new conjugated degree. With these changes, it can be relevant study professional management outcomes as professional identity and work engagement as suggested by some reference authors (Schaufeli et al., 2009; Houdmont and Leka, 2010; Ruess et al., 2014) and correlate them with an effectiveness measure (perceived organizational performance) on professionals looking for some real and updated data for that professionals.

Therefore, it is important to study the leadership impact in Allied Health Professionals (AHP) because there is known a quality deficit in leadership skills, particularly in their framework and integration on health services (Cunha, 2008). Leadership is a guiding component of Quality Systems whose basically assumptions are described on ISO 9001 (2015). Certification and accreditation on healthcare services is a need to improve the quality of health services and provide confidence of this quality to all stakeholders (Bretaña, 2017). The accreditation programs also have leadership as a focus, and these orientations indicate that the leader should to “promote the creation and maintenance of a safe culture with the eliminations a intimidating behavior (“disruptive”) which prevent the communication between employees” (Baker, 2011). All that factors suggested us that leadership could moderate the relation between how professionals are connected to your job and workplace and their performance.

One of the primary goals and objectives of the Master in Health Technology Assessment and Management is to develop professional skills to promote and optimize the

management of health resources, to better respond to the needs of the population (Regulamento Mestrado GATS, 2012). In this context emerged the motivation to put into practice the knowledge acquired in the context of the professional activity where the acquisition, deepening and demonstration of the capacities of applying the knowledge and the competences developed along the high formative graduation, particularly in the field of action of the leadership and relate it to Health Technology Assessment and quality of health services.

This project is presented in a structured document format containing two articles for publication. This format was chosen due to the willingness and relevance of promoting the creation of evidence of these management outcomes for Allied Health Medical Imaging and Radiotherapy professionals in Portugal. It also serves to encourage hospital managers, leaders and professionals to focus on the issue of leadership and to realize its importance and the driving power it can have in health services. At the same time, it's also intended of these articles frame the theme of leadership on AHP on international context and contribute to understand of professional identity and work engagement contributions to study a profession in change.

Thus, two articles were elaborated, which are entitled:

> Study A: Leadership on allied health professionals.
>
> Study B: Professional identity and performance of Health Allied Health Medical Imaging and Radiotherapy Technologists: Can leadership profiles make a difference?

The first article is a systematic review of the literature. This scientific paper pretends to identify the state of the art about leadership in the Allied Health Professionals globally in order to understand the main outcomes that resulted from these studies. It is intention of the authors submit this article to Journal of Health Organization and Management.

The second paper is a quantitative cross-sectional study. The aim of this study is to present the results of an online survey to professionals that assessed PI, WE, POP and leadership profiles (LP). Additionally, the research pretends to corroborate the theoretical model that create a moderate mediated relationship between the variables studied. It is intention of the authors submit this article to Journal of Management.

The articles are presented under the standards and publication requirements required by each journal. The same was applied to references of each article.

The chosen format is considered the most appropriate to contribute to scientific production in Portugal in this area, contributing to the dissemination of knowledge in

order to apply scientific evidence in clinical practice and fulfilling with an important component of a radiographer's practice as defended by Peh (2007).

STUDY A - LEADERSHIP ON ALLIED HEALTH PROFESSIONALS

Amadeu Martins*, Isabel Faro de Albuquerque**, Gilda Cunha***

* Nuclear Medicine Technologist at Joaquim Chaves Saúde, Teaching Assistant at Red Cross Superior Health School, Master student in Health Technology Assessment and Management Master's Program of Lisbon School of Health Technology

** Teaching Assistant at NOVA-School of Business and Economics, PhD

*** Professor on ESTeSL, MsC

Author contacts:

Name: Amadeu Manuel Rodrigues Cardoso Martins

Phone: 000 351 926 824 079

E-mail: amadeumartins@esscvp.eu

Leadership on allied health professionals

Abstract

Purpose: Allied Health Professionals (AHP) form a large part of the workforce in health care and play a central role in diagnosis and therapeutic procedures. Leadership outcomes on allied health professionals are unclear and not thoroughly studied. This article consists in a systematic review about leadership outcomes on allied health professionals globally.
Methodology: This was a systematic review of the literature on PubMed, B-ON, ScienceDirect and Scopus databases, using the terms: leadership AND allied health professions. This research was restricted to articles published between 2008 and 2018.
Findings: 746 papers were retrieved; 11 met the inclusion criteria. The included literature varied in quality and design, being 9 quantitative studies and 2 qualitative studies. After a thematic analysis, leadership outcomes were obtained and put together in three major areas: characteristics of the leaders, barriers to leadership and the needs of improvement.
Value: This systematic review adds to the growing body of evidence and indicates that leadership has been studied to identify and characterize leadership profiles on those professionals. There were highlighted several barriers to leadership that depend on external and internal factors. Additionally, leadership challenges and potential areas of development for leadership training were identified, as well as the implementation of specific leadership programs for each job category and country.

Keywords: Allied Health Professionals, Leadership, outcomes.

Introduction

The World Health Organization (WHO) is concerned about leadership on healthcare environment and defines that "(...) strengthening leadership in health requires a focus on ensuring an ecosystem that enables participation from diverse actors, nurtures debates and provides an opportunity for all actors to assert their leadership potential, as the need arises, to the benefit of improved health-system performance." (WHO,2016).

Effective leadership results in enhanced clinical teamwork and clinical outcomes (McAlearney, 2008) and contributes to align team objectives, better support innovation, higher participation of the professionals and a greater commitment to the good practices, better clinical practice, enhanced conflict management and shared governance (West, 2012; Cummings et al., 2010; Wong and Giallonardo, 2013).

Leadership within the organizational context is a strong influencing factor on the acceptance and use of research evidence in practice (Aarons et al., 2016).

Tappen (2005) stands by the idea that every health professional must study administration and leadership to be able to hold a leading position. This author justifies that most problems at a professional level are not technical but rather relational, justifying that the purpose of leadership and learning administration is to acquire work with people who are part of groups and teams in an organization.

A large study developed on the English National Health System concluded that six key elements were necessary for sustaining cultures that ensure high quality and compassionate care for patients: inspiring visions put into practice at every level by leaders; leaders ensuring clear aligned objectives for all teams, departments and individual staff; supportive and enabling people management; high levels of staff engagement; leaders focused on ensuring learning, innovation and quality improvement in the practice of all staff; and effective team work. (Dixon-Woods et al., 2014)

Martin and Henderson (2004), in the context of the management of health units, consider that management and leadership are practical activities, where managers are increasingly expected to take a leading role.

In September 2012 the International Chief Health Professions Officers (ICHPO) provided an agreed definition of an Allied Health Professionals (AHP) that contain the previous definition (Dal Poz MR et al., 2009): "Allied Health Professions are a distinct group of health professionals who apply their expertise to prevent disease transmission, diagnose,

treat and rehabilitate people of all ages and all specialties. Together with a range of technical and support staff, they may deliver direct patient care, rehabilitation, treatment, diagnostics, and health improvement interventions to restore and maintain optimal physical, sensory, psychological, cognitive and social functions." The professional groups that integrate allied health professions can vary in some countries and are legislated in each country. For example, in some countries like Australia, social workers are also considered allied health professionals, meanwhile, in Europe, they are not.

AHP are tertiary educated health professionals who work in healthcare teams contributing to better results on patient's health. (Pickstone C. et. al, 2008)

The majority of the available literature was focused on nurse or clinician professionals. Although leadership is considered an essential element in the provision of high-quality health care, it remains under-studied on AHP.

It is essential that nurse and Allied Health professional managers acquire the leadership skills required to cope with increasing demands on actual health services (Barr and Dowding 2012). From the literature review, transformational leadership (Bass & Riggio, 2006) emerged as the most effective model for AHP leadership development (Leggat and Balding, 2013; McKee et al., 2011; Wylie and Gallagher, 2009; Gellis, 2001). The educational needs for leadership development on allied health professions teaching programs are well documented in the literature (Bamber R et. al, 2000; Bamber R. et. al, 2004).

There is a quality deficit of leadership and there is, above all, a major deficit in its framework and integration. Formal leaders do not emerge by their relational or management skills, but by the result of their positions of administrative acts of career progression, mostly based on years of experience. Thus, many times we find leaders who are often autocratic, with a taxing, non-advisory style, and still not keen on adopting participatory models. This is one of the factors that most influence the professionals' engagement with their work and the development of the desired competencies that they aspire to achieve at their level of professional performance. (Pacheco, 2006)

The aim of this article is the evaluation of the research that has been done globally about leadership on allied health professionals.

Using PICO methodology for systematic reviews (Santos et al., 2007), the question raised by this investigation is: "What are the main outcomes of the studies done about leadership on allied health professionals?"

Methodology

Search strategy:

A standard systematic review approach was used, which included search, selection, and thematic analysis. A range of electronic databases (Medline, SCOPUS, ScienceDirect, and B-on) was accessed between the period of August 2018 to December 2018. All the searches were conducted by Article, Title, Abstracts, Keywords. The keywords and alternatives searched were leadership AND allied health professions. The AND Boolean was used for the combinations in the search. The free web application Rayyan QCRI® was used to manage references.

Eligibility and Exclusion criteria:

For this study, it has been considered all primary and recent studies, written in English, Portuguese or Spanish, within the period of the last 10 years (1st. January 2008 till 31st December 2018), that had outcomes of leadership and that had AHP like a target population. Exclusion criteria were duplicate articles, case reports, articles that had other outcomes or that had not had AHP the target population, animal studies, secondary studies (reviews, letters to authors, information to authors, and all those who do not obey the primary research methodology). Studies that did not present an abstract or full article available were also excluded (n=3). Figure 1 represents the article extraction process, following the application of the inclusion and exclusion criteria, the removal of duplicates and the removal of articles that could not be located.

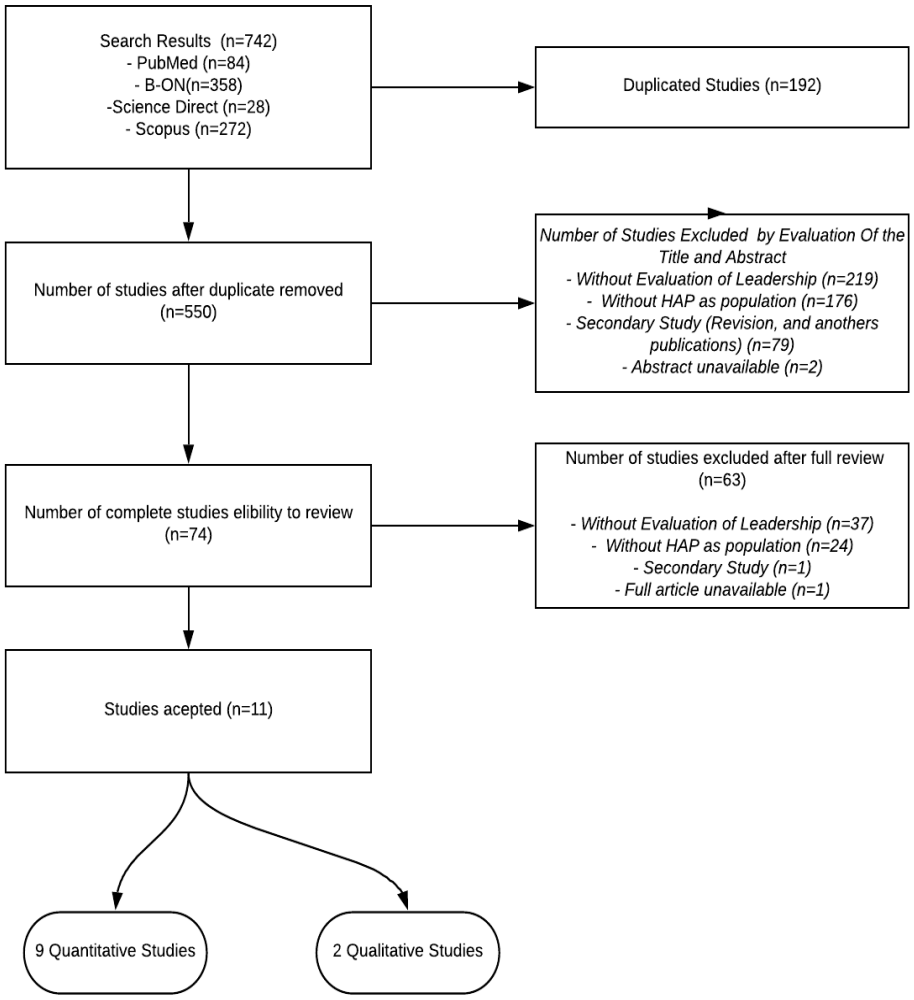

Figure 1 - Data selection process

Analysis

The review considered the evidence and information derived from the peer-reviewed articles that had a more thorough analysis. Data was extracted into tables. To integrate the different types of literature included in this review, themed analysis was used. The selected quantitative studies were also subject to an evaluation of the degree of medical evidence using the Oxford Center of Evidence-Based Medicine (OCBEM) scale, and for qualitative studies was used the Critical Appraisal Skills Programme Checklist (CASP) for qualitative studies. All the studies included are observational studies which justify the needless application of other scales of assessment of the methodological quality.

Results:

Study Characteristics

The charting process highlighted that peer-reviewed research, specific to Allied Health leadership within the health sector, has predominately been conducted in Australia (n=4), followed by the USA (n=3), UK (n=1), Saudi Arabia (n=1), Scotland (n=1), Canada (n=1) and Singapore (n=1). Six of the eleven articles focused on multiple AH professions and focused specifically on physiotherapists (Alkassabi, OY, 2018), one on occupational therapy (Fleming-Castaldy and Patro, 2012), one on Dietitians (Palermo et al., 2017), one on Radiographers (Watson et al., 2009) and one on Radiation Therapists (Probst and Griffiths, 2008).

Most of the studies included in this review were found to have a relatively large sample size ranging across studies from 17 participants (Bradd et. al., 2018) to 753 participants (Wylie and Gallagher, 2009). The three studies with the largest sample size (753, 307 and 359 participants respectively) were all focused on transformational leadership models. The methodological strength of the studies of Watson et. al (2009) (due to larger sample group and a randomized sample study) and Bradd et al. (2018) (have a control group) was therefore found to exceed the other studies included in this review. Table 1 summarizes the quantitative studies and table 2 the qualitative studies.

Table 1 - Characteristics of include quantitative studies

Author	Year and Country	Aim	Level of Evidence - OCBEM grade	Sample	Methodology	Value
Stanley et al.	2017, Australia	Evaluates the leadership on the professionals perspective and understand the effective clinical leadership like an essential role for a culture of change and progression in health services.	Level IV	307 AHP of 14 different specialties	Evaluation by on-line survey. Questionnaire developed by the author's and used in similar studies before.	Effective communication, clinical competence, approachability role model and supportive are the main attributes to clinical leadership. The majority of responders consider more important the clinical focus than management skills on your leaders. Identify some barriers to leadership.
Wyllie and Gallagher	2009, Scotland	Assesses the self-reported transformational leadership behavior profiles and evaluates the effect of seniority grade, locus of employment, and/or leadership training as a positive influence on transformational leadership behaviors.	Level IV	753 Allied Health Professionals: 99 dietitians 160 Occupational Therapists 81 Podiatrists 62 Radiographers 91 Speech and Language Therapists	1700 postal questionnaires. Previously validated instrument: Multifactorial Leadership Questionaire as an assessment tool.	Allied Health professionals scored higher if in a senior grade or had leadership training. Differences found amongst Allied Health specialties.
Alkassabi et al.	2018, Saudi Arabia	Examines the job satisfaction and influential factors among physiotherapists working in private and government hospitals of Saudi Arabia with a focus on leadership style.	Level IV	69 physiotherapists	Two previously validated instruments: Multifactorial Leadership Questionaire (MLQ) as an assessment tool. The Job Satisfaction Survey questionnaire	Leadership style does matter in job satisfaction among physiotherapists in the kingdom of Saudi Arabia. Participants were satisfied with their supervisors; they also perceived their leadership style to be more transformational or transactional than passive/avoidant.
Leggat et al.	2016, Australia	Develops a leadership program to increase clinical leadership among health professionals working in public sector organizations to improve their skills in ensuring high quality and safe health services.	Level IV	22 allied health professionals 15 clinicians 33 nurses	It´s been done an intervention designed with a focus on inquiry-based learning. The final workshop required the participants to present their projects in a scenario revolving around a 'minute' with the State Minister of Health.	Provides evidence of an effective clinical leadership program for enhancing health system quality and safety.

Mitchel, et al.	2015, Australia	Develops and investigates a model that predict that leader inclusiveness enhances interprofessional team performance through an increase in shared team identity and a reduction in perceived status differences.	Level IV	346 professionals Nurse, Dietitian, Physiotherapist, Social Worker, Medical Practitioner, Pharmacist, Occupational Therapist, Speech Pathologist, Radiographer, and Psychologist.	Used two different questionnaires developed by the authors.	Support for the effect of leader inclusiveness on team identity suggests that this style of leadership by explicitly valuing each member's unique contributions engenders a greater psychological engagement to the team. Professional diversity indicated as a moderator of the relationship between reduced status differences and performance. Re-ensured the importance of developing leadership programs.
Fleming-Castaldy and Patro	2012, USA	Examines the leadership characteristics of occupational therapy clinical managers in the field today.	Level IV	66 Occupational Therapy Professionals	Evaluation of on-line survey Previously validated instrument: Kouzes and Posner's Leadership Practices Inventory (LPI) (2002)	Respondents believe they possess distinct qualities that can contribute to their success as leaders in the field of occupational therapy. This knowledge can inform practitioners' reflective evaluation of their readiness to assume leadership roles and help them create professional development plans to facilitate the acquisition of desired leadership characteristics.
Ang, et. al.	2016, Singapore	Describes the development and preliminary explores the psychometric properties of a leadership competency instrument.	Level IV	106 Allied health Professionals (6 Dietitians, 4 Occupational Therapists, 20 Pharmacists, 43 Physiotherapists, 8 Podiatrists, 7 Speech and Language Therapists, 18 Medical Social Services	Previously validated instruments: AHEAD and LPI instruments.	Developed and validated the AHEAD instrument to evaluate leadership competency in existing and emerging AHP leaders. Although needing further validation, AHEAD will not only be used as an assessment tool, but it will also play a key role in an AHP's leadership development.
Bradd et al.	2018, Australia	Investigates the opinions and perceptions of senior allied health (DAH) leaders in relation to AH leadership, governance and organization from an Australian public health perspective.	Level III	17 Allied Health Professionals	Online survey and two confirmatory focus groups with members of the NSW Health Allied Health Directors Committee.	Need to increase the influence of DAHs within the health system, particularly by increasing their individual and collective political acumen. DAHs felt they needed to better use their role in executive teams to expand their focus beyond AH. Participants suggested that a way to strengthen AH capacity and capability was the development of a state-wide and tailored leadership training, mentoring and coaching program for DAHs.
Watson	2009, USA	Assesses the leadership styles of frontline medical imaging supervisors and examine the relationship between leadership behaviors and motivational factors that influence job satisfaction of medical imaging staff in acute care facilities.	Level III	359 radiology technologists. Randomized sample	Previously validated instruments: MLQ as an assessment tool.	A significant relationship exists between perceived supervisor leadership behaviors and medical imaging professionals satisfaction with extrinsic and intrinsic motivators that influence satisfaction with the work environment, satisfaction with the job and commitment to the employer.

Table 2 - Characteristics of qualitative studies.

Author	Year and Country	Aim	Rigor (CASP)	Sample	Methodology	Value
Palermo et al.	2017, Australia	Explores the work roles, major tasks and core activities of advanced practice dietitians in Australia to define the Competency Standards for advanced practice.	Low	16 dietitians	Four focus groups were conducted. Data from the focus groups were confirmed with in-depth interviews about their core activities with a purposive sample of 10 individuals recently recognized as Advanced Accredited Practicing Dietitians.	Through qualitative exploration and analysis it was found that advanced practice was defined primarily by leadership. As leaders, advanced practitioners influence, inspire and innovate to solve practice problems, to change practice and show evidence of their impact on health
Probst and Griffiths	2009, United Kingdom	Identifies and explores the current and developing roles and responsibilities of therapists and the impact of these factors on job satisfaction.	Low	18 radiation therapists	Individual interviews used as instrument. An interpretive design was adopted using a previously validated method.	Retention strategies should initially concentrate on the three main areas identified: 1. Job characteristics,2. Leadership style and organizational governance 3. Job stressors. Leadership skills: clinical supervisors and those in first line management positions need to have appropriate managerial and leadership training: in some cases, these skills were perceived as lacking.

The literature that brings together leadership and allied health professionals, included on this review, comprehends three major areas – first being the perceived leadership and the ideal leadership characteristics that are considered as critical on a leader role, secondly there are highlighted barriers to leadership that depended of intrinsic and extrinsic factors and, at last, potential areas for leadership development considering this professional group. Table 3 summarizes the articles and presents the topics for each area.

Table 3 - Results of thematic analysis

Characteristics of the Leader	Barriers to Leadership	Needs for improvement of Leadership
● Present ideas logically and effectively. ● Flexible. ● Has appropriate clinical skills. ● Displays high moral character. ● Remains visible in practice, recognize optimal performance and expresses appreciation in a timely manner. ● Encourages initiative and innovation. ● Engages and leads service improvement, changes and influences the way clinical care was delivered. ● Has emotional intelligence. ● Can influence, inspire and innovate to solve practice problems. ● Can change practice and show evidence of their impact on health outcomes. ● Can promote intellectual stimulation, inspirational motivation, extra effort, and effectiveness.	● Bureaucracy within the workplace. ● Pressures and directives from higher management levels and needs of staff. ● Lack of time or a high clinical/client demand of their time, ● Lack of opportunities to work in a clinical leadership role ● Lack of managerial and leadership training opportunities. ● Engagement with clinical leadership by professionals including a lack of confidence, burnout or being bullied. ● Lack of relationships between leaders and AHP. ● Linear career structure	● Develop communication skills. ● Develop clinical competence. ● Increase an approachability role. ● Acquire management techniques. ● Encourage initiative and be involved in innovation. ● Engagement and lead service improvement. ● Engagement with lead change. ● Improve provision staff support and proximity. ● Adopt and develop innovation behaviors ● Influence the way clinical care is delivered. ● Acquire and develop emotional intelligence. ● Develop leadership coaching programs. ● Develop leader inclusiveness to increase professional recognition. ● Develop managerial and leadership training. ● Develop studies of leadership on AHP of different specialties and countries.

Discussion:

Leadership development impacts on quality of care and on workplace cultures for staff. Clinical leadership embracing transformational and other collective leadership approaches is a key factor to develop effective workplace cultures at micro-systems level.

Characteristics of the leader:

Studies included on this review have shown strong correlations between leadership behaviors, the job satisfaction and the commitment with the work environment, which can be applied to physiotherapists (Alkassabi et al., 2018) and medical imaging technologists (Watson, 2009). Stanley et al. (2017), since it was found that better leadership and senior grade professionals are related to each other, which indicates that experience is one important factor to leadership, and the completed leadership programs reveal that this could be improved by the acquisition of leadership and knowledge management. Nevertheless, professionals consider more important the clinical focus than management skills on their leaders, that can open a future investigation line. Palermo et al (2017) on his qualitative study also reaffirms that leadership is the key factor to develop advanced practices on allied health professions because the leader not only has the role to motivate the professional growth but also fight for professional recognition to other health professionals and healthcare managers. Stanley et al. (2017) highlights that clinical leaders were not recognized according to their position or seniority, but because their beliefs about practice and support for their colleagues were shown and were congruent with their actions. The emotional characteristics, such as having emotional intelligence (Bradd, 2018) or display of high moral character that promote leader inclusiveness on the team (Mitchell, 2015) are also pointed as crucial on leaders by AHP, since they can be the ability to build trusting relationships, cultivate networks of supportive confidants and balance advocacy with inquiry. Those professionals value the presence of the leader in the work field (Mitchell, 2015) as the most reasonable way of expressing appreciation and recognition for optimal performance of their colleagues. The majority of the studies agree that there are crucial leadership characteristics that encourage an inventing environment characterized by innovation and initiative, engagement with change process which contributes to influencing and inspiring collaborators to innovative forms of solving problems (e.g Willie and Gallagher, 2009).

There is also some value attributed to professional characteristics as clinical skills of the leaders because professionals see the leader as an exemplary professional (Stanley et al., 2017).

From AHP's perspective, it is not only essential that the leader has the ability to understand the constantly changing business and clinical environment but also interpret

the ramifications of changes within an organization allowing the increase of individual and political acumen for the profession. (Bradd, 2018).

Barriers to Leadership:

There were presented some barriers to leadership that depend on organizational factors and professional factors. Leadership is one social role that is characterized by being challenging since it is restricted by various factors such as other professionals, organization, governance and other professional and institutional identities.

Leadership involves high levels of interpersonal relationship with other professionals and this is pointed as a basic barrier because a leader has to balance individual and organizational needs, behaviour characteristics, absence of communication and trusting relationships (Bradd, 2018).

Bureaucracy was pointed as a barrier to leadership (Stanley et al., 2017, Mitchell et al., 2015) because it is time consuming and that makes it difficult for the leader to have proximity to the team and therefore focuses his leadership on proceedings instead of the collaborators' or the team's needs.

Multifocal pressures (higher management, staff and clients/patients) could create conflict on leadership behaviours when it is impossible to balance them. Stanley et al. (2017) points a series of faults that could harm leadership, like lack of training or confidence, although these faults can be overcome with training and leadership programs. Structural issues can also be a barrier to leadership, and this aspect is difficult to change because it could involve organizational cultural changes. On a higher level, state-owned rules that regulate career progression, that more often imply senior grades to manage appointments without considering leadership skills, are also considered a great barrier to leadership on AHP (Probst and Griffiths, 2008).

Another barrier highlighted, which is also considerably in need of improvement for leadership on AHP, is the lack of authority within organization what brings few managerial opportunities. AHP has several job categories that sometimes act as individual areas which brings some weakness to the managerial field on health organizations.

Leaders also have to deal with insufficient resources (e.g. financial/information/ technology/staff) which could be a barrier to developing leadership skills (Stanley et al., 2017).

Identified development needs:

Some articles included in this revision consider as principal necessities the creation, development, and evaluation of leadership programs intended to allied health leaders and teams. These programs contribute to developing communication skills, management knowledge and team working techniques that improve work conditions and clinical outcomes for patients. The instrument AHEAD (Ang et al., 2016) demonstrated efficiency on assessing the leadership competency and also played a key role to leadership development on a large scale of different allied health professionals group, but still, needs more validation in order to be a better fit for the professionals and maximization of their potentialities. Leadership development programs like the ones implemented by Bradd et al. (2018) and Leggat et al. (2016) apply for those who received coaching on a reported significant benefit and value to having access to individual support. Particularly, it enabled them to develop greater self-efficiency in their leadership role and to implement strategies in order to maintain and develop awareness and self-care as leaders. In addition to the leaders' training, these programs present an *in situ* component involving the whole team which presents the most effective results. Mitchell et al. (2015) reinforces that not only leadership programs could include a focus on facilitating participation for lower status employees, but also the importance of modeling interprofessional collaboration and developing a working environment in which such collaboration is encouraged. This author also reaffirms that leader inclusiveness, by explicitly valuing each profession's distinct contribution, establishes a perception of parity across professions.

Included studies also highlighted the need to develop innovative behaviours, acquire and develop emotional intelligence skills on a leader as a way of improving staff support and proximity. Mitchell et al. (2015) defends leadership inclusiveness to increase profession recognition and influence the way as clinical care is delivered which brought relevance on the development of this outcome as a leadership need.

Globally, all the articles reinforce the importance of leadership study on AHP for a better leadership framing on each specialty on AHP and for each country and their suitable reality, which will contribute for leadership development through more efficient leadership programs and can also improve the professional recognition and the development of competencies for each professional group.

Limitations of the study:

There are several study limitations. Regarding the methodology for systematic reviews, it is recommended that two or more reviewers independently assess individual studies for quality and content. The papers in this study were reviewed by one individual author and discussed with supervisors in order to achieve an agreement where there was dubious content.

AHP had various national and international professional associations, trade unions and colleges with specializations that could provide important information of leadership on these professions, although grey literature was not include in this review.

Another limitation found is the variability associated with the concept of allied health professionals across different countries and their specific frameworks.

Conclusion:

Leadership is one of the aspects that concern professions transversally. Allied health professions are essential members of the multidisciplinary healthcare teams, contributing to diagnosis and treatment of innumerous pathologies. There has been limited research in the areas of allied health leaders and leadership development. Evidence available focuses on correlations between leadership and outcome measures such as job satisfaction or work commitment and highlights the importance of developing and evaluating leadership programs that can build leadership confidence and effectiveness, resulting in an enhanced workplace engagement and positive leadership outcomes for allied health leaders, their teams and their patients.

Through literature review it was possible to define a desired leader profile that should contemplate congruence, relating, visioning and inventing characteristics. Some leadership barriers are also highlighted as bureaucracy, relationship issues, lack of managerial and training opportunities and linear career structures that do not promote leadership development. The development of leadership programs that contain training for leaders and *in situ* assessment for everyone in the clinical technologists' team have been pointed as a possible solution to increase leadership performance on that group of professionals which is also the most critical point. As role innovators, leaders also have a key role, through collaborative problem-solving, in seeking to develop organizational structures and proceedings that build leadership capacity in healthcare settings and understand the major challenges on leadership development for those professionals.

In conclusion, it was possible to perceive the need for well-designed research studies to evaluate leadership on AHP adapted for each reality (country and job category).

References:

Aarons GA, Green AE, Trott E, Willging CE, Torres EM, Ehrhart MG, et al. (2016). The roles of system and organizational leadership in system-wide evidence-based intervention sustainment: a mixed-method study. *Admin Pol Ment Health*.;43(6):991–1008.

Alkassabi, O. Y., Al-Sobayel, H., Al-Eisa, E. S., Buragadda, S., Alghadir, A. H., & Iqbal, A. (2018). Job satisfaction among physiotherapists in Saudi Arabia: Does the leadership style matter? BMC Health Services Research, 18(1), 1–9.

Ang, H.-G., Koh, J. M.-Y., Lee, J., & Pua, Y.-H. (2016). Development and preliminary validation of a leadership competency instrument for existing and emerging allied health professional leaders. London: *BMC Health Services Research*, 16, 64.

Bamberg R, Layman E (2004) Approaches to leadership development used by deans of allied health. *J Allied Health*; 33:113–124.

Bamberg R, Layman E, Jones HP (2000) Leadership progression in schools of allied health. *J Allied Health*; 29:196–202.

Barr, J. and Dowding, L. (2012). *Leadership in health care*. 2nd ed. Los Angeles, CA: Sage Publications.

Bass, B. M., & Riggio, R. E. (2006). *Transformational leadership* (2nd ed.). Mahwah, NJ, US: Lawrence Erlbaum Associates Publishers.

Bradd, P., Travaglia, J., Hayen, A., & Bradd, P. (2018). Developing allied health leaders to enhance person-centered healthcare. *Journal of Health Organization and Management*, Vol. 32 Issue: 7, pp.908-932,

Cummings, C., Macgregor, T., Davey, M., Lee, H., Wong, C., Lo, E., Muise, M. and Stafford, E. (2010), "Leadership styles and outcome patterns for the nursing workforce and work environment: a systematic review", International Journal Nursing Studies, Vol. 47 No. 3, pp. 363-385.

Dal Poz MR et al. (2009), *Boundaries of the health workforce: definition and classifications of health workers.* In: Handbook on monitoring and evaluation of human resources for health. Geneva: World Health Organization.

Dixon-Woods, M., Baker, R., Charles K., Dawson J., G. Jerzembek, G., Martin, G., et al. (2014). Culture and behaviour in the English National Health Service: an overview of lessons from a large multimethod study. *BMJ Qual. Saf.*, 23 (2)

Fleming-Castaldy, R. P., & Patro, J. (2012). Leadership in Occupational Therapy: Self-Perceptions of Occupational Therapy Managers. *Occupational Therapy In Health Care*, 26(2–3), 187–202.

Gellis, Z. D. (2001). Social work perceptions of transformational and transactional leadership in health care. Social Work Research, 25(1), 17-26.

Kouzes, J.M. and Posner, B.Z. (2002), *Leadership Challenge*, 3rd ed., Jossey-Bass, San Francisco, CA.

Leggat, S. G., Smyth, A., Balding, C., & McAlpine, I. (2016). Equipping clinical leaders for system and service improvements in quality and safety: An Australian experience. *Australian and New Zealand Journal of Public Health*, 40(2), 138–143.

Leggat, S.G. and Balding, C. (2013). Achieve in organizational competence for clinical leadership: the role of high-performance work systems. *J. Health Organisation. Management*, 27(3): 312-29

Martin, V. and Henderson, E. (2004). *Gestão de Unidades de Saúde e de Serviços Sociais.* (1a ed.). Lisboa: Monitor.

McAlearney, A.S. (2008). Using leadership development programs to improve quality and efficiency in healthcare. *J. Healthc. Manag*. 53(5). 319-331.

McKee, M. C., Driscoll, C., Kelloway, E., & Kelley, E. (2011). Exploring linkages among transformational leadership, workplace spirituality and well-being in health care workers. *Journal of Management, Spirituality & Religion*, 8(3), 233-255.

Mitchell, R., Boyle, B., Parker, V., Giles, M., Chiang, V., & Joyce, P. (2015). Managing Inclusiveness and Diversity in Teams: How Leader Inclusiveness Affects Performance through Status and Team Identity. *Human Resource Management*, 54(2), 217–239.

Pacheco CA (2007). *Tecnologias da Saúde : Paradigmas e Paradoxos na Gestão de Pessoas.* Lisboa: Master Degree Thesis in Human Resources Management at ISCTE-IUL

Palermo, C., Capra, S., Beck, E. J., Dart, J., Conway, J., & Ash, S. (2017). Development of advanced practice competency standards for dietetics in Australia. *Nutrition and Dietetics*, 74(4), 327–333.

Pickstone C, Nancarrow S, Cooke J, Vernon W, Mountain G, Boyce RA, et al. (2008). Building research capacity in the allied health professions. *Evid Policy A J Res Debate Pract* 1;4(1):53–68.

Probst, H., & Griffiths, S. (2009). Job satisfaction of therapy radiographers in the UK: Result of a phase I qualitative study. Radiography, 15(2), 146–157.

Santos, CMC, Pimenta CAM, Nobre MRC. (2007). A estratégia PICO para a construção da pergunta de pesquisa e busca de evidências. Brasil: *Revista Lat-Amer de Enf*, 15(3), 508-511

Stanley, D., Blanchard, D., Hohol, A., Hutton, M., & McDonald, A. (2017). Health professionals' perceptions of clinical leadership. A pilot study. *Cogent Medicine*, 4(1), 1–15.

Tappen, R. M. (2005) *Liderança e Administração em Enfermagem – Conceitos e Prática* (4a Ed) Loures: Lusociência

Watson, LW. (2009). Leadership's influence on job satisfaction. Radiologic Technology, 80(4), 297–308.

West, M. (2012), *Leadership and Engagement for Improvement*. in We the NHS: Together we Can, The King's Fund, London.

Wong, C. and Giallonardo, L. (2013), "Authentic leadership and nurse-assessed adverse patient outcomes", *Journal of Nursing Management,* Vol. 21 No. 5, pp. 740-752.

World Health Organization (2016), *Open mindsets: participatory leadership for health.* Geneva: World Health Organization

Wylie, D. A., & Gallagher, H. L. (2009). Transformational leadership behaviors in allied health professions. *Journal of Allied Health*, 38(2), 65-73.

STUDY B - PROFESSIONAL IDENTITY AND PERFORMANCE OF ALLIED HEALTH MEDICAL IMAGING AND RADIOTHERAPY TECHNOLOGISTS: CAN LEADERSHIP PROFILES MAKE A DIFFERENCE?

Amadeu Martins*, Isabel Faro de Albuquerque**, Gilda Cunha***

*Nuclear Medicine Technologist at Joaquim Chaves Saúde, Teaching Assistant at Red Cross Superior Health School, Master student in Health Technology Assessment and Management Master's Program of Lisbon School of Health Technology

** Teaching Assistant at NOVA-School of Business and Economics, PhD

*** Professor at ESTeSL, MsC

Author contacts:

Name: Amadeu Manuel Rodrigues Cardoso Martins

Phone: 000 351 926 824 079

E-mail: amadeumartins@esscvp.eu

Professional identity and performance of Allied Health Medical Imaging and Radiotherapy Technologists: Can leadership profiles make a difference?

Abstract

Recently, the interest in management outcomes of Allied Health Medical Imaging and Radiotherapy Technologists (AHMIRT) has been is increasing (Martins and Isouard, 2015). However, little is known about the influence of different leadership profiles (LP) on motivation and performance of these professionals. Based on Quinn's Model (Quinn's et al, 1988) *we predict that the relationship between professional identity (PI) and perceived organizational performance (POP) is mediated by work engagement (WE) and the correlation between WE and POP is moderated by LP. When LP presents more levels of flexibility, a higher level of WE should be accompanied by higher levels of POP. When LP presents more levels of control, WE should fail to produce a positive effect on POP. Our model was based on a sample of 392 AHMIRT that have answered an online survey. The results of the moderated mediation analysis supported our hypothesis. That is, PI was significantly related to POP via WE when LP presented higher levels of flexibility but not when LP presented high levels of control.*

Keywords: *professional identity, work engagement, leadership style, allied health professionals, performance*

Introduction

In health care organizations, employee motivation, commitment and satisfaction should be considered by managers and policymakers, particularly because of the high impact that professionals have on patients, since they are the ones who directly provide health care (Peters et al., 2010). Effective clinical leadership at all levels of care is required to improve the access to health care services and how they are provided, enhance clinical teamwork and improve safety (Daly et al., 2014). Innovation and the production of desired leadership outcomes it is also needed (Snodgrass et al., 2008; Wylie and Gallagher, 2009; Leonard and Frankel, 2010). Gilmartin and D'Aunno (2007) highlighted the positive outcomes of the transformational leadership theory and its connection with staff satisfaction, unit or team performance, organizational climate and staff retention.

The study by Correia et al. (2011) emphasize that policy development is key in order to use human resources efficiently in health systems, including in the Portuguese National Health Service. Another idea of the study is linked with the importance of potential effects on the recruitment and retention of active health professionals, as well as the quality and efficiency of services through economic measures such as the reduction of salaries or new retirement conditions. Health planning and management development should be a priority for actual health policies (SNS, 2018).

In 2014 was published a decree law that sets the joint competency framework for the professions of Nuclear Medicine Technologist (NMT), Radiology Technologist (RT) and Radiation Therapy Technologist (RTT) (Diário da República, 2014). This brings major changes on the university's courses that had to join the three syllabus together. With this change, a new course was created: the Medical Imaging and Radiotherapy degree.

The decree law also refers that these professionals have to "(...) demonstrate leadership skills including organizational, communication and management skills" (Diário da

República, 2014). However, there are few scholar programs that include leadership training on their syllabus.

Additionally, the European Association of Nuclear Medicine recently established the *Nuclear Medicine Technologists Competencies Framework* which defines the transversal competencies of all Nuclear Medicine Technologists in Europe, and underlines that professionals "take responsibility for coordination of all procedures in a multidisciplinary spirit" (EANM, 2017). On Health Applied Sciences, the formal leaders are elected based on traditional hierarchical promotion. According to Cunha (2008), this linear career structure did not allow individual diversification or specialization and there was no clear career planning to help individuals identify a career path. Leaders were not emerging by their relational or business skills, but only by their administrative career advancement positions, which means that they are often authoritarian (Cunha, 2008). The conflict on health care teams was latent, contributing to an increase of mistrust and to a structural dismemberment which could result in a low level of work engagement experienced by professionals (Ibidem).

All these findings justify the importance of studying leadership in these areas and develop the knowledge about the professionals in this field, in particular Allied Health Medical Imaging and Radiotherapy Technologists (AHMIRT)

We also respond to a gap in literature, assessing professional dynamics related to AHMIRT characterizing their professional identity and their feelings about work.

The present study characterizes the relationship between the professional identity (PI) of AHMIRT with the perceived organizational performance (POP), considering work engagement (WE) as mediator. In addition, this study analyses the moderating role of leadership profiles (LP) between WE and POP. Technically, with this model we are describing a moderated mediation, since the mediating process that is responsible for

producing the effect on the outcome (i.e. performance) depends on the value of a moderator variable (i.e. leadership profiles) (Morgan-Lopez and MacKinnon, 2006).

The proposed model is represented in Figure 1.

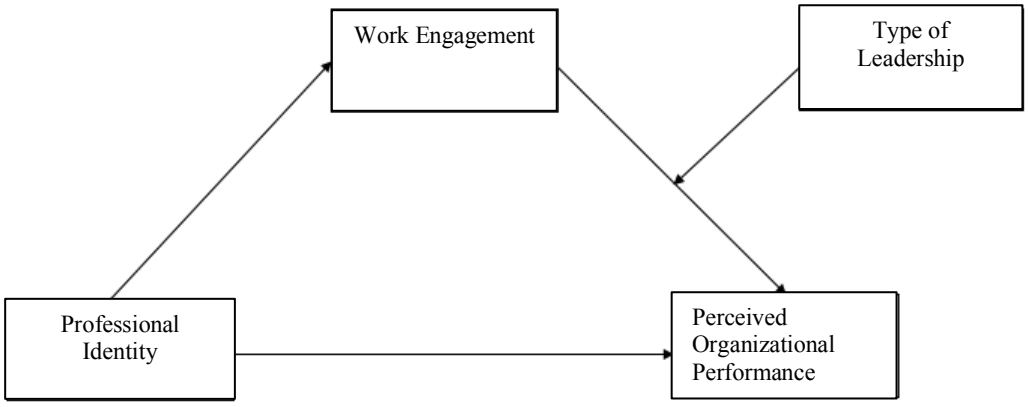

Figure 1 - Hypothesized moderated mediation model.

Professional identity and organizational performance:

Professional identity is defined as a characteristic that covers the personal motives, interests, experiences and competencies that are associated with professional performance (Cech, 2014; Schein, 1978). According to Van Maanen and Speer (1986), PI is not only related to acquisition of new competencies, but also includes norms and values adopted by the professional group. Kroger (2007) further completes this definition embracing the life experiences of each professional, as well as individual influences, decisions and behaviors, making this concept more individualized. The set of shared values, norms, competencies and behaviors is entirely dependent on each professional group and is volatile with an adaptability of the socioeconomic and labor context of each profession. PI has been studied in several disciplines providing a consistent theoretical basis, allowing the creation of conceptual models associated with this topic. There is no description in the PI literature data acquired in the context of health technology professions, so it's relevant to gauge information in order to create evidence about this parameter for this professional group. Porter and Wilton (2019) in their recent cross-sectional study affirmed that the more staff worked and interact with their profession, the stronger their professional identity. Moreover the professional identity of staff within each allied health structure was higher. Pittmen and Foubert (2016) highlighted that the supervision style

showed the highest, and only, statistically significant predictive power on professional identity, when tested in a new group of professionals. All these previous acknowledgments led us to develop a greater understanding of PI on AHMIRT.

Perceived organizational performance can be defined as the employee perceptions regarding their organization's overall performance and the individual perception of organizational efficiency by employees (Giauque, et al., 2013). This measure can be used as an efficiency measure that evaluates how an organization works and the results obtained by their workers' perspective.

According to Quinn & Rohrbaugh (1983) competing values model, three major dimensions lead to an effectiveness criteria that are integrated on the same quadrant model used for assessment of leadership profiles and it's based on organizational culture.

Perceived performance measures may be taken as valid indicators of organizational performance, since previous studies have already shown significant correlations between perceived and objective organizational performance measures (Pearce et al., 1987, Waterson et al., 1999, and, more recently, Albuquerque et al., 2014).

A strong occupational identity as a part of PI can stimulate greater WE and organizational commitment, as well as consistent performance (Walsh and Gordon 2008). Therefore, we propose:

Hypothesis 1: Professional identity is positively associated with Perceived Organizational Performance.

Role of work engagement

Schaufeli et al. (2009) defined WE as a "positive, satisfactory and work-related state of mind, characterized by vigor, dedication, and absorption". The vigor is created by the energetic levels that capture how workers experience their work and how they applied mental resilience while working. Dedication contains the enthusiasm and pride that each worker have on their work and how enthusiastic they are in their work development. Absorption results in a happy full concentration at work through intrinsic motivation. Several studies developed in the health care sector describe a negative association between WE and burnout (Schaufeli et al. 2002, Maricuțoiu et al., 2017). Additionally, Villavicencio-Ayub et al. (2014) suggests that WE casually decreased the probability of developing organizational burnout, which makes it more relevant to study that variable on AHMIRT.

Health professionals have a stressful but meaningful work, helping other people. High WE levels are important. Previous studies assess WE on health professionals in Portugal (Albuquerque et al 2014, Pinto et al 2015, Santos et al. 2016). For those reasons, it is very advantageous to use this measure in order to understand which results are obtained for AHMIRT professionals.

PI is a precursor of WE. Popova-Nowak (2010) affirms, "It is through work engagement that individuals contextualize and situate their occupational skills and articulate and negotiate their work identities".

Engaged individuals are known to share common perceptions and have a commitment to the quality of service which results in a higher performance and customer satisfaction (Salanova et al., 2005).

Hypothesis 2: WE mediates the relationship between professional identity and perceived organizational performance.

Leadership profiles as a moderator

Previous studies consider that Quinn's model (Quinn's et al, 1988) is a theory that can easily portrait a hospital culture considering the "dysfunctionality of human relationships due to the lack of communication between groups and the closure of the system about itself; the individual objectives and the excessive fixation on internal processes." (Moreira, 2010).

The Competing Values Framework by Cameron and Quinn (2011) defines twelve leadership profiles that have different impacts on the professionals. This model presents four quadrants and each one is accompanied by two specific leadership profiles which are opposite to each other and all have positive and negative characteristics. On one hand the upper quadrants are characterized by being more flexible and can be internal oriented (human relations) or external oriented (open systems), whereas, on the other hand, lower quadrants are characterized by a higher control and also can be internal oriented (internal processes) or external oriented (rational goal) which means leadership focused on results and competition (Quinn, 1988).

Prior knowledge about leadership and performance is based on two ways of thinking: some authors defend that leaders can only have a very limited impact on performance as a result of contextual constraints, either internal or external to the organization (i.e

Lieberson and O'Connor, 1972). However, there are others that stand by the idea that top managers have sufficient discretion to influence performance (Ireland & Hitt, 1999; Thomas, 1988). A recent systematic review highlighted that "empirical studies have mainly found positive correlation between leadership and performance, although effect sizes vary considerably" (Knies et. al, 2016).

Leadership has been pointed out as being a crucial factor in building WE (Buckingham and Coffman, 1999). Nevertheless, little is known about the effects of different leadership styles.

Hawkes et al. (2017) affirmed that leadership was a source of job resources and founded a significant indirect path between transformational leadership and engagement via job resources.

Therefore, we hypothesize:

Hypothesis 3: leadership profiles have a moderator role on the relationship between WE and POP.

Method

Sample and procedures:

Data collection took place between November 2018 and January 2019. The number of technologists licensed by regulatory authority in Portugal (N=6417) was given by ACSS (Administração Central do Sistema de Saúde IP, 2018) who represents the population of AHMIRT in Portugal. The online survey became available to the technicians of the three areas by email, professional and social networks. The first question, technologists were asked to point out their professional group. Demographic features were also collected: age, gender, education and tenure. Tenure with the leader and leadership experience were also assessed. There were emitted 6417 technologists' professional licenses by ACSS, of which 347 were Nuclear Medicine licenses, 858 were Radiotherapist licenses and 5211 were radiologist licenses. This number is used to estimate the population of the study. Statistically, we consider 363 the minimum number of responses to an 95% confidence interval and 5% of error.

We obtained 392 valid questionnaires: 19.6% (n=77) from Nuclear Medicine Technologists, 19.6% (n=77) from Radiotherapy Technologists and 60.7% (n=238) from

Radiology Technologists. Regarding education 1.5% has a bachelor, 58.2% a bachelor's degree, 11.7% a postgraduate course, 26.5% a master degree and 2% a PhD.
Regarding gender, 74.2% were female and the average age was 34.37 years (ranged from 22 to 74). A Mann-Whitney U test analysis revealed no significant variable differences in study between men and women, except for professional identity (ρ=.000).
We also obtained a national coverage: 46.7% were from Lisbon Health Regional Area, 24.0% were from the North Health Regional Area, 13.8% from the Center Health Regional Area, 5.4% from Madeira Health Regional Area, 3.8% from Alentejo Health Regional Area, 3.3% from Algarve Regional Health Area and 3.1% from Açores Health Regional Area. Descriptive statistics are shown in Table 1 by job category.

Table 1 - Descriptive statistics

	Age (SD)	Gender (M/F)	Mean tenure (SD)	% Public Sector	% Private Sector	Mean tenure with leader (SD)	Leading roles	Mean of years leading (SD)
Total Results (n=392)	34.37 (10.63)	25.8% / 74.2%	11.17 (10,25)	43.9%	56.1%	5.70 (5.73)	14.8% (n=58)	10.76 (7.72)
Radiology (n=238)	35.09 (10.96)	34% / 66%	11.74 (10.53)	47,9%	52.1%	5.63 (5.95)	13.9% (n=33)	12.33 (7.96)
Nuclear Medicine (n=77)	33.75 (11.91)	11.7% / 88.3%	11.01 (11.52)	39%	61%	6.57 (6.03)	14.3% (n=11)	6.73 (4.65)
Radiotherapy (n=77)	32.75 (7.79)	14.3% / 85.7%	9.58 (7.64)	36,4%	63.9%	5.03 /3.88	18.2% (n=14)	10.21 (8.28)

Measures:

Leadership profiles.

To assess leadership styles we used the model of the Competing Values Framework (Quinn, 1988) and updated by Lawrence et al. (2009), with 32 questions with Likert scale. This questionnaire was previously validated and approved in several previous studies (Parreira et al., 2006; Melo et al., 1996). There were defined four types of leadership behaviors based on the updated version of Competing Values Framework: Human

Relations (HR), Open Systems (OS), Internal Processes (IP) and Rational Goals (RG). Each variable contains the mean values of the three leadership profiles that characterize them. On simple slope analysis the mean values between variables of flexible behaviors (HR and OS) and control behaviors (IP and RG) were used.
Cronbach's alpha for the total 32 items of the leadership instrument was 0.99.

Professional identity.

Professional identity was assessed through the scale developed by Bergami and Bagazzi (2000) and Bartel (2001) to analyze how the professionals relate with the organization and adapted by Duarte et al. (2007), for the nurse profession, with an $\alpha = 0.85$. This scale contains two questions related to the correlation between personal and professional identity (a scale of 1-8, from minimum to maximum integration, respectively). Cronbach's alpha in this study was 0.94.

Work engagement.

WE was measured using Schaufeli et al. (2006) scale with 9 items. Sample items include three different categories: vigor, dedication and absorption. A 7-point Likert scale was used where 1=Never to 7=All the days, respectively.
For this study, the Cronbach's alpha was .95, that is achieved by Schaufeli et al. (2006), that obtained an interval of 0.85-0.96.

Perceived Organizational Performance.

Perceived organizational performance was assessed by five positively worded questions addressing the extent of technician's agreement, using a Likert scale from 1=fully disagree to 5=fully agree scale. The five performance criteria are: just-in-time (waiting time to schedule an exam or treatment), total quality management (continuous improvements toward service quality), team work (work is done by teams), and skill development (skill improvements), all proposed by Wall et al. (2004) and patient satisfaction, as proposed by Cabral et al. (2002). Confirmatory factor analysis corroborated the one-dimensional structure ($\mathcal{X}^2$/df= 2.701; CFI= .867; TLI= .893; RMSEA= .065). Cronbach's alpha was .93.

Results

The influence of the workplace type:

A total of 43.9% of the technologists work in the public health sector and the majority, 56.1% work in private health services. Workplace type was found to have no significant influence on PI (ρ=.071) or on WE (ρ =.206). However, this variable presents significant differences on POP (ρ =.000).

The influence of having leadership experience:

A total of 14.8% of the technologists reported to have a leadership role and the years of experience ranged from 1 to 30 years. Our results revealed that having a leadership role significantly influences all the variables in the study (PI: ρ <.01; WE: ρ <.00; LP: ρ <.00; POP: ρ <.00).

Professional identity and work engagement

As shown in Table 2, PI values demonstrate an average of 5.89 [SD 1.19] which reflects a moderate to a great correlation between personal identity and professional identity. Results also revealed that there is a significant difference in professional identity for each professional area (ρ =.000).

WE results show a mean score of 5.24 [SD 1.19]. There are significant differences in work engagement for each professional area (ρ=.000). NMT the most engaged with their work and RTT were the least engaged.

Perceived organizational performance:

Perceived Organizational Performance scores measured were 4.7 [SD 1.24] for the total of the technologists. This result shows that professionals had a good perceived idea of their work placement and of their service to the patients. There are significant statistical differences in perceived organizational performance for each professional area (ρ =.000).

Table 2 - Results for professional identity, work engagement and perceived organizational performance for total of the professionals and for job category.

	Total Results	Radiology	Nuclear Medicine	Radiotherapy
Professional Identity				
Mean	5.86	5.86	5.87	5.85
SD	1.19	1.19	1.20	1.19
SE	0.06	0.08	0.15	0.14
Work Engagement				
Mean	5.24	5.25	5.26	5.23
SD	1.26	1.25	1.25	1.26
SE	0.06	0.08	0.15	0.15
Perceived Organizational Performance				
Mean	4.7	4.71	4.71	4.69
SD	1.24	1.24	1.25	1.25
SE	0.06	0.08	0.14	0.15

The profile of leadership designed for AHMIRT through this study concludes that the majority of leaders show monitor profiles for RT and NMT. For RTT, regulator is the profile more scored.

RT and RTT presented the lowest scores for empathizer behaviors, while NMT had the highest scores for competitor profiles.

Leadership profiles related to the internal processes model have the highest scores for the perception of studied professionals whereas the behaviors related to human relations and relational goals models had the lowest scores. Table 3 show the scores results by leadership profile for the whole sample and for each job category.

Table 3 - Leadership profiles scores

	Itens	Total Results		Radiology		Nuclear Medicine		Radiotherapy		Cronbach's Alpha
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Facilitator	1,5,9	3.170	.373	3.214	.079	3.264	.146	2.940	.146	.972
Mentor	13,17,21	2.890	.103	2.905	.084	3.052	.160	2.684	.148	.972
Empathizer	25,29,33	2.776	.170	2.811	.085	2.818	.159	2.623	.149	.972
Visionary	3,7,11	2.921	.350	2.850	.034	3.082	.155	2.978	.137	.972
Inovator	15,19,23	2.833	.024	2.878	.079	2.879	.155	2.649	.147	.972
Motivator	27,31,35	2.915	.108	2.971	.080	2.900	.162	2.758	.146	.971
Regulator	2,6,10	3.483	.105	3.472	.073	3.515	.121	**3.489**	**.118**	.973
Monitor	14,18,22	**3.527**	**.112**	**3.510**	**.078**	**3.762**	**.128**	3.346	.120	.974
Coordinator	26,30,34	3.098	.198	3.063	.075	3.138	.132	3.165	.108	.973
Competitor	4,8,12	2.742	.056	2.824	.071	2.576	.119	2.658	.137	.978
Producer	16,20,24	3.171	.181	3.161	.083	3.216	.162	3.156	.120	.972
Driver	28,32,36	3.378	.051	3.437	.065	3.390	.135	3.182	.113	.974

Descriptive statistics and correlations among the variables in the study and Cronbach alphas are shown on table 4. PI is significantly related to WE (r= .48, ρ < .01), POP (r= .39, ρ < .01), and with all four variables of leadership profiles: HR (r=.18, ρ <0.01), OS (r=.16, ρ <.01), IP (r=.17, ρ <.01) and RG (r=.16, ρ <.01). WE is significantly and positively related to POP (r=.53, ρ <.01) but also in leadership variables: HR (r=.50, ρ <.01), OS (r=.50, ρ <.01), IP (r=.49, ρ <.01) and RG (r=.50, ρ <.01). In addition to IP and WE, POP is also significantly and positively related to leadership outcomes: HR (r=.61, ρ <.01), OS (r=.63, ρ <.01), IP (r=.60, ρ <.01) and RG (r=.59, ρ <.01). The four control variables, age, education, tenure and tenure with the leader are all significantly related to POP.

Table 4 - Descriptive statistics and correlations among variables

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1. Age	34.37	10.63	-										
2. Tenure	11.17	10.25	.96**	-									
3. Education [a]	1.69	.95	.26**	.27**	-								
4. Tenure with leader	5.70	5.63	.59**	.62**	.21**								
5. Professional Identity (PI)	5.86	1.19	-.002	-.02	.05	-.02	(.93)						
6. Work Engagement (WE)	5.24	1.26	-.058	-.09	-.11*	-.89	.48**	(.82)					
7. Perceived Organizational Performance (POP)	4.70	1.24	.026*	-.01*	-.16**	.05*	.39**	.53**	(.82)				
8. Human Relations (HR)	2.94	1.24	-.06	-.05	-.04	-.04	.18**	.50**	.61**	(.80)			
9. Open Systems (OS)	2.89	1.19	-.08	-.07	-.04	-.02	.16**	.50**	.63**	.95**	(.80)		
10. Internal Processes (IP)	3.31	1.09	-.06	-.05	-.02	-.02	.17**	.49**	.60**	.95**	.96**	(.80)	
11. Rational Goals (RG)	3.10	.99	-.07	-.06	-.02	.01	.16**	.49**	.59**	.94**	.95**	.94**	(.81)

Notes. [a] 5-point scale (Education: 1= bachelor; 2 = degree; 3 = postgraduate; 4 = master degree; 5 =doctoral degree;); Cronbach's alphas are displayed on the diagonal in parentheses. * p< .05; ** p< .01.

Confirmatory Factor Analysis

In order to examine if our measurement model had an acceptable fit, we conducted a series of confirmatory factor analysis (CFA) using AMOS 23. We compared our theoretical four-factor model with one alternative model (results on table 5): a one-factor model that combined all four factors into one single factor. The hypothesized four-factor model was the best fitting model ($\mathcal{X}^2$/df = 2.78; TLI= .925; CFI= .930; RMSEA= .060; SRMR= .062). Moreover, following the recommendation put forth by Podsakoff et al. (2012) to test the presence of common method variance (CMV) we included a latent variable in CFA, a common method factor, and took into account every indicator on this uncorrelated factor (Podsakoff et al., 2012). The fit slightly improved, which is expected (Williams et al 1989) ($\mathcal{X}^2$/df = 2.91; TLI= .893; CF= .954; RMSEA= .065; SRMR= .055). The CMV impact is examined by the total variance of the unrelated method factor, which should be below 25 percent (Williams et al., 1989). In our data, CMV accounted for 2.4 percent of the total variance, which suggests that CMV accounts for a small variation in the data.

Table 5 - CFAs for the hypothesized model and alternative models

	χ^2	*df*	TLI	CFI	RMSEA	SRMR
Four-factor model	828.45**	298	.925	.930	.060	.062
Three-factor model	823.84**	304	.804	.892	.062	.058
One-factor model	842.78**	312	.721	.867	.063	.064
Unmeasured latent factor	837.90**	287	.893	.954	.065	.055

Notes. CFAs = confirmatory factor analyses; *df* = degrees of freedom; CFI = comparative fit index; TLI = Tucker–Lewis index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square error residual; ** p< .01.

Results for hypothesized model

For double mediation analysis, Hayes' (2013) PROCESS bootstrap macro (model 14) was applied, with WE as mediator and leadership profiles as moderator (HR, OS, IP and RG). In this model the independent variable was PI and the dependent variable was POP. Control variables also were inserted on bootstrap.

Figure 2 shows the total effects of PI on POP (B=.128, *t*=2.66, ρ< .05). Thus hypothesis 1 is supported by our data. WE was used as a moderator on the correlation between PI and POP also is demonstrated through the analysis of direct effects of bootstrap (B=.80, *t*=1.96, ρ < .05), which corroborate our second hypothesis.

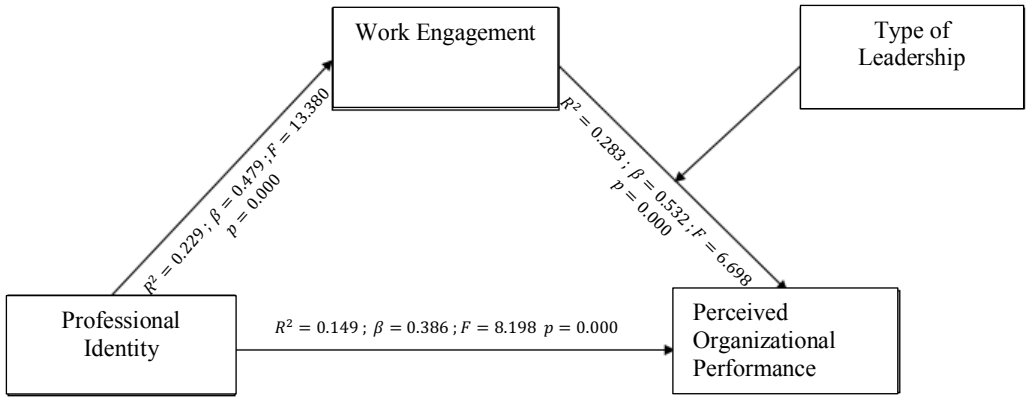

Figure 2 - Results of hypothesis on theoretical model

Table 6 also shows the index of moderated mediation for the four leadership variables used as mediator on the correlation between WE and POP.

Table 6 - Bootstrapping results

	Total, Direct and Indirect Effects			
	B	**SE**	***t***	
Total Effect				
Professional Identity Perceived Organizational performance	.128	.048	2.66**	
R^2 =.149, Adj R^2 = .691				
Direct Effect	.80	.41	1.96**	
Work Engagement → Perceived Organizational Performance				
R^2 = .283 , Adj R^2 = .143				
Index of moderated mediation	**Index**	**SE**	**LLCI**	**ULCI**
HR	.193	.0159	,125	.513
OS	.232	.0168	,091	.568
IP	-.227	.0192	-.615	-.013
RG	-.400	.0168	-.743	-.091

HR, OS, RG and IP demonstrated a statistically significant moderation effect on the theoretical model.

HR moderated the relationship between work engagement and perceived performance. The positive effect demonstrates that when leadership styles related to people increase, the correlation between WE and POP also increases. HR leadership doesn't moderate the cases sorted by age (CI: -.14<0<.13) nor by education (CI: -.2739<0<.1058) once the bootstrap CI included zero while controlling for demographic variables.

OS moderated the relationship between WE and POP. The positive effect demonstrates that when leadership styles related to leading change were demonstrated by the leader, the correlation between WE and PP also increases. OS leadership doesn´t moderate the cases sorted by age (CI: -.1486<0<.3921) nor education (CI: -.2698<0<.1080).

PR moderated the relationship between WE and POP. The negative effect shows that when leaders demonstrate behaviors focused on producing results, the correlation

between work engagement and perceived performance decreases. IP leadership doesn´t moderate the cases sorted by age (CI: -.1740<0<0,3701) nor education (-.218<0<0,120). IP moderate the relationship between WE and POP. The negative effect shows that when leaders demonstrate behaviors focused on managing processes, the correlation between WE and POP decreases. IP leadership doesn´t moderate the cases sorted by age (CI: -0,198<0<0,482) nor education (CI: -.3209<0<.0563).

Using simple slope analysis (figure 3), using mean values of flexible profiles (human relations and open systems) and control profiles (internal processes and rational goals), we found that the work engagement was positively related with performance when we have flexible leadership profiles (t=2.97; ρ <.05), but not when there is moderation by one controller leader (t=-1.47; ρ<.05).

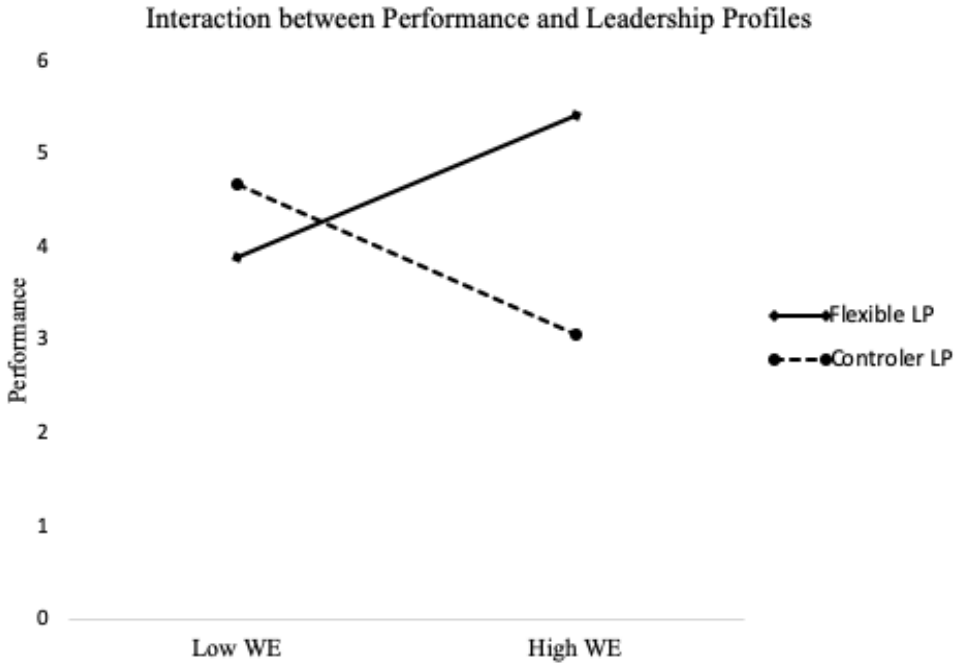

Figure 3 - Interaction between POP and LP

Discussion

Our research contributes to the development of leadership knowledge in AHMIRT professionals.

AHMIRT showed a high professional identity. The area of medical imaging and radiotherapy contains a range of activities which are in constant development which contributes to the motivation and daily challenge for the professionals. As shown in literature, professional identity provides an individual sense of meaning and purpose

(Walsh and Gordon, 2008). Understanding that those professionals have high levels of professional identity can indicate good responses to professional development. For instance, they can strongly identify with their occupation than an organization. Thus, they are looking for better congruence between their occupational skills and work (Witt et al. 2002). Additionally, individuals with strong work identity are less vulnerable to stress in ambiguous situations, since the perception of themselves as professionals is not easily threatened (Elovainio and Kivimäki 2001), which supports good perspectives of resilience on the professional growth for the profession that has a new and recent framework. Porter and Wilton (2019) used a mean number of years of work of 15 years or over and suggested that the technologists were highly experienced with established professional identities and may have contributed to the very high professional identity scores reported on their studies. Our mean tenure also can be considered high (mean of 11.7 years) which can also justify our high values of PI.

Through this study's results we accessed to the WE score for that professional group. The results revealed high levels of WE (5.24±1.26) comparing with similar studies done in Portuguese nurse professionals which obtained a mean score of work engagement of 3.9±1.7 (Pinto et al, 2015) and 5.08±1.05 (Santos et al, 2015). Nurses also showed differences on work engagement related with different workplace typologies (public vs. private sector), which suggests that work conditions were an important factor for work engagement as described by Carvalho (2012) who describes the main challenges of management nurses on public and private sector. Furthermore, in a meta-analysis of burnout, involvement and job security (Mark, 2007), involvement with work was positively related to the safety climate for nurses. From a patient point of view, the greater involvement with nurses' work was significantly related to the higher levels of patient satisfaction (Bacon, 2009). Another recent systematic review in nursing concludes that leadership and leadership management influence team involvement (Garcia-Sierra, 2016), which can also be observed in this study for AHMIRT through the acceptance of our hypothesis 3. Work engagement has been largely studied in nurses and correlated with other management outcomes that could also be studied on allied health professions. Apesoa-Varano (2007) showed that when it comes to nurses, strong professional and work identities are articulated and negotiated through caring for their patients. This can also be adapted to AHMIRT, once we obtained high values of professional identity (5.86±1.19) and it is known that professionals have several competencies of patient care (i.e, EANM, 2018).

Different leadership profiles can bring different outcomes to the professionals. However, differences in leadership can contribute to the balance of the work systems. The three job categories showed different leader profiles, which can be connected to the processes and technical specificities of each one. However, the leadership profiles related to control were more scored globally. These profiles related to control intend to achieve accurate work, controlling projects and clarifying policies (Lawrence et al., 2009). Professions that use ionizing radiation, as AHMIRT, have rigid protocols, orientations and guidelines that are well defined and have to be strictly fulfilled for safety and protection of patients and health professionals. This point can partially explain the concern of the leaders on following the rules and procedures in AHMIRT professionals, which contributes to increase their controller behaviors. Controller profiles of leadership show on previous studies, negative effects on several outcomes as knowledge sharing (Yang, 2006).

As expected, the concern about the results does not seem to have an important role for leaders, which is easily explained by the intrinsic goals of the profession that are centered on patient satisfaction and quality of services and not in the competition between providers. This evidence could justify the least scored profile on general results and NMT for the competitor leader profile.

Analyzing the moderation role of LP on the correlation between the WE and POP, results show that when leaders assume controller and competing profiles, WE is negatively associated with POP. On the other hand, flexible and creative LP led to a positive association between WE and POP. Watson et al (2009) found a significant correlation between perceived supervisor leadership behaviors and medical imaging professionals' satisfaction. This study also brought a significant contribution that shows that leadership profiles influence behavior and work engagement, with significant impact on the performance of that group of professionals. We corroborated those results on our study.

Several studies have found a correlation between transformational leadership and the efficiency in organizations (Avolio, 1999; Avolio et al 1995; Dumdum et al 2002) and meta-analytic reviews have corroborated positive connections between transformational leadership of superiors and the performance of their subordinates (Judge and Piccolo, 2004; Lowe et al. 1996). In our study, LP, that are focused on human relations presented lower score for RT and RTT regarding specifically the empathizer profile, which could influence motivation and performance of those professionals.

Implications for theory and practice.

This research brings several important theoretical contributions. Firstly, this study provides a characterization of professional identity, work engagement and leadership profiles in AHMIRT. The novelty of this data can bring awareness to politicians, managers and professionals for the importance of critical dimensions in the workplace for AHMIRT.

Callan et al. stands by the idea that "changes that seek to break down professional boundaries are likely to be resisted by employees, particularly those in low status groups," recommending and emphasizing both old and new identities may be less likely to result in employee exclusion from the change process. Once professionals with the old and current training will cohabit in the same work fields, it seems to be crucial to assess and monitor the levels of AHMIRT PI,

The theoretical model of this study showed, as expected, a positive association between PI and POP via WE. The correlation between WE and performance were largely studied, having been pointed out some moderators as organizational support (Yongxing et al., 2017), organizational culture, leadership, and personal characteristics (Arifin et al., 2014). Several previous studies highlighted that leadership has a positive effect on work engagement, and transformational leadership model is relevant to predict work engagement (Arifin et al 2014, Vincent-Höper et al, 2012).

Besides that, our research is one of the very few studies that correlated the leader style effects on teamwork and interprofessional dynamics through an objective measure, that being the performance. This study supports the effect of flexible leadership profiles on better performance results. The professional with high professional identity and high work engagement is conditioned by their leader: if there is a flexible, innovator and focused leader, the motivation and professional development will be increased and the performance will be better. On the other hand, if we have an authoritarian leader, more conservative and focused on processes, disregarding the professional and their personal needs, it will increase demotivation and increase the risk of burnout as shown in the previous studies (Marquis et al, 2015).

With our study we also suggest that using competing values framework can help leaders to act more efficiently and effectively in creating value and understanding what the behaviors they have through the eyes of the collaborators. (Cameron et al., 2006).

With the evidence that currently leaders on AHMIRT are trying to control everything, and previously knowing how professional careers of those professionals are organized, it is time to reflect on new ways of leader selection and advanced leadership training with the development of innovation and interpersonal relationships skills.

This research also provides some guidance for managerial practice. This evidence can also contribute to the organizations when it comes to being aware of the importance of leadership on the teams and proving the real impact in management outcomes as the performance and work connection of professionals. Taking this into consideration it is possible to assume that leadership is a critical area of action to improve professional's motivation.

On an educational perspective, this study also makes you aware about the needs of integrating leadership training in undergraduate or graduate syllabus of Medical Imaging and Radiotherapy degrees which can promote leadership skills on future professionals.

This research contributes to a new perspective over leadership importance by demonstrating that leadership actively contributes to minimize the negative consequences of work engagement and performance reduction and suggesting the development of innovation and interpersonal relationship skills as a way to improve leadership roles on AHMIRT teams.

Limitations and future research directions:

The survey used to measure leadership has inherent limitations. The survey used can at its best tell what a leader is doing, but it cannot explain why. The major limitation of this study is the perceived based assessment of leadership profiles of different leaders. It would have undoubtedly been helpful to incorporate triangulation and a grounded methodology theory that obtains results of perceived leadership but also the self-assessment of leadership by the leader.

There are also some concerns about common method variance, since PI, WE, LP and POP were collected from the same source (i.e., AHMIRT). However, there are two aspects of our research that minimize these concerns. On the one hand, we collected data from multiple raters (supervisors and subordinates) to reduce the likelihood that results are due to the influence of common method variance effects (Podsakoff et al., 2003). Additionally, interaction effects are not likely artifacts of common method, since interaction effects will be deflated by unique measurement error, making them more difficult to detect (Busemeyer and Jones, 1983). Nonetheless, future research should try

to assess these variables from other sources (e.g. leadership profile as viewed by an entire team).

Notwithstanding some limitations of the study, including a cross-sectional observational study, due to the results found and the lack of similar studies in our country, it is recommended to carry out longitudinal studies, success/ failure cases or other contexts of care.

The survey was anonymous in order to reduce the potential desirable social biased response. However, it is recognized that leader responses may have been influenced by social desirability effects.

Future research could also be directed towards the contextual variables that influence leader effectiveness, creating leadership programs designed to improving flexibility behaviors on AHMIRT leaders.

Further research is needed to study the intrinsic characteristics of each specialty to list the characteristics of leadership behavior which will allow designing specific leadership profiles and then try developing leadership programs that can improve the correlation between work engagement and performance.

A new design can be used to integrate organizational culture, assessing perceived leadership and self-perceived leadership.

Leadership has also been pointed out as being crucial to competencies development and professional recognition (Watson, 2009) and this theoretical model provides some directions for leadership training to improve clinical results, professional development and widen up competencies. Previous researches studied intrinsic outcomes of the professionals, like job autonomy and their correlation with abusive leadership (Velez, 2016). Looking for our results, could be interesting to study these characteristics on AHMIRT to improve professional competencies and explain the lowest scores of leadership centered on human relations.

It is possible to develop leader behavior to achieve higher effects when teams were engaged in some tasks, such as those involving interdependence, over others (Bligh et al, 2006). Future research could be directed towards extending this study by investigating the moderating effect of task type on leader impact, as well as other contextual issues such as team climate and team communication.

PI starts and grows along with the study programs (Goldie, 2012). This study was applied to a group of professionals that had individually specialized degree programs. It could be interesting to apply the same study to future professionals that had a new degree program

on Medical Imaging and Radiotherapy which had three fused areas. In the education field, it could be interesting to study the correlation between programs that had leadership on their syllabus and the leadership behaviors on the professionals.

Conclusion

Due to the continuously increasing average age of active AHMIRT, recruitment and retention of medical imaging professionals are crucial. This study contributed to a better understanding of the power of leadership on performance and work engagement, contributing to an acquisition of knowledge in order to get a higher humanization of workplaces for AHMIRT.

AHMIRT reported scores on professional identity and work engagement are slightly higher in comparison to other portuguese health care professionals, which brings new perspectives for professional development into a renewed profession with a recent framework.

The results of this study support the hypotheses that PI is positively associated with perceived organizational performance through the mediation of work engagement when LP is characterized by flexible orientation (people and innovation-oriented). On the other hand, when LP is characterized by processes, results, rules and control behaviors WE was a negative indirect effect acting on POP which has a negative impact on WE. However, AHMIRT perceived the majority of their leader's behavior as control-oriented. Thus, it is therefore necessary that AHMIRT leaders develop skills that promote innovation and interpersonal capacity.

This research can lead to a better understanding of employee motivation and practical recommendations on theoretical, managerial and educational levels, which could improve psychological safety, trustworthy relationships between employees and supervisors, bringing a positive organizational climate and better organizational outcomes.

Conflict of interest: The authors declare that they have no competing interests.

Ethical considerations: This study has the approval of the Ethical Board of the Lisbon School of Health Technology.

References

ACSS. 2018. *Gestão de profissionais*. Retrieved October 25, 2018, retrieved from http://tdt-rhs.min-saude.pt/pages/entradaacss.aspx?ReturnUrl=%2fAPP%2f UserProcess%2fDEFAULT.ASPX

Albuquerque, I., Cunha, R., Martins, L., & Sá, A. 2014. Primary health care services: workplace spirituality and organizational performance. *Journal of Organizational Change Management*, *27*(1), 59–82.

Apesoa-Varano, E.C. 2007. Educated caring: The emergence of professional identity among nurses. *Qualitative Sociology*, 39: 249-274.

Avolio, B. J. 1999. *Full leadership development*. Thousand Oaks, CA: Sage.

Avolio, B. J., Bass, B. M., & Jung, D. I. 1995. Multifactor Leadership Questionnaire *technical report*. Redwood City, CA: Mind Garden.

Bacon, C. and Mark, B. 2009. Organizational Effects on Patient Satisfaction in Hospital Medical-Surgical Units. USA: *The Journal of Nursing Administration*. 39, 220-227.

Bartel, C. 2001. Social comparisons in boundary-spanning work: effects of community outreach on members' organizational identity and identification, *Administrative Science Quarterly* 46, 379-413.

Bergami, M., Bagazzi R.P. 2000. Self-categorization, affective commitment, and group self-esteem as distinct aspects of social identity in the organization. *The British Journal of Social Psychology*, 39(4), 555-577.

Bligh M., Pearce C., Kohles J. 2006. "The importance of self- and shared leadership in team based knowledge work: A meso-level model of leadership dynamics", *Journal of Managerial Psychology*, Vol. 21 Issue: 4, pp.296-318

Busemeyer, J.; & Jones, L. 1983. Analysis of multiplicative combination rules when the causal variables are measured with error. *Psychological Bulletin*, 93, 549-562.

Buckingham, M., & Coffman, C. 1999. First, break all of the rules. What the worlds greatest managers do differently. New York, NY: Simon & Schuster.

Cabral, M.V., Silva, P.A. and Mendes, H. 2002. Saúde e Doença em Portugal. Inquérito aos Comportamentos e Atitudes da População Portuguesa perante o Sistema Nacional de Saúde. Lisboa: Imprensa de Ciências Sociais, Instituto de Ciências Sociais da Universidade de Lisboa.

Cameron, K.S., Quinn, R.E. and DeGraff, J. 2006. *Competing Values Leadership: Creating Value in Organizations*, Edward Elgar, Cheltenham.

Cameron, K. S., Quinn, R. E. 2011. *Diagnosing and changing organizational culture: Based on the competing values framework.* San Francisco. CA: John Wiley & Sons.

Carvalho, T. 2012. Managerialism and professional strategies: A case from nurses in Portugal. *Journal of Health, Organisation and Management*, *26*(4), 524–541.

Cech, E. A. 2014. Culture of disengagement in engineering education?. *Science, Technology & Human Values*, 2014. 39(1), 42-72

Correia, T. I. G., Ribeiro, M. I. e Martins, M. D. S. 2011. Competências de liderança em enfermeiros especialistas. *Revista Científica da Unidade de Investigação em Ciências da Saúde – Enfermagem*. 2:4, III Série, Supl. p. 537

Cunha, P. 2008. *Conflito e Negociação*. Lisboa: Edições Asa.

Daly, J., Jackson, D., Mannix, J., Davidson, P., & Hutchinson, M. 2014. The importance of clinical leadership in the hospital setting. *Journal of Healthcare Leadership*, 75.

Diário da República (2014, 30 de Julho) *Despacho n.o 9408/2014 de 30 de Julho*, IS-A.

Duarte, A., Nunes, F., Martins., L. 2007. *Estudos e pareceres da ordem dos Farmacêuticos – Responsabilidade social no sector das farmácias em Portugal*, Ordem dos Farmacêuticos, Gest-In/ISCTE.

Dumdum, U. R., Lowe, K. B., & Avolio, B. J. 2002. A meta-analysis of transformational and transactional leadership correlates of effectiveness and satisfaction: An update and extension. Oxford, UK: *Transformational and charismatic leadership: The road ahead*. (pp 35-66) Elsevier Science.

EANM Technologist Committee. 2017. NMT EDD Nuclear Medicine Technologist Competencies. *EANM Benchmark Document*.

García-Sierra, R., Fernández-Castro, J. and Martínez-Zaragoza, F. 2016. Work Engagement in Nursing: An Integrative Review of the Literature. Spain: J*ournal of Nursing Management*. 24, E101-E111.

Giauque, D., Anderfuhren-Biget, S. & Varone, F. 2013. HRM Practices, Intrinsic Organizational Performance in the Public Sector. *Public Personnel Management*, 42(2), 123-150

Gilmartin, M.J. and D'Aunno, T.A. (2007) Leadership Research in Healthcare: A Review and Roadmap. *The Academy of Management Annals*, 1, 387-438.

Hawkes, A. J., Biggs, A., & Hegerty, E. (2017). Work Engagement: Investigating the Role of Transformational Leadership, Job Resources, and Recovery. *The Journal of Psychology*, *151*(6), 509–531.

Judge, T. A., & Piccol, R. F. 2004. Transformational and transactional leadership: A meta-analytic test of their relative validity. *Journal of Applied Psychology*, *89*(5), 755–768.

Kroger, J. 2007. *Identity development: Adolescence through adulthood* (2nd ed.). Thousand Oaks, CA, US: Sage Publications, Inc.

Lawrence, K. A., Lenk, P., & Quinn, R. E. 2009. Behavioral complexity in leadership: The psychometric properties of a new instrument to measure behavioral repertoire. *Leadership Quarterly*, *20*(2), 87–102.

Leonard, M. and Frankel, A. 2010. *How Can Leaders Influence a Safety Culture?*, The Health Foundation, London.

Lowe, K. B., Kroeck, K. G., & Sivasubramaniam, N. 1996. Effectiveness correlates of transformational and transactional leadership: A meta-analytic review of the MLQ literature. *Leadership Quarterly, 7,* 385– 425.

Mark, B., Hughes, L., Belyea, M., Chang, Y., Hofmann, D., Jones, C. and Bacon, C. 2007. Does Safety Climate Moderate the Influence of Staffing Adequacy and Work Conditions on Nurse Injuries?. USA: *Journal of Safety Research*, 38, 431-446.

Melo, M. R. A. C., Fávero, N., Trevizan, M. A. e Hayashida, M. 1996. Expectativa do Administrador Hospitalar Frente às Funçoes Administrativas Realizadas pelo Enfermeiro. Ribeirão Preto: *Rev. Latino-Am. Enfermagem* 4,1, p. 131-44.

Maricuțoiu, L. P., Sulea, C., & Iancu, A. (2017). Work engagement or burnout: Which comes first? A meta-analysis of longitudinal evidence. *Burnout Research*, *5*(May), 35–43. https://doi.org/10.1016/j.burn.2017.05.001

Marquis, B. L., & Huston, C. J. 2015. *Leadership roles and management functions in nursing. (8th ed.)*. Philadelphia, PA: Wolters Kluwer Health

Martins, J. and Isouard, G. 2015. An evidence-based framework: Competencies and skills for managers in Australian health services. *Asia Pacific Journal of Health Management*, Vol. 10, No. 2, 2015: 8-23.

Moreira, MC. 2010. O *paradoxo em tecnologias de saúde: da racionalidade paramétrica à racionalidade estratégica.* Lisboa: ISCTE-IUL, 2010. Master Thesis.

Morgan-Lopez, A.; & MacKinnon, D. 2006. Demonstration and evaluation of a method for assessing mediated moderation. *Behavior Research Methods*, 38, 77–87.Ng, T. W. H., & Feldman, D. C. 2010. Organizational Tenure and Job Performance. *Journal of Management*, *36*(5), 1220–1250.

Nyström, S., Dahlgren, M. A., & Dahlgren, L. O. 2008. A winding road – professional trajectories from higher education to working life: a case study of political science and psychology graduates. *Studies in Continuing Education*, *30*(3), 215–229.

Parreira, P. M., Felício, M. J., Lopes, A., Nave, F., Parreira, F. 2006. Papéis de liderança: um instrumento avaliativo. Portugal: *Revista de Investigação em Enfermagem.* vol. 13, pp. 3-14.

Peters, D. H., Chakraborty, S., Mahapatra, P., & Steinhardt, L. 2010. Job satisfaction and motivation of health workers in public and private sectors: cross-sectional analysis from two Indian states. *Human resources for health*, 8, 27.

Pinto, A., Elvio, J., Mendes, A., & Fronteira, I. 2015. Estudo RN4CAST em Portugal: Work Engagement dos Enfermeiros. Portugal: *Revista Investigação Em Enfermagem*, *10*(2), 26–37.

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. 2003. Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*(5), 879-903.

Popova-Nowak, I. V. 2010. Work Identity and Work Engagement. *The George Washington University, Washington, D.C., U.S.*, *42*(1–2), 93–106.

Quinn, RE. 1988. *Beyond rational management: Mastering the paradoxes and competing demands of high performance*. San Francisco: Jossey-Bass.

Quinn, R.E. & Rorhbaugh, J. 1983. A spatial model for effectiveness criteria: towards a competing value approach to organizational analysis. *Management Science*, *29*, 363–77.

Salanova, M., S. Agut, and J.M. Peiró. 2005. Linking organizational resources and work engagement to employee performance and customer loyalty: The mediation of service climate. *Journal of Applied Psychology*, 90: 1217-1227.

Santos, A., Chambel, M.J. & Castanheira, F. 2016. Relational job characteristics and nurses' affective organizational commitment: the mediating role of work engagement. Portugal:*Journal of Advanced Nursing* 72(2), 294– 305.

Schaufeli, W. B.; Salanova, M.; Gonzalez-Roma, V. & Bakker, A.B. 2002. The measurement of engagement and burnout: A two sample confirmatory factor analytic approach. *Journal of Happiness Studies*, *3*, 71–92.

Schaufeli, W. B.; Bakker, A. B. & Salanova, M. 2006. The measurement of work engagement with a short questionnaire: A cross-national study. *Educational and psychological measurement*, 66(4), 701–716.

Schaufeli, W. B., Shimazu, A. and Taris, T. 2009. Being Driven to Work Excessively Hard the Evaluation of a Two-Factor Measure of Workaholism in the Netherlands and Japan. Netherlands: *Cross-Cultural Research*, 43, 320-348.

Schein, E. H. 1978. *Career Dynamics: Matching individual and organizational needs*. London: Addison-Wesley.

SNS. 2018. *Política de Saúde do Serviço Nacional de Saúde*. Retrieved on October 30, 2018, retrieved from https://www.sns.gov.pt/institucional/politica-de-saude/

Snodgrass, J., Douthitt, S., Ellis, R., Wade, S. and Plemons, J. 2008. "Occupational therapy practitioners' perceptions of rehabilitation managers' leadership styles and the outcomes of leadership". USA: *Journal of Allied Health*, Vol. 37 No. 1, pp. 38-44.

Van Maanen, R., Speer, J. R. 1986. Prototype of a profession: Psychology's public image. Chicago: *Professional Psychology: Research and Practice*, 17(1), 5.

Velez, M.J. Neves, P. 2016. Abusive supervision, psychosomatic symptoms, and deviance: Can job autonomy make a difference? *Journal of Occupational Health Psychology*, 21(3), 322-333.

Villavicencio-Ayub, E., Jurado-Cárdenas, S., & Valencia-Cruz, A. 2014. Work engagement and occupational burnout: Its relation to organizational socialization and psychological resilience. *Journal of Behavior, Health & Social Issues*, *6*(2), 45–55.

Vincent-Höper S., Muser C., Janneck M. 2012. Transformational leadership, work engagement, and occupational success, *Career Development International*, Vol. 17 Issue: 7, pp.663-682.

Wall, T.D., Michie, J., Patterson, M., Wood, S.J., Sheehan, M., Clegg, C.W. and West, M. 2004. "On the validity of subjective measures of company performance", Personnel Psychology, Vol. 57, pp. 95-118.

Walsh, K. and J.R. Gordon. 2008. Creating an individual work identity. *Human Resource Management*, 18: 46-61.

Waterson, P.E.; Clegg, C.W.; Bolden, R.; Pepper K.; Warr, P.B.; & Wall, T.D. (1999). The use and effectiveness of modern manufacturing practices: A survey of UK industry.International Journal of Production Research, 37(10), 2271–2292.

Watson, LW. 2009. Leadership's influence on job satisfaction. USA: *Radiologic Technology*, 80(4), 297–308.

Williams, L., Cote, J. & Buckley, M. 1989. Lack of method variance in self-reported affect and perceptions at work: Reality or artifact? *The Journal of Applied Psychology*, *74*, 462–468.

Witt, L.A., A.L. Patti, and W.L. Farmer. 2002. Organizational politics and work identity as predictors of organizational commitment. *Journal of Applied Social Psychology*, 32: 486-499.

Wylie, D. A., & Gallagher, H. L. 2009. Transformational leadership behaviors in allied health professions. *Journal of Allied Health*, 38(2), 65-73.

Yang, J.-T. (2007). Knowledge sharing: Investigating appropriate leadership roles and collaborative culture. *Tourism Management*, *28*(2), 530–543.

Yongxing, G., Hongfei, D., Baoguo, X., & Lei, M. (2017). Work engagement and job performance: the moderating role of perceived organizational support. Anales de Psicología, 33(3), 708.

Discussion and final reflection

This dissertation joint two independent studies that are presented on research article form. First study is a systematic review of literature that intend answer to the question "What are the main outcomes of the studies done about leadership on health allied professionals?". This systematic review adds to the growing body of evidence with some leader characteristics, barriers to leadership and needs of improvement. Leadership profiles are characterized by sense making, relating, visioning and inventing aspects. There were also highlighted several barriers to leadership that depends on external (e.g. polices, external pressure) and internal factors (e.g. bureaucracy, lack of relationships). Additionally, leadership challenges and potential areas of development for leadership training were identified, as well as for the implementation of specific leadership programs for each job category and country.

Second study is a quantitative study that aim to study the influence of four types of leadership profiles based on Competing Values Framework of Quinn's (1988) (human relations, open systems, internal processes and rational goals) as moderator of the mediated relationship between professional identity and perceived organizational performance by work engagement on HAMIRT in Portugal. The results of this study support the hypotheses that PI is positively associated with POP through the mediation of work engagement when LP are characterized by flexible orientation (people and innovation-oriented). On the other hand, when LP are characterized by processes, results, rules and control behaviors WE have a negative moderation effect on the relationship between of WE and POP. However, HAMIRT perceived the majority of their leader's behavior as control-oriented. Thus, it is therefore necessary that HAMIRT leaders develop skills that promote innovation and interpersonal capacity, and could create some future research paths on understanding why this relation occurs.

The novelty provided by this study is characterized by the contribution to HAMIRT data in Portugal about leadership outcomes, and be one of few articles that present the professional identity as a precursor of work engagement. Bakker and Demerouti (2008) placed work engagement within the job demands-resources theory, yet no theoretical framework exists for work identity, and no framework exists to help conceptualize the relationship between work identity and work engagement. A recent study by Porter and Wilton (2019) highlighted the importance of study professional identity when occurs

changes, what predicts that could be advantageous study this variable on AHMIRT and follow the process of professional changing.

There are many future research lines that could be implemented soon as study how leadership can be improved on practical ways to promote flexible and creative profiles to increase the number of this behaviors on HAMIRT and studying in this particular case why we found high rates of control behaviors on that professionals.

Through this research it was possible bring to practice the knowledge previously acquired on master's degree curricular program, namely: Health Technology Management, Health Technology Assessment, Biostatistics and Health Quality and Systematic Review and Metanalysis. One factor that was fundamental to the success of that project was the high involvement of professionals who answered the online questionnaire response and contributed to the good response rate.

This project was already presented as preliminary results in the 1st Conference on Medical Imaging and Radiotherapy of the Portuguese Red Cross Higher School, with a favorable participation of the professionals participating in these Conferences (scientific program of the journals in annex). This study was also submitted to the Annual Congress of the European Association of Nuclear Medicine, to be held in Barcelona from October 12 to 16, 2019, and therefore awaiting feedback on its acceptance.

This project consisted on a great challenge that implicate personal involvement but also provided great personal and professional satisfaction.

To better health management it will be necessary to ensure that good professionals and their expertise are facilitated and enabled by good systems and efficient processes to achieve good performance. The findings can provide some relevant outcomes for researchers, managers and policy makers, regarding humanization of work conditions for workers and highlighting leadership as crucial to implementing quality and efficiency in clinical practice.

REFERENCES

A3ES. (2013). 1.º Relatório sobre propostas de "agregação/fusão" de 1.º ciclos de estudos. Lisboa: Portugal

Baker, G. R. (2011). The roles of leaders in high-performing health care systems. *Commission on Leadership and Management in the NHS. The Kings Fund*, 1–27.

Bakker, A.B., and E. Demerouti. 2008. Towards a model of work engagement. *Career Development International*, 13: 209-223.

Bretaña, R. M, & Álvarez, Y. A. (2017). Accreditation and certification of hospital quality: different or similar? Revista Ingeniería Biomédica, 11(21), 35-41.

Cruess, R. L., Cruess, S. R., Boudreau, J. D., Snell, L., & Steinert, Y. (2014). Reframing Medical Education to Support Professional Identity Formation. Academic Medicine, 89(11), 1446–1451.

Cunha, P. (2008). *Conflito e Negociação*. Lisboa: Edições Asa.

Diário da República (2014, 30 de Julho) Despacho n.o 9408/2014 de *30 de Julho*, IS-A.

ESCO. (2019). ESCO - Occupations - European Commission - Europa EU. Retrieved April 20, 2019, from https://ec.europa.eu/esco/portal/occupation/radiographer

International Organization for Standardization. (2015). Quality management systems - Requirements with guidance for use (ISO/DIS Standard No. 9001). Retrieved: from http://www.iso.org/iso/catalogue_detail?csnumber=63787

Houdmont, J., & Leka, S. (2010). *Contemporary occupational health psychology: Global perspectives on research and practice. Chichester,* UK: Wiley-Blackwell.

Peh, W. (2007). Scientific writing and publishing: its importance to radiologists. *Biomedical Imaging and Intervention Journal*, *3*(3).

Porter, J., & Wilton, A. (2019). Professional Identity of Allied Health Staff. Journal of Allied Health, 48(1), 11–17.

Regulamento Mestrado GATS - Gestão e avaliação de tecnologias em saúde (2012). Retrieved October, 2012, from http://moodle.estesl.ipl.pt/

Schaufeli, W. B., Bakker, A. B., & Van Rhenen, W. (2009). How changes in job demands and resources predict burnout, work engagement, and sickness absenteeism. Journal of Organizational Behavior, 30(7), 893–93

Appendix 1: Ethical Board approval

Conselho de Ética da ESTeSL <conselhodeetica@estesl.ipl.pt> 8 de fevereiro de 2019 às 16:14
Para: i.albuquerque@novasbe.pt
Cc: amadeu.martins26@gmail.com

REFERÊNCIA INTERNA DO PROJETO: CE-ESTeSL-Nº.13-2018 - AMADEU MANUEL RODRIGUES CARDOSO MARTINS

Título do Projecto: O Futuro da Imagem Médica e Radioterapia

Tipo de Projeto/Estudo: Dissertação de Mestrado em Gestão e Avaliação de Tecnologias em Saúde

INVESTIGADOR/A: Amadeu Manuel Rodrigues Cardoso Martins

ORIENTADOR/A: Isabel Faro de Albuquerque

INSTITUIÇÃO PROMOTORA: Escola Superior de Tecnologia da Saúde do Instituto Politécnico de Lisboa & Escola Superior de Saúde da Universidade do Algarve

RECEBIDO: 22-06-2018

RESPOSTA DO CE: 19-09-2018

RESPOSTA RECEBIDA: 16-11-2018

RESPOSTA DO CE: 8-01-2019

RESPOSTA RECEBIDA: 13-01-2019

Exmª. Senhora Professora Doutora Isabel Faro de Albuquerque

Exmº Senhor Dr. Amadeu Manuel Rodrigues Cardoso Martins, aluno do Mestrado em Gestão e Avaliação de Tecnologias em Saúde

Após análise do projeto supracitado e dos esclarecimentos prestados a 13 de janeiro de 2019, o Conselho de Ética da Escola Superior de Tecnologia da Saúde de Lisboa (ESTeSL) considerou por unanimidade que a designação de "Consentimento Informado" deve ser alterada para "Enquadramento do Estudo", uma vez que a aplicação de Consentimento Informado pressupõe que não exista anonimização. O Conselho de Ética da Escola decidiu ainda por unanimidade atribuir um parecer favorável.

Lembramos ainda que todos os estudos que envolvem a autorização dos participantes e a recolha de amostras e dados anonimizados e/ou codificados têm de cumprir com o estabelecido no Regulamento Geral sobre a Proteção de Dados de 27 de abril de 2016.

Por último, solicita-se também que, ao abrigo do artº 19 da Lei 21/2014 de 16 de abril e do disposto no nº23 da atual versão da Declaração de Helsínquia, dê igualmente conhecimento ao Conselho de Ética da ESTeSL do relatório final com as conclusões do estudo, de eventuais alterações ao protocolo de investigação e demais informações tidas por relevantes.

Aproveitamos ainda para desejar o maior sucesso no desenvolvimento deste trabalho.

Com os melhores cumprimentos,

Helena Soares

Profª. Coordenadora Helena Soares
Presidente do Conselho de Ética da ESTeSL
Escola Superior de Tecnologia da Saúde de Lisboa
Av. D. João II, lote 4.69.01, 1990-096 Lisboa
Tel. 218 980 447; Fax. 218 980 460

Appendix 2: EANM Annual Congress Abstract Submission and Notification of Acceptance

Control/Tracking Number: 2019-T-1813-EANM **Activity:** Technologist Programme **Current Date/Time:** 4/30/2019 2:00:56 AM

Nuclear Medicine Technologists: Professional Identity - Can leadership profiles makes a difference?

Author Block: A. Martins[1,2,3], I. Faro de Albuquerque[4], G. Cunha[3]; [1]Higher School of Health of the Portuguese Red Cross, Lisbon, PORTUGAL, [2]Joaquim Chaves Saúde, Lisbon, PORTUGAL, [3]Lisbon School of Health Technology, Lisbon, PORTUGAL, [4]NOVA-SBE, Lisbon, PORTUGAL.

Abstract:
Aim/Introduction: The aim of the study is to identify, provide and explore some management outcomes data on Nuclear Medicine Technologists (NMT) in Portugal like professional identity, work engagement, leadership profiles and analyze their impact on perceived organizational performance. There is no data about management outcomes on NMT in Portugal. Leadership profiles characterization and assessment of their influence on motivation and effective outcomes of professional performance have been demonstrated an important role in human resources management.
Materials and Methods: 67 NMT answered an online survey that assesses their perceptions about their leadership styles, their professional identity, work engagement and perceived organizational performance. Data were statistical treated and one theoretical model that correlates the variables studied has been proposed and tested. The wished leadership profile also was assessed. **Results:** These professionals have revealed a professional identity that reflects a moderate to great integration between their personal identity and their identity in the profession. Higher values of work engagement were obtained than those found in other health professions such as nursing. The perceived performance was also high in most cases. The leadership profile with the highest scores was the "Mentor Leader" in the case of Nuclear Medicine. With the application of the proposed theoretical model, we can prove that work engagement mediate the relation between professional identity and perceived organizational engagement, and we have also been able to prove statistically assesses focused on flexibility (focused on people and teamwork and focused on innovation, change and professional performance) positively measure the relationship between work engagement and perceived organizational performance. On the other hand, convergent, control-focused leadership models (focused on the hierarchy or the achievement of results) negatively moderate the relationship between work engagement and perceived performance. **Conclusion:** This study allowed obtaining characteristics of the NMT professionals of the for which data were not yet available in Portugal. The proof that leadership moderate the relationship between how we are integrated into our workplaces and the way we perceive these same places in terms of their performance, brings new importance in betting on training and discuss leadership as the theme for obtaining of new human resources policies and professional solutions in the area of Nuclear

Medicine. This information can be used to help develop strategies to meet those needs through work redesign and leadership behavior development. **References:** None

Author Disclosure Information:

A. Martins: None.
Topic (Complete): 16.2 Quality and Department Management **Disclosures (Complete)**:

I or one of my co-authors (specify name/position/company) hold a position as an employee, consultant, assessor or advisor for a pharmaceutical, device or biotechnology company: : Nothing to disclose

I or one of my co-authors (specify name/position/company) receive support from a pharmaceutical, device or biotechnology company (please specify which project and whether support is in kind or monetary): : Nothing to disclose

I or one of my co-authors (specify name/position/company) hold property rights/patents for (radio)pharmaceuticals, medical devices or medical consulting firms: : Nothing to disclose

I or one of my co-authors have written articles for (radio)pharmaceutical, med. device, biotechnology or consulting companies during the last 5 yrs. If yes, specify name/position/company/article/journal & co-authors.If not state "Nothing to disclose" : Nothing to disclose

I herewith declare, that I submitted all relevant information below to the best of my knowledge : True

Additional and Gender (Complete): **I agree**: Yes

I agree: Yes **I agree**: Yes **I agree:** Yes **I am** : Male

Presentation Preference (Complete): Oral or e-Poster **Status:** Complete

De: **abstracts** abstracts@eanm.org
Assunto: EANM'19 Congress - Notification of Acceptance - Technologists - Oral Presentation
Data: 19 de junho de 2019, 01:12
Para: amadeu.martins26@gmail.com

Dear Mr. Amadeu Martins,

Thank you very much for submitting your work for the
EANM'19 - Annual Congress of the European Association of Nuclear Medicine
(October 12-16, 2019 in Barcelona/Spain).

I am pleased to inform you that your abstract (Control Number: **#1813**):

"Nuclear Medicine Technologists: Professional Identity - Can leadership profiles makes a difference?"

was accepted as an **Oral Presentation** within the Technologist Programme of EANM'19.

Please find below your presentation details:

Presentation Number: **OP-555**
Session: **1304 - Technologists: Oral Presentations 3**
Session Date: **Tuesday, October 15, 2019**
Session Time: **11:30:00 AM - 1:00:00 PM**
Session Hall: **Lecture Hall 117**

Within your session you will be presenter number: **9**
Therefore your oral presentation time is: **12:50:00 PM - 1:00:00 PM**

Please note that the presentation time of 10 minutes MUST BE structured as follows:
8 minutes presentation plus 2 minutes discussion. Due to the tight schedule we have to stick to this time restriction, and chair persons will be encouraged to stop your presentation in case you overrun your time.

The **oral presentation guidelines** as well as a template for the **disclosure statement** can be found on our website under the following link: https://eanm19.eanm.org/submitters-presenters/. Please note that you must include the disclosure statement in your onsite presentation.

If you need to **withdraw your paper** and/or will not be able to give your presentation, please send a written notification to the EANM Executive Office by latest July 1, 2019.

We would also like to draw your attention to the upcoming **Early Registration Deadline: June 26, 2019.**
Please visit our website https://eanm19.eanm.org/ and profit from the lower fee.

I look forward to seeing you this October in Barcelona.

With best regards,

Francesco Giammarile
EANM Congress Chair 2017-2019

Appendix 3: Abstract and Program of 1ªs Jornadas IMR ESSCVP

Título: O futuro da Imagem Médica e Radioterapia: Identidade Profissional e Liderança

Amadeu Martins[1,2]
Isabel Faro de Albuquerque, PhD[3]
Gilda Cunha, MsC[4]

1- Escola Superior de Saúde da Cruz Vermelha Portuguesa; 2- Joaquim Chaves Saúde; 3- NOVA-SBE; 4- Escola Superior de Tecnologias da Saúde de Lisboa.

Introdução: Identificou-se um hiato de conhecimento, que consiste na ausência de evidência no conhecimento do perfil de liderança percecionado e do seu impacto na motivação dos Técnicos Superiores de Diagnóstico e Terapêutica (TSDT), sendo que estas áreas são pouco exploradas do ponto de vista de gestão dos recursos humanos.

Objetivos do Estudo: O estudo apresentado apresenta como objetivos o caracterizar alguns indicadores intrínsecos à profissão como a identidade profissional, o work engagement, o tipo de liderança percecionado, sendo que como medida objetiva de desempenho optou-se pela obtenção de um desempenho organizacional percecionado. Para a análise dos tipos de liderança recorreu-se ao Modelo de Valores Competitivos (Quinn, 1988). Relacionaram-se os conceitos e criou-se um modelo teórico que foi testado e comprovado.

Resultados: Foram registados 392 questionários válidos (238 TSDT radiologia, 77 TSDST Medicina Nuclear, 77 TSDT Radioterapia). Estes profissionais revelaram uma identidade profissional que reflete uma moderada a grande integração entre a sua identidade pessoal e a sua identidade na profissão. Obtiveram-se valores superiores de work engagement dos que encontrados em outras profissões da área da saúde como a enfermagem. O desempenho percecionado também foi elevado na maioria dos casos.

Os perfis de liderança com maiores scores foram o "Líder Inovador" para a generalidade das áreas, o "Líder Produtor" no caso da Radiologia, o "Líder Mentor" no caso da Medicina Nuclear e o "Líder Facilitador" no caso da Radioterapia.

Com a aplicação do modelo teórico proposto conseguiram-se provar do ponto de vista estatístico ($p=.001$) a correlação positiva entre a identidade profissional e o desempenho percecionado, a correlação positiva entre a identidade profissional e o work engagement, a correlação positiva entre o work engagement e o desempenho organizacional percecionado. Foi possível comprovar que o work engagement age como mediador na relação entre a identidade profissional e a performance. Comprovou-se ainda do ponto de vista estatístico que modelos de liderança focados na flexibilidade (focados nas pessoas e no trabalho de equipa e focados na inovação, mudança e desempenho profissional) moderam de forma positiva a relação entre o work engagement e o desempenho organizacional percecionado. Por outro lado, modelos de liderança convergentes e focados no controlo (focados na hierarquia ou na obtenção de resultados) moderam negativamente a relação entre o work engagement e o desempenho percecionado.

Discussão e conclusão: Com este estudo foi possível estudar características da população de TSDT das áreas de Imagem Médica e Radioterapia para as quais ainda não havia dados em Portugal. A comprovação de que a liderança modera a relação entre a forma como estamos integrados nos nossos locais de trabalho e a forma como percecionamos esses mesmos locais ao nível do seu desempenho, trás uma nova importância em apostar em formação e debater a liderança como temática para obtenção de novas soluções políticas e profissionais nas áreas da Imagem Médica e Radioterapia.

PROGRAMA

08h30 Abertura do Secretariado

09h00 Sessão de Abertura

09h15 - 10h45

Moderador Isabel Rodrigues

- **Tomossíntese/Tomobiópsia**
  Orador: Elisabete Batista (TSDT Radiologia, IPO-FG Lisboa)
- **SBRT no tumor do pulmão**
  Orador: Catarina Travancinha (Médica Radioncologista, IPO-FG Lisboa/CUF Descobertas)
- **Teragnóstico em Medicina Nuclear**
  Orador: Susana Carmona (Médica Nuclearista, Hospital Garcia de Orta/Joaquim Chaves Saúde)
- **Perfusão e Difusão na determinação do grau de malignidade nos tumores cerebrais em RM**
  Orador: Sandra Carmo (TSDT Radiologia, CHLC, HSJ)

10h45 - 11h00 | Coffee Break

11h00 - 13h00

Moderador Aurea Lopes

- **IQon-Spectral CT, uma nova realidade**
  Oradores: Vera Raposinho, Romana Gomes e Rui Abreu (TSDT Radiologia - Fundação Champalimaud)
- **TC Espectral**
  Orador: Sara M. F. Ferreira (Clinical Applications and Product Specialist - Philips)
- **Tratamentos de Radioterapia com CyberKnife**
  Orador: Joana Vale (Física Médica, Clínica Júlio Teixeira Instituto CUF Porto)
- **Desenvolvimento de Novos Radiofármacos**
  Orador: Célia Fernandes (Investigadora no C2TN/IST)

13h00 - 14h00 | Almoço

14h00 - 15h30

Moderador Margarida Monteiro

- **A Imagiologia no planeamento de colocação de endopróteses**
  Orador: Pedro Silva (TSDT Radiologia, Hospital da Cruz Vermelha Portuguesa)
- **Novos avanços em Ressonância Magnética**
  Oradores: Marco Costa e Daniel Leitão (TSDT Radiologia, Hospital CUF Infante Santo)
- **Sistemas de Monitorização on-line | Quais as suas potencialidades?**
  Orador: Nicolle Gomes (TSDT Radioterapia, Fundação Champalimaund)
- **Multimodalidade em Medicina Nuclear**
  Orador: Andreia Santos (TSDT Medicina Nuclear, Hospital CUF Descobertas)

15h30 - 15h45 | Coffee Break

15h45 - 17h30

Moderador João Magalhães

- **O impacto da inteligência artificial na Imagem Médica**
  Oradores: Hugo Marques (Business Manager, Digital Services – Siemens Healthineers) Cláudia Mota (Global Business Manager, Digital Cardiology – Siemens Healthineers)
- **Imobilização de pacientes em técnicas avançadas de tratamentos de Radioterapia**
  Orador: Filipa Jerónimo (TSDT Radioterapia, Ibervoxel)
- **Braquiterapia eletrónica de alta taxa no cancro da mama| Experiência Clínica**
  Orador: Sónia Costa (Sales & Customer Support, Avanço - Advanced Medical Systems)
- **Radiofármacos | Diagnóstico e Terapêutica**
  Orador: Pedro Costa (ISODER)
- **Fujifilm e a inovação tecnológica**
  Orador: Engª Raquel Reis (Fujifilm Healthcare)

17h30 - 18h45

Moderador Cristina Almeida

- **O valor do Técnico de IMRT numa multinacional na área da saúde**
  Oradores: Hugo Marques (Business Manager, Digital Services – Siemens Healthineers) Cláudia Mota (Global Business Manager, Digital Cardiology – Siemens Healthineers))
- **Competências dos Técnicos de Medicina Nuclear - Referencial Europeu**
  Orador: Andreia Santos (Presidente do Comité Técnico da Associação Europeia de Medicina Nuclear)
- **O futuro da IMRT: Identidade profissional e Liderança**
  Orador: Amadeu Martins (TSDT Medicina Nuclear, ESSCVP/Joaquim Chaves Saúde)

18h45 | Sessão de Encerramento

A sua oportunidade, uma escola com futuro.