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Burnout in Radiation Therapists in Portugal

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Abstract

The main purpose of the present study is to evaluate the burnout levels in radiation therapists working in Portugal, using a validated measurement, the Maslach Burnout Inventory – Human Service Survey. This consists of three components: emotional exhaustion, depersonalisation and personal accomplishment.

Initially, a systematic review of the literature was conducted to retrieve and analyse studies assessing burnout levels in radiation therapists. A total of eleven studies were found to be eligible for inclusion in this systematic review, nine of which used Maslach Burnout Inventory questionnaire. Concerning solely studies using the latter questionnaire, 95% confidence intervals for radiation therapists with high emotional exhaustion scores, high depersonalization scores and low personal accomplishment scores were [24.8; 54.6], [10.1; 40.2] and [17.4; 41.6], respectively. The 95% confidence intervals for the corresponding means were found to be [20.0; 26.2], [5.1; 8.8] and [35.9, 39.6], respectively. The review revealed an arguably high prevalence of burnout in radiation therapists in spite of it varying substantially between studies. The factors leading to burnout and how to best tackle the problem remain to be clarified.

After completion of the systematic review, a survey to evaluate burnout was distributed via e-mail to radiation therapists working in Portugal. This included a social-demographic questionnaire and work-related questions in addition to the Maslach Burnout Inventory – Human Service Survey. A total of 103 people responded to the survey, 95 of which employed as radiation therapists at the time of the survey. The mean burnout scores of the latter were 20.60 ± 11.21 , 7.43 ± 5.34 and 35.02 ± 6.02 , for the emotional exhaustion, depersonalisation and personal accomplishment subscales, respectively. In the same order, the total of radiation therapists at high risk of burnout were 29%, 14.9% and 29.3% for the different dimensions. The mean scores of burnout did not differ significantly regarding gender, civil status, working in the public or private sector and years of service. Radiation therapists aged 40 years or older presented greater risk of burnout, though with no statistical significance.

Keywords: Burnout, Radiotherapy, Radiation Therapist, Portugal, Maslach Burnout Inventory

Resumo

O objetivo principal deste estudo é avaliar os níveis de burnout em técnicos de radioterapia a trabalhar em Portugal. Para esse efeito, usa-se um instrumento validado, o *Maslach Burnout Inventory – Human Service Survey*, que avalia três componentes: exaustão emocional, despersonalização e realização pessoal.

Inicialmente, realizou-se uma revisão sistemática da literatura para analisar os estudos que avaliam os níveis de burnout em técnicos de radioterapia. Um total de onze estudos foram considerados elegíveis para inclusão na revisão, dos quais nove usaram o questionário *Maslach Burnout Inventory*. Tendo em conta apenas estes nove estudos, os intervalos de confiança a 95% para os técnicos de radioterapia com resultados elevados de exaustão emocional, despersonalização e realização pessoal foram, respetivamente, [24.8; 54.6], [10.1; 40.2] e [17.4; 41.6]. Os intervalos de confiança a 95% para as médias correspondentes foram [20.0; 26.2], [5.1; 8.8] e [35.9, 39.6], respetivamente. Observou-se uma prevalência de burnout em técnicos de radioterapia considerável, apesar das variações substanciais entre estudos. Conclui-se não estar ainda totalmente esclarecido quais são os fatores que levam ao burnout e a melhor forma de enfrentar este síndrome.

Após a conclusão da revisão sistemática, distribuiu-se a técnicos de radioterapia a trabalhar em Portugal, via e-mail, um questionário para avaliar os níveis de burnout. Este incluía o *Maslach Burnout Inventory – Human Service Survey*, bem como algumas questões sociodemográficas ou relacionadas com o trabalho. As médias dos valores de burnout dos 95 respondentes foram 20.60 ± 11.21 , 7.43 ± 5.34 e 35.02 ± 6.02 , para as escalas exaustão emocional, despersonalização e realização pessoal, respetivamente. Pela mesma ordem, a percentagem de técnicos de radioterapia em risco alto de burnout foi de 29%, 14.9% e 29.3% para as diferentes dimensões. Analisando as médias dos valores de burnout, verificou-se não haver relação estatisticamente significativa com o género, estado civil, sector de trabalho (público ou privado) ou anos de serviço. Os técnicos de radioterapia com 40 ou mais anos mostraram ter um risco mais elevado de burnout, embora sem significado estatístico.

Palavras-Chave: Burnout, Radioterapia, Técnicos de Radioterapia, Portugal, *Maslach Burnout Inventory*

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List of acronyms and abbreviations

EE – Emotional Exhaustion

DP - Depersonalisation

PA – Personal Accomplishment

RT – Radiation Therapists

MBI-HSS – MBI-Human Services Survey

OLBI – Oldenburg’s Burnout Inventory

UK – United Kingdom

USA – United States of America

CASP – Critical Appraisal Skills Programme

MBI – Maslach Burnout Inventory

RE – Random Effect

ART – Associação de Técnicos de Radioterapia

Chapter 1 – Introduction

1.1 Scope and motivation

Burnout, first described by Freudenberger in 1974, is an occupational disease which is common in health care workers. It arises from a prolonged response to chronic work stressors and a feeling of discrepancy between the efforts made by the worker and the achievements gained (1–3). According to Maslach *et al.*, this stress-induced disease can be characterized by three dimensions: emotional exhaustion (EE), depersonalisation (DP) and low personal accomplishment (PA) (4). EE is the first component, in which the individual feels “overextended and depleted of one’s emotional and physical resources”; the second component, DP, is represented by “a negative, callous, or excessively detached response to various of the job” whereas low PA is associated to “feelings of incompetence and a lack of achievement and productivity in work” (5).

The questionnaire most widely used to evaluate burnout in healthcare workers, and in particular also in Radiation Therapists (RTs), is the Maslach Burnout Inventory - Human Services Survey (MBI-HSS). It assesses the aforementioned three dimensions (EE, DP and PA) and has been defined as “reliable, valid and easy to administer” (4). However, whereas the MBI-HSS questionnaire does seem to be the most widely questionnaire used to evaluate burnout, alternatives do exist. One of these is the Oldenburg’s Burnout Inventory (OLBI) questionnaire, which has gained some popularity in the past years for being “more psychometrically accurate since it contains both positively and negatively worded statements” and since it has been shown to “have high levels of reliability and validity”. This questionnaire has two core dimensions: emotional exhaustion and disengagement from work (6–8). The Pro-Quality of Life questionnaire is another alternative to the MBI-HSS questionnaire, assessing compassion satisfaction and compassion fatigue, the latter including burnout and secondary traumatic stress. According to the authors of the Pro-Quality of Life questionnaire, burnout is characterized by feelings of unhappiness, disconnectedness, and insensitivity to the work environment (9).

Several studies have been conducted to evaluate burnout levels on oncology workers. The majority of these studies included doctors and nurses (10–15), with a few –

often more recent – studies including RTs as well. Some of these articles did not present results pertaining explicitly to RTs (10,16–19) but rather pooled together results of RTs results and other workers. However, some publications did present results pertaining solely to RTs (8,20–28).

Several authors used the MBI-HSS questionnaire to evaluate burnout levels in RTs. In particular, a study conducted in Australia with 112 RTs by Diggins *et al.* reports burnout scores of 17.74 ± 9.93 , 3.62 ± 3.35 and 37.17 ± 7.15 for EE, DP and PA subscales, respectively (20).

In Canada, 4 studies were performed by 3 authors. Koo *et al.*, found out that the EE, DP and PA results in 18 RTs were, respectively, 20.0 ± 11.6 , 5.4 ± 6.1 and 37.1 ± 9.2 (21). The results found by other authors were higher in the EE and DP subscales; Sale *et al.*, published one article with two studies in two separated years and found the EE, DP and PA results of 58 RTs in the first year to be 25.2 ± 12.24 , 7.5 ± 6.8 and 36.8 ± 7.28 , respectively. For the second year, 56 RTs were included and the results obtained were 27.0 ± 11.07 , 8.5 ± 6.7 and 36 ± 6.8 for the EE, DP and PA, respectively (24). Finally, Smoke *et al.* studied the burnout levels in 70 RTs and the EE, DP and PA results were, respectively, 25.2 ± 12.6 , 7.5 ± 7 and 36.8 ± 7.2 (25).

In the United Kingdom (UK), Probst *et al.* included 87 RTs to study the burnout levels of this professionals and found out the results to be 22.9 ± 10.6 , 7.1 ± 4.8 and 37.0 ± 6.5 to the EE, DP and PA subscales, respectively (22).

Demirci *et al.* studied the burnout levels in 12 RTs from Turkey and the results obtained were 18.92 ± 11.46 for the EE subscale, 5.25 ± 5.17 for the DP subscale and 36.33 ± 10.13 for the PA subscale (23).

Le Blanc *et al.* (26) only studied the EE and DP levels of 227 RTs working in the Netherlands, stating that the mean levels of burnout for this population were, respectively, 19.9 and 9.3.

The largest study was performed in the United States of America (USA) by Akroyd, *et al.* The study, which included 502 RTs, reports having obtained 27.9 ± 13.7 , 10.5 ± 9.0 and 42.1 ± 6.3 in the EE, DP and PA subscales, respectively (27).

Though cultural and workplace differences can be expected to play a role in the burnout levels of workers (1,29,30), it is possible to see that RTs from the different countries where studies were conducted using the MBI-HSS questionnaire were almost

always at medium average risk of burnout in the three subscales included in the questionnaire (2,31). It is worth noting that the highest risk of burnout in the EE and DP subscales was found in the USA (27), but it was this same sample that presented the best results in the PA subscale.

Not all authors resorted to the MBI-HSS questionnaire. In particular, Poulsen *et al.* used the OLBI questionnaire to evaluate the burnout levels in 124 RTs in Australia and Gillies *et al.* (28) used the Pro-Quality of Life questionnaire to survey 475 RTs in Canada. The results were consistent with those of the remaining literature.

To the best of our knowledge, no study assessing burnout levels in RTs working in Portugal had hitherto been conducted.

1.2 Aim

The main aim of this thesis was to assess burnout in RTs working in Portugal. For that purpose, we conducted a systematic review and resorted to a survey; the study approval to this thesis can be seen in Appendix 1.

The systematic review (and meta-analysis) of the literature is reported in Chapter 2. The purpose of this review was to retrieve and analyse the studies assessing burnout levels of RTs and to uncover what factors can have an impact on the burnout scores.

In Chapter 3 we report a study that we conducted to assess burnout levels of RTs working in Portugal. For this purpose, a survey was sent out to these workers, including the MBI-HSS questionnaire along with social demographic and work related questions. A descriptive analysis of the results that were obtained, together with an analysis of the possible associations between burnout and social-demographic and work factors, is presented in the chapter.

1.3 Thesis/Dissertation layout

The present thesis is divided in four chapters. The first chapter presents a brief analysis of the literature and argues why it is relevant to study burnout of RTs working in Portugal. In addition, the aims of the project will be defined.

The second chapter is devoted to presenting a systematic review that was performed to retrieve studies evaluating burnout in radiation therapists working in

different countries. Only studies using validated burnout measures and presenting new results were included in the review.

Subsequently, Chapter 3 presents a study conducted by the authors, aiming to evaluate the burnout scores of RTs working in Portugal, for which a survey was distributed via-email.

Chapter four includes the final considerations and conclusions.

Chapter 2 – Systematic Review

Burnout may be typified in three dimensions: emotional exhaustion (EE), depersonalization (DP) and low personal accomplishment (PA). The main aim of this chapter is to evaluate the burnout levels experienced by radiation therapists (RTs). For this purpose, PubMed, Lilacs and Google Scholar were searched for articles reporting burnout levels in RTs. Only studies explicitly assessing burnout in this population and using a validated instrument were retrieved. A critical appraisal was performed following Critical Appraisal Skills Programme tools (CASP). Meta-analyses were undertaken, based on articles that used the Maslach Burnout Inventory (MBI) to assess burnout, to determine 95% confidence intervals for the overall prevalence of radiation therapists (RTs) with high burnout risk in three dimensions: emotional exhaustion, depersonalization or low personal accomplishment. Additionally, meta-analyses were also performed to determine the overall mean reported for each of these three dimensions.

2.1 Introduction

Changes brought by economic, technological, legal and political forces have had a strong impact in the work place (1,29). In particular, to increase effectiveness, cutbacks and a reduction of the workforce were a measure prescribed to many industries, leading to an increase of the workload of the remaining workers, which in turn incremented potential stressful circumstances (29) and led to a “progressive loss of idealism, energy and purpose” (30).

Burnout has been seen to be associated to some of the most significant features of the work place environment: workload, control, reward, community, fairness and values (32). Individual factors such as demographic, personal or job attitudes are argued not to have a clear correlation with burnout, as “burnout is more of a social phenomenon than an individual one” (33).

High burnout levels hinder job performance and undermine the health of the individual (33). Absenteeism, intention to leave, turnover, lower productivity or morale, decreased job satisfaction and reduced commitment to the job or organization are some of the consequences of burnout, that in turn diminish job performance (2,32,34).

Likewise, symptoms such as headaches, anxiety, mood swings, depression, insomnia, muscle tension, hypertension, gastrointestinal disorders or flu episodes, or increase substance use are associated to burnout and affect the health of the individual (2,12,32).

Burnout, first described in 1974 by Freudenberger (35), was subsequently characterised by Maslach as a psychological syndrome occurring in workers that contact with people on a daily basis which comprised three dimensions: emotional exhaustion (EE), depersonalisation (DP) and reduced personal accomplishment (PA) (2). EE is the first and most widely reported sign of burnout, as there is a depletion of energy and emotional resources along with feelings of emotional overload. DP appears after EE, as an attempt to create distance between the person and the patients, as the person feels pessimist and cynical. The lack of PA arises from the scarcity of relevant resources and leads the worker to a negative self-evaluation and to the rise of doubts about his capacity to perform his work, demotivation and intentions to leave the work (33,36,37).

The Maslach Burnout Inventory (MBI) is the most widely used questionnaire to assess burnout, as it is “reliable, valid and easy to administer” (5). Its original version, also called MBI-Human Services Survey (MBI-HSS), was designed to be applied to professionals in the human services, including, for example, nurses or physicians (32). More recent versions of the MBI have been developed for other populations, but MBI-HSS remains as the most widely used version of the MBI. There are alternatives to MBI such as Oldenburg’s Burnout Inventory (OLBI), which is a questionnaire that can be argued to be “more psychometrically accurate since it contains both positively and negatively worded statements”. It has two core dimensions: exhaustion and disengagement from work (6,7).

The MBI questionnaire entails the three dimensions of burnout identified by Maslach, notably EE, DP and PA. Out of the 22 items of the MBI-HSS questionnaire, 9 are related to EE, 5 to DP and 8 to PA. Scores in the different dimensions can be interpreted separately, as can be read in Table 1: high levels in the EE and DP subscales are associated to high burnout whilst it is low levels in PA subscale that are related to high burnout (2,31). Burnout can be said to be present in individuals for which there is severe involvement of one or more dimensions of MBI, i.e., individuals displaying high levels of EE, high levels of DP or low levels of PA(38).

Table 1 - Burnout Scores interpretation

MBI subscale	Burnout Risk		
	Low	Medium	High
EE	≤16	17-26	≥27
DP	≤6	7-12	≥13
PA	≥39	38-32	≤31

It has been reported that EE is a precursor to the development of DP and there is a strong correlation between this two subscales (32,34). The relationship between PA and the first two subscales is not as linear, as it appears that reduced PA develops in parallel to EE and DP, rather than sequentially (34).

Though the MBI questionnaire has been applied to health workers in different countries, a comparison between the results is difficult because of the cultural differences that can dictate different philosophical backgrounds and the manner how workers face issues like death and suffering (12). As Maslach noted, “Europeans show lower average scores than do North Americans and other researchers have found cultural differences in multi-dimensional data sets” (32). In particular for Radiation Therapists (RTs), several studies have been reported. These professionals work in a difficult emotional area, coupling complex technology and usage of high therapeutic doses with the severity of the diseases treated, which altogether make the work environment of RTs a highly stressful one (39). In this chapter we seek to analyse burnout levels in RTs.

2.2 Materials and Methods

Articles assessing burnout in RTs, written in English, Portuguese or Spanish, were searched in PubMed, LILACS and Google Scholar up to September 2016. The following search terms were used: burnout, radiotherapy, oncology and radiation oncology, complemented in MedLine by the MeSH terms “burnout professional” and radiotherapy.

After duplicates were removed, a screening process was conducted wherein articles matching the following eligibility criteria were sought; to be included in the study, articles had to (1) assess burnout, with a validated instrument, in a population including RTs; (2) explicitly report results for RTs; and (3) report new results. The screening process was divided in two stages. At first, titles and abstracts were screened to exclude

publications failing to meet eligibility criteria. A full text analysis ensued, adopting the same criteria. The articles which were deemed eligible after the two-stage screening procedure were included in the review. All decisions throughout the process were reached by consensus and kept for future record.

After selection of eligible articles based on the aforementioned eligibility criteria, an extraction sheet was filled in with information on the aim of the each article, its participants, the instruments used to evaluate burnout levels, the main results and conclusions. The data extracted from the articles was complemented, in some instances, by information provided by authors who were contacted for that purpose.

The studies included in this study were subjected to critical appraisal, performed by both authors, based on Critical Appraisal Skills Programme tools, as applicable (CASP, Oxford, UK; <http://www.casp-uk.net/casp-tools-checklists>; 2017). The intent was to exclude articles for which methodological flaws were found.

Finally, separate meta-analyses were performed for each of the dimensions of the MBI questionnaire. The goal was to derive 95% confidence interval for the proportions of RTs with high emotional exhaustion, RTs with high depersonalisation and RTs with low personal accomplishment. Additionally, 95% confidence intervals were sought for the means of EE, DP and PA. The heterogeneity of the data was analysed using I^2 statistic and Cohen's Q test. For each dimension, a random effect model was then used to estimate a global effect measure. R version 3.3.2 was used to perform the meta-analyses. The level of significance adopted was $\alpha=0.05$.

2.3 Results

2.3.1 Search Outcome

In total, 430 records were retrieved from three databases, see Figure 1. After duplicates were removed, a total of 414 articles were left to assess on basis of their titles and abstracts to check whether they met the eligibility criteria. A total of 93 records were excluded for not assessing burnout with a validated instrument in a population including RTs, 228 for not explicitly reporting results for RTs and 51 for not reporting new results. The 42 remaining publications were taken on to the second screening stage consisting of a full text analysis. This resulted in the exclusion of 8 articles for not assessing burnout

with a validated instrument in a population including RTs, 15 for not explicitly reporting results for RTs and 8 for not reporting new results. Finally, 10 articles, including 11 studies (one article reported two separate burnout assessments), all of which written in English, were deemed eligible for the present study. A critical appraisal of the 11 studies was performed, with no relevant methodological flaws being found.

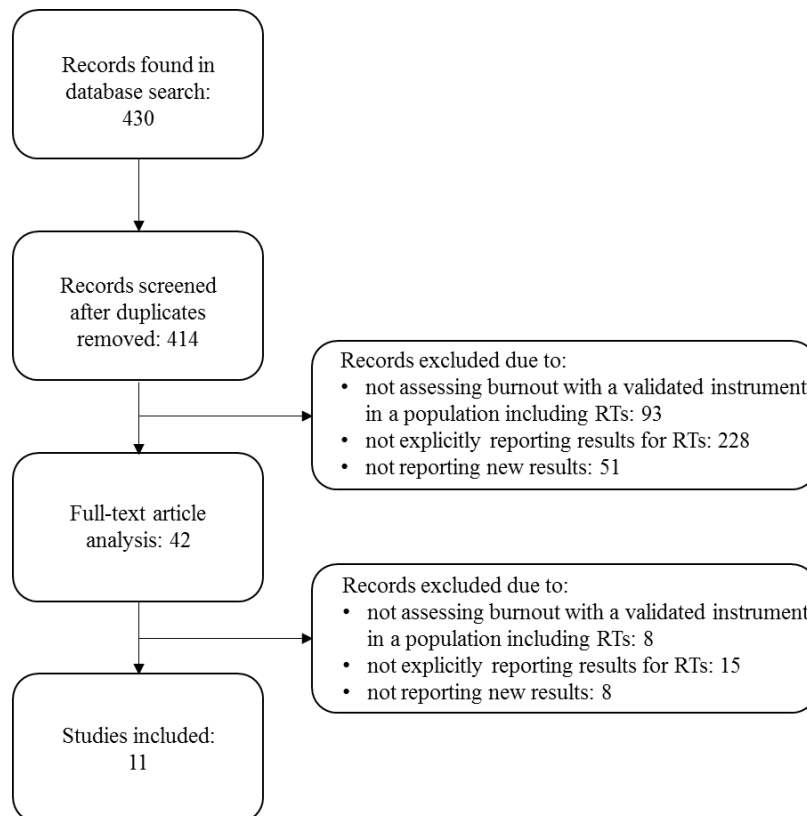


Figure 1- Flow chart of the screening process

2.3.2 Burnout scores

Out of the ten articles included in the study, eight (20–27), reporting nine studies, resorted to the MBI questionnaire, see Table 2. The percentage of RTs with high risk of burnout in the EE subscale were reported to range from 19.5% to 55%. In the DP subscale the corresponding proportions were seen to range from 1.8% to 45%. Finally, for PA, the proportions ranged from 16.8% to 58.3%.

Table 2 - Articles reporting burnout results with MBI questionnaire in RTs

Author, Year	Country	Type of Survey	n	Only RTs?	Response Rate (%)	EE	DP	PA
Diggens J, 2014 (20)	Australia	Electronic Survey	112	Yes	50.2%	17.74 \square 9.93 19.5%	3.62 \square 3.35 1.8%	37.17 \square 7.15 16.8%
Koo K, 2013 (21)	Canada	Electronic Survey	18	No	20%	20.0 \pm 11.6 25%	5.4 \pm 6.1 33.3%	37.1 \pm 9.2 58.3%
Probst H, 2012 (22)	UK	Handed-filled Survey	87	Yes	28%	22.9 \square 10.6	7.1 \square 4.8	37.0 \square 6.5
Demirci S, 2009 (23)	Turkey	Handed-filled Survey	12	No		18.92 \pm 11.46	5.25 \pm 5.17	36.33 \pm 10.13
Sale J, 2007 (Year 1 study) (24)	Canada	Handed-filled Survey	58	No	8.2%	25.2 \pm 12.24 43%	7.5 \pm 6.8 17%	36.8 \pm 7.28 24%
Sale J, 2007 (Year 2 study) (24)	Canada	Handed-filled Survey	56	No	17.2%	27.0 \pm 11.07 55%	8.5 \pm 6.7 30%	36 \pm 6.8 29%
Smoke M, 2006 (25)	Canada	Handed-filled Survey	70	Yes	93%	25.2 \pm 12.6 43%	7.5 \pm 7 17%	36.8 \pm 7.2 24%
Le Blanc 2003 (26)	Netherlands	Handed-filled Survey	227	No		19.9	9.3	-
Akroyd D, 2002 (27)	USA	Electronic Survey	502	Yes	50.2%	27.9 \pm 13.7 53%	10.5 \pm 9.0 45%	42.1 \pm 6.3

In the table, n=number of RTs included in the study; Only RTs?="Did the study include only RTs?"; EE=emotional exhaustion; DP=depersonalisation and PA=personal accomplishment.

The results pertaining to EE, DP and PA are presented as mean \pm standard deviation and percentage of individuals with high risk of burnout.

Only two authors (8,28) opted not to use the MBI questionnaire and resorted to the Pro-Quality of Life questionnaire and the OLBI questionnaire instead, respectively, see Table 3.

Table 3 - Articles reporting burnout results with other questionnaires in radiation therapists

Author, Year	Country	Type of Survey	n	Only RTs?	Questionnaire	Results
Gillies C, 2014 (28)	Canada	Electronic Survey	475	Yes	ProQOL-Revision V	23.5 ± 0.5
Poulsen MG, 2011 (8)	Australia	Handed-filled Survey	124	No	OLBI	38.19 ± 5.49

In the table, n=number of RTs included in the study; Only RTs?="Did the study include only RTs?". The results are presented as mean ± standard deviation.

Meta-analyses of the results reported by authors that used the MBI questionnaire were performed applying random effect (RE) models due to the amounts of heterogeneity found. Out of the two studies reported in Sale *et al.* (24), only the most recent results were included. Five studies report a total of 353 RTs (out of 758) to have high levels of EE. The 95% confidence interval for RTs with high EE scores was found to be [24.8; 54.6], Q-value=42.41, df=4; p-value<0.001; I²=91%, see Figure 2 A. The same five studies report a total of 263 RTs (out of 758) to have high levels of DP. The 95% confidence interval for RTs with high DP scores was found to be [10.1; 40.2], Q-value=46.81, df=4; p-value<0.001; I²=92%, see Figure 2 B. Four of the aforementioned five studies report a total of 62 RTs (out of 256) with low levels of PA. The 95% confidence interval for RTs with low PA scores was found to be [17.4; 41.6], Q-value=11.94, df=3; p-value=0.008; I²=75%, see Figure 2 C.

Additionally, meta-analyses were performed, this time based on 7 studies with 857 RTs, to determine 95% confidence interval for the means of EE, DP and PA, again applying RE models due to high amounts of heterogeneity found. The 95% confidence interval found for EE was found to be [20.0; 26.2], Q-value=93.39, df=6; p-value<0.001; I²=91%, see Figure 3 A. For DP, the corresponding 95% confidence interval was seen to be [5.1; 8.8], Q-value=190.95, df=6; p-value<0.001; I²=94%, see Figure 3 B. Finally, for PA, a 95% confidence interval of [35.9, 39.6] was found, Q-value=127.63, df=6; p-value<0.001; I²=90%, see Figure 3 C.

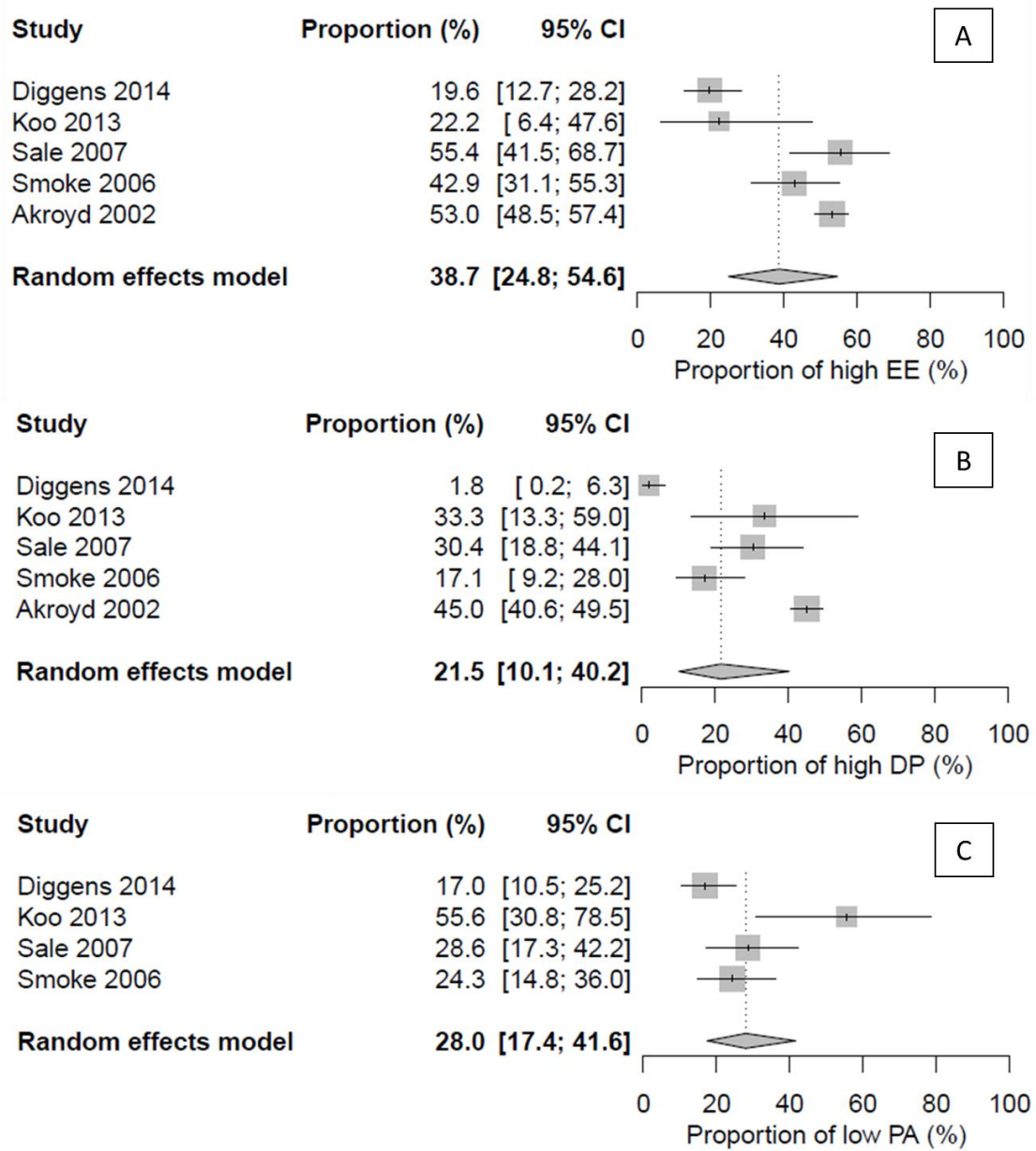


Figure 2- Forest plots of the proportion of RTs with high EE (A), high DP (B) and low PA (C), with 95% confidence intervals

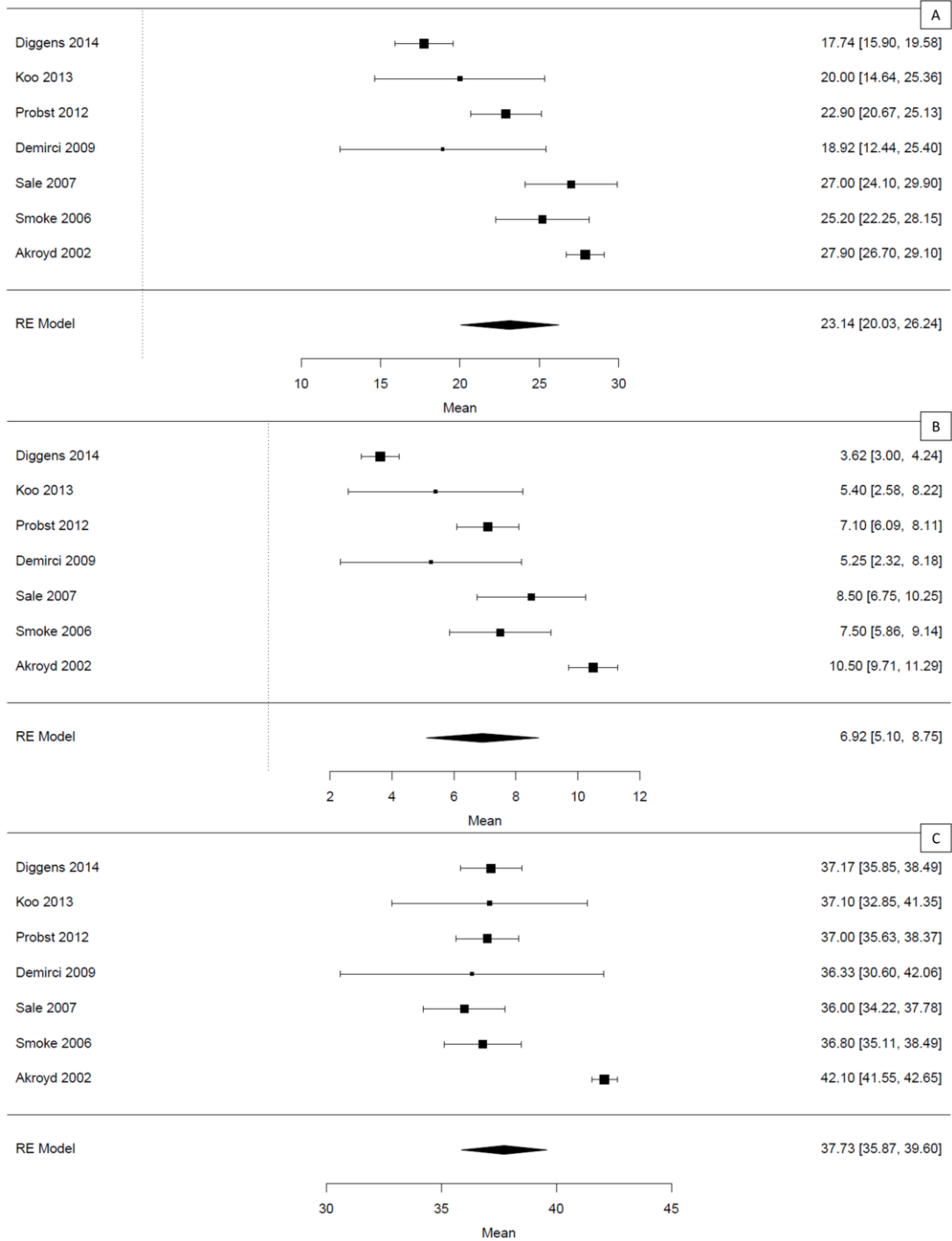


Figure 3 - Forest plots of the means of EE (A), DP (B) and PA (C) of RTs, with 95% confidence intervals

2.4 Discussion

Burnout is a concern among cancer care workers, see e.g. (12). Though there are studies assessing burnout levels in RTs (8,10,16–28,40), to the best of our knowledge no systematic review with meta-analysis has hitherto been conducted.

A total of eleven studies were found which assessed burnout in RTs, with nine of the studies resorting to the MBI questionnaire. The scarcity of articles resorting to other questionnaires makes it more difficult to interpret the results of the two studies which did not use MBI. Dramatically different response rates were reported in the different studies, ranging from 16% to 93%. Overall, high levels of burnout were observed in RTs, but the heterogeneity across the studies is noteworthy. As the results were obtained in different countries, cultural and workplace differences may weigh on them. In particular, different healthcare systems, incomes, stressors and cultures may play a role, dictating different personalities and ways to cope with death or suffering. As can be seen in Table 2, RTs from Australia (20) present the lowest mean levels of EE and DP, followed by RTs from Turkey (23). In one study from Canada (21), RTs' mean levels in the DP subscale place them at low burnout risk, but the corresponding mean levels in the EE place them at medium burnout risk in that subscale. Two other studies were conducted in the same country: both in Sale *et al.* (24) and Smoke *et al.* (25), the mean EE and DP levels reported place RTs at medium risk of developing burnout in the two subscales. According to Probst *et al.* (22), RTs in the UK are at medium risk of developing burnout in the EE and DP subscales. In turn, RTs from the USA (27) presented alarming mean levels for both the EE and DP subscales, being at high risk of developing burnout. When comparing the PA subscale results, it is the RTs from USA (27) that present the better results, as they are at low risk of developing burnout in this subscales. All the other countries present medium risk of developing burnout.

Age, marital status, number of children and number of years of experience in the job were found to be associated to burnout scores in Demirci (23), but this was assessed in a population including RTs and not in RTs alone. In Sale, *et al.* (24) age and gender were argued to seem to be related to burnout scores in RTs, but no statistically significant results were reached. Interestingly, in the seminal work of Maslach *et al.* (34) the authors suggest the existence of correlations between social-demographic factors and burnout in the general population, but further mention that this relationship is not as great as that with situation factors like job demands, suggesting that “burnout is more of a social phenomenon than an individual one”. Job demands like workload, time pressure or role conflicts and absence of job resources were identified by this author as situational factors that could lead to the development of burnout. Focusing on RTs alone, Diggins *et al.* (20)

and Le Blanc *et al.* (26) found workload, time pressure, machines constraints and ineffective or inefficient work to contribute to job stress or job dissatisfaction, which may play a role in burnout levels.

2.5 Conclusion

Studies assessing burnout in RTs are scarce but reveal that RTs are at medium to high risks of developing burnout. Results vary a great deal between studies and countries, with cultural and social differences seemingly playing a major role. The factors contributing the most to burnout in RTs remain to be clarified.

2.6 Acknowledgments

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Chapter 3 – Study

3.1 Introduction

Burnout has been an object of study for different health occupations, notably for physicians (41), medical students (42) and other health care professionals (43). As a construct, burnout must be distinguished from occupational stress, which may theoretically lead to burnout (22). In particular for oncology care, a number of studies have assessed burnout on doctors or nurses, see for example (10–13) and (13–15), respectively. However, few articles have included an evaluation of burnout in radiation therapists (RTs), a workforce that works on a daily basis with cancer patients, high therapeutic doses, heavy workloads and inappropriate support (39).

Some articles do include RTs in their samples (10,16–18) but present their burnout scores pooled with those of other occupations, while other publications focus solely on RTs or explicitly report burnout scores for this population (19–28).

The instrument most used to assess burnout is the Maslach Burnout Inventory (MBI) questionnaire, which includes three subscales: emotional exhaustion (EE), depersonalisation (DP) and personal accomplishment (PA) (32,34). According to the authors of the original version of the MBI questionnaire, the MBI - Human Services Survey (MBI-HSS), the three dimensions of the questionnaire measure “feelings of being emotionally overextended and exhausted by one's work”, “unfeeling and impersonal response toward [patients]” and “feelings of competence and successful achievement in one's work”, respectively (2).

Few authors have used other questionnaires - notably the Oldenburg Burnout Inventory (8) and the Pro-Quality of Life questionnaire (28) - to assess burnout in RTs, while most have resorted to MBI-HSS (20–27). Focusing solely on the latter, the majority of studies surveyed RTs located in North America (21,24,25,27) or in Europe (22,23,44), with a single study from Australia (20). Concerning the results that were reported, regardless of cultural differences, RTs were consistently seen to be at medium average risk of burnout in the three subscales of the MBI questionnaire (20,22,25,26), with exception of Koo, *et al.* (21) and Demirci, *et al.* (23), that observed low levels of burnout in the DP subscale. In addition, Sale, *et al.* (24) reported high levels of burnout in the DP

subscale while Akroyd *et al.* (27) found that RTs from his USA sample were at high risk of burnout in the EE and DP subscales. Interestingly, this study reports the lowest burnout risk in the PA subscale.

No studies aiming at evaluating the burnout levels of RTs working in Portugal have previously been reported. We aim at assessing burnout in this population using the MBI-HSS questionnaire.

3.2 Material and Methods

3.2.1 Study design and sample

Radiotherapists residing in Portugal were surveyed in February 2017. The web-based survey, written in Portuguese, had an estimated time of response of 5 minutes and comprised socio-demographic questions (sex, age, marital status, years of service as an RT and whether the participant worked in the public or in the private sector) and the MBI-HSS; the permission to use the latter is presented in Appendix 2 and a few questions from MBI-HSS in Appendix 3. The Portuguese association of RTs (ART – Associação de Técnicos de Radioterapia) was contacted to distribute the survey among their associates. Participation was voluntary and the confidentiality of the participants was guaranteed at all stages of the process. Solely the authors of the study had access to the data. No compensation or other reward was provided for participation. The study was reviewed and approved by the Ethics Commission of the Faculty of Medicine of the University of Coimbra.

3.2.2 Burnout questionnaire

In addition to questions to gather socio-demographic data, participants were asked to respond to the MBI-HSS questionnaire. This questionnaire is composed by 22 items and it is divided in 3 subscales: EE (comprising by 9 items), DP (comprising 5 items) and PA (comprising 8 items). A 7-point Likert scale is used for each item and scores within individual burnout domains can either be used as continuous variables or categorized into indicators of low, medium or high risk of burnout using established cut-offs, see Table 4 (31).

Table 4 - Burnout Scores

MBI Subscale	Burnout Risk		
	Low	Medium	High
EE	≤16	17-26	≥27
DP	≤6	7-12	≥13
PA	≥39	38-32	≤31

It is worthwhile noting that while high levels in the EE and DP subscales are associated to high burnout, high levels in PA subscale are associated to low burnout.

3.2.3 Statistical Analysis

Categorical data are described by absolute and relative frequencies whereas for quantitative data the means and standard deviations were used instead. The median, 25th percentile, 75th percentile, minimum and maximum of the MBI scores in the three dimensions are also presented. The normality of quantitative variables was checked with Shapiro Wilk tests. Associations between pairs of categorical data and correlations between pairs of quantitative variables were assessed using Fisher tests and by computing Spearman's correlation coefficients, respectively. Whenever normality assumptions held, t-Student tests and ANOVA were used to verify whether statistically significant differences arose between two groups or more groups, respectively. When the assumptions did not hold, Mann-Whitney and Kruskal-Wallis tests were used instead. The significance level adopted was $\alpha=0.05$. The statistical analysis was performed on IBM® SPSS® Statistics 24.

3.3 Results

3.3.1 Participation and sample

A total of 103 people responded to the survey. Eight of these were not employed as RTs at the time. The results below pertain to the remaining 95 (92.2%) participants, 81 of which were female (85.3%) and 14 (14.7%) male, see Table 5. Two of the respondents did not provide information on their age and out of the other 93 that did, the average age

was observed to be 30.2 ± 5.9 . When asked about their civil status, 53 (55.8%) of the RTs stated they were single, 41 (43.2%) married and one RT divorced (1.1%). Fewer participants – 43 (45.3%) – were working in the public sector than in private RT departments – 52 (54.7%). The mean number of years working as an RT was seen to be 7.06 ± 5.59 .

Table 5 - Demographical characterisation

	Subgroup	n (%)
Gender	Female	81 (85.3%)
	Male	14 (14.7%)
Age (years)	[20-29]	52 (55.9%)
	[30-39]	36 (38.7%)
	[40-49]	3 (3.2%)
	50+	2 (2.2%)
Civil Status	Single	53 (55.8%)
	Married	41 (43.2%)
	Divorced	1 (1.1%)
Sector	Public	43 (45.3%)
	Private	52 (54.7%)
Years in RT service	[0-4]	38 (40%)
	[5-9]	28 (29.5%)
	[10-14]	21 (22.1%)
	[15-19]	5 (5.3%)
	20+	3 (3.2%)

Data are presented as number (percentage).

3.3.2 Burnout results

The results of the MBI questionnaire are shown in Table 6. Not all participants replied to every item of the questionnaire; the number of responders ranged from 92 for PA to 94 for DP. For EE the mean was seen to be 20.60 ± 11.21 ; for DP it was 7.43 ± 5.34 and for PA the mean was 35.02 ± 6.02 .

Table 6 – Burnout scores for each of the three dimensions of the MBI-HSS questionnaire.

MBI Subscale*	M ± SD [min-max]	Med (P₂₅; P₇₅)
EE (n=93)	20.60±11.21 [1-50]	20 (11; 28)
DP (n=94)	7.43±5.34 [0-28]	7 (3; 11)
PA (n=92)	35.02±6.02 [20-48]	35 (31; 40)

*For each MBI subscale, data are presented as mean ± standard deviation [minimum-maximum] and as median (25th percentile; 75th percentile)

As aforementioned, for each subscale, the burnout risk can be categorised as low, medium or high risk. Table 7 displays the percentage of RTs at different levels of risk of developing burnout in each subscale. For the EE subscale, 36 (38.7%) of the RTs were seen to be at low risk of developing burnout, 30 (32.3%) at medium risk and 27 (29.0%) were at high risk of developing burnout. Better results were found for the DP subscale, as only 14 (14.9%) of the RTs were at high risk of developing burnout, with 46 (48.9%) and 34 (36.2%) at low and medium risk of developing burnout, respectively. For PA, 27 (29.3%) of the RTs were seen to be at high risk, with 35 (38.0%) and 30 (32.6%) being at medium and low risk, respectively.

Table 7 - Prevalence of low, medium and high risk of burnout for each of the three dimensions of the MBI-HSS questionnaire.

	Burnout Risk		
	Low	Medium	High
EE (n=93)	36 (38.7%)	30 (32.3%)	27 (29.0%)
DP (n=94)	46 (48.9%)	34 (36.2%)	14 (14.9%)
PA* (n=92)	30 (32.6%)	35 (38.0%)	27 (29.3%)

Data are presented as number (percentage).

3.3.3 Relationship between burnout components, demographics and work history

When the average EE, DP and PA scores are considered, RTs were seen to nearly always be at medium risk of developing burnout, independently of gender, age, civil status, working in the public or private sector and years of service, see Table 8. There were few exceptions where the mean MBI scores were not indicative of medium risk of

burnout. Notably, for RTs aged between 20 and 29 years old and RTs working in the area for up to 4 years were at low risk of developing burnout in the DP subscale; RTs with 40 years or more were at high risk of developing burnout in the EE and PA subscale.

Females shown slightly lower levels of burnout in the EE and PA subscales than males, although no statistically significance was found in either subscales ($p=0.160$ and $p=0.106$, respectively). Better results were also found for females in the PA subscale ($p=0.464$).

When analysing whether the age groups of the RTs were associated with the burnout scores, it was found that the median burnout scores to EE, DP and PA were similar, independently of the group ($p=0.199$, $p=0.500$ and $p=0.192$, respectively), except for RTs with 40 years or more, who were at high risk of developing burnout in the EE and PA subscales. As for RTs aged between 20 and 29, they were at low risk of developing burnout in the EE subscale. Correlations between age and the values obtained in the three dimensions were further assessed. A statistically significant weak positive correlation was found between age and EE ($r_s=0.219$, $p=0.037$), but no significant correlations were attained between age and DP ($r_s=0.030$, $p=0.778$) or age and PA ($r_s=-0.044$, $p=0.682$).

Regarding the marital status of the participants, the median burnout score for each subscale was similar between RTs who were single or divorced and RTs who were married ($p=0.716$, $p=0.766$ and $p=0.424$, respectively for the EE, DP and PA subscales). People working in the public sector had EE and DP values higher than the ones observed in RTs working in the private sector; however this difference was not statistically significant ($p=0.147$ and $p=0.271$, respectively). In the PA subscale, the results showed that RTs working in the public sector were at slightly higher level of developing burnout ($p=0.812$).

No statistically significant associations were found between years in service as an RT and burnout levels ($p=0.092$, $p=0.641$ and $p=0.634$, respectively for the EE, DP and PA subscales). However, RTs with less years of services displayed better levels of burnout in the three subscale.

More detailed information about the numbers of individuals at each level of risk of developing burnout can be found on Table 9. Males were seen to be at a higher risk of burnout more often than females in the three subscales, with no statistical significance

Table 8 – Burnout scores for different subgroups.

		EE	<i>p</i> -value	DP	<i>p</i> -value	PA	<i>p</i> -value
Gender	Female	19.8±10.8	0.160	7.0±5.0	0.106	35.2±6.0	0.464
	Male	25.3±12.9		10.0±6.6		33.9±6.2	
Age groups	[20-29]	19.0±10.8	0.199	6.6±4.5	0.500	35.8±5.7	0.192
	[30-39]	20.9±10.8		8.2±6.0		34.7±6.4	
	40+	29.2±15.2		8.4±7.4		30.8±5.3	
Civil Status	Single/divorced	21.0±11.3	0.716	7.6±4.6	0.766	34.6±5.6	0.424
	Married	20.1±11.2		7.1±6.2		35.6±6.6	
Sector	Public	22.3±11.8	0.147	7.9±5.0	0.271	34.9±6.0	0.812
	Private	19.2±10.6		7.0±5.6		35.2±6.1	
Years of service as an RT	[0-4]	17.2±10.8	0.092	6.8±4.4	0.641	35.6±5.9	0.634
	[5-9]	22.5±11.5		7.4±6.7		34.9±6.1	
	[10-14]	21.7±9.6		8.3±4.6		35.2±6.8	
	15+	26.4±13.5		8.0±6.6		32.5±4.6	

* For each of the three dimensions (EE, DP and PA) and for each category of each variable, data are presented as mean±standard deviation. Results presented in cells with grey background correspond to lower risk of burnout (normal font) or higher risk of burnout (boldface).

being found ($p=0.503$, $p=0.139$ and $p=0.314$, respectively for the EE, DP and PA subscales). Civil status appeared not to be significantly associated to burnout.

In what concerns the age of the RT workers, a higher percentage of RTs at high risk of burnout was found in workers 40 years or older, again with no statistical significance ($p=0.420$, $p=0.444$ and $p=0.278$, respectively). Likewise, RTs who had been working for at least 15 years were also seen to present high risk of burnout more often ($p=0.404$, $p=0.209$ and $p=0.559$, respectively).

A higher percentage of RTs working in public hospitals was found to be at high risk of burnout in the three subscales, though once more no statistically significant associations were found ($p=0.230$, $p=0.420$ and $p=0.520$, respectively).

3.4 Discussion

Burnout syndrome has adverse consequences for individuals, causing a variety of cognitive, affective, physical, behavioural and motivational problems, (45). This syndrome can decrease the quality of life of workers and often induces the increase of anxiety, depression, headaches, mood swings, hypertension and cardiovascular or gastrointestinal disorders. Job performance, dissatisfaction, absenteeism, intention to leave the job, low levels of commitment to the organisation, lower productivity or morale and turnover are other facets that have been frequently associated to burnout. (2,12,32,34).

RTs practice a caring profession known to often have high levels of contact with patients, which may potentially lead to burnout (22). In our study, burnout of the RT population working in Portugal was seen to be 20.60 ± 11.21 , 7.43 ± 5.34 and 35.02 ± 6.02 for the EE, DP and PA subscales, respectively, all translating a medium average risk of burnout. In this sense, the results were similar to those reported in the literature.

However, for PA, the average score observed was worse than those reported by every other study assessing burnout in RTs. In the Portuguese RTs, PA was 35.02 ± 6.02 , while for other countries the average PA ranged between $36.0 (\pm 6.8)$ and $42.1 (\pm 6.3)$, see (24) and (27), respectively.

The percentage of RTs at high risk of burnout in Portugal was seen to be 29.0%, 14.9% and 29.3% for the EE, DP and PA subscales, respectively. Focusing on EE, for

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Table 9 - For each of the three dimensions (EE, DP and PA) and for each category of each variable, data is presented as percentage of people in low risk of burnout : percentage of people in medium risk of burnout : percentage of people in high risk of burnout.

		EE	p-value	DP	p-value	PA	p-value
Gender	Female (n=81)	41% : 33% : 27%	0.503	53% : 35% : 13%	0.139	32% : 41% : 27%	0.314
	Male (n=14)	29% : 29% : 43%		29% : 43% : 29%		36% : 21% : 46%	
Age groups	[20-29] (n=52)	46% : 32% : 22%	0.420	51% : 40% : 10%	0.444	41% : 35% : 25%	0.278
	[30-39] (n=36)	33% : 36% : 31%		47% : 36% : 17%		28% : 52% : 31%	
	40+ (n=5)	20% : 20% : 60%		40% : 20% : 40%		0% : 40% : 60%	
Civil Status	Single or divorced (n=54)	37% : 35% : 29%	0.837	45% : 42% : 13%	0.477	31% : 37% : 31%	0.898
	Married (n=41)	42% : 29% : 29%		54% : 29% : 17%		34% : 39% : 27%	
Sector	Public (n=43)	33% : 29% : 38%	0.230	42% : 40% : 19%	0.420	33% : 33% : 35%	0.520
	Private (n=52)	43% : 35% : 22%		55% : 33% : 12%		33% : 42% : 25%	
Years of service as an RT	[0-4] (n=38)	53% : 28% : 19%	0.404	49% : 43% : 8%	0.209	39% : 39% : 22%	0.559
	[5-9] (n=28)	32% : 36% : 32%		57% : 25% : 18%		37% : 30% : 33%	
	[10-14] (n=21)	29% : 38% : 33%		38% : 48% : 14%		24% : 48% : 29%	
	15+ (n=8)	25% : 25% : 50%		50% : 13% : 38%		33% : 38% : 50%	

which the literature reports high risk of burnout to range between 19.5% and 55%, only two authors observed lower burnout percentages (20,21). The proportion of RTs at high risk of burnout in the DP dimension ranges from 1.8% to 45% in the literature, with only Diggins *et al.* (20) reporting a lower proportion than what was observed for the Portuguese sample. For PA, the literature reports high risk of burnout percentages from 16.8% up to 58.3%, except Koo K *et al.* (21) that exceeded, quite expressively, what was seen for the Portuguese RTs.

Several authors studied potential associations between burnout and individual or workplace factors, not specifically for RTs. In particular, younger workers are seen to normally present higher levels of burnout than those 30 years or older; gender has not been shown to be strongly associated to burnout; unmarried workers seem to have higher burnout levels than those who are married or divorced; burnout seems to be higher in workers with a higher education level, (34). As “burnout is more of a social phenomenon than an individual one”; factors such as workload, control, reward, community, fairness and values may be more relevant (32,34). For RTs, relationships were found to hold between burnout and age, marital status and number of years of experience (23) or between burnout, age and gender (24). In the current study, an analysis of the relationship between social-demographic and work history of the RTs and the three burnout subscales was performed. Older RTs (≥ 40 years) were seen to be at higher risk of burnout in all subscales, though no statistical significance was reached.

Response bias is a potential limitation of this study, as it is unknown whether professional and personal distress weighed on the response rate. Furthermore, it should be noted that to avoid discouraging potential responders from filling out the survey that was conducted for this study, only a small number of questions were included in it besides the MBI-HSS questionnaire. Though this is not a large study, the sample size is quite considerable given the number of RTs in Portugal. However, this attempt to maximise the number of responders came at the cost of exploring possible causes or correlates of burnout in Portuguese RTs. Adding questions on job satisfaction, job characteristics or even additionally resorting to quality of life or stress surveys could have been informative. In conclusion, our results indicate a prevalence of burnout in RTs in Portugal which is similar to what is reported in the literature, with RTs aged 40 years or more presenting greater risk of burnout.

3.5 Conclusion

In our study we observed that RTs in Portugal are at medium average risk of burnout in the EE, DP and PA subscales, evaluated by the MBI-HSS questionnaire, with 29%, 14.9% and 29.3% being at high risk of burnout, respectively. These results are similar to what had been reported in the literature for other countries.

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Chapter 4 - Conclusion

Oncology workers work in a sensitive area where there often is great pressure to have a good job performance, which can lead to burnout. In particular for Radiation Therapists (RTs), this can worsen their individual performance at work, having a direct impact on their patients, fellow workers and the organisations for which they are employed.

Few studies have been conducted assessing burnout levels in RTs. The systematic review we conducted retrieved only 10 such studies, the majority using the MBI-HSS questionnaire and finding, for the three subscales of the latter, average burnout scores corresponding to medium burnout risk.

The results of this study have shown that the RT population working in Portugal is at medium average risk of developing burnout in the three subscales analysed by the MBI-HSS questionnaire. The mean emotional exhaustion (EE), depersonalisation (DP) and personal accomplishment (PA) were seen to be 20.60 (\pm 11.21), 7.43 (\pm 5.34) and 35.02 (\pm 6.02), respectively. The latter are consistent to the existing literature. However, for the PA subscale, the results obtained were the lowest reported so far.

In terms of the proportion of RTs at high risk of burnout, this was 29.0% for the EE subscale, 14.9% for the DP subscale and 29.3% for the PA subscale.

No statistically significant associations were found between burnout and the social-demographic and work factors, although the burnout scores were higher in males, RTs with 40 or more years (who were at high risk of burnout in the EE and PA subscales), RTs working in the public sector and RTs working as such for at least 15 years.

The results obtained in this study offer a characterisation of the burnout status of RTs working in Portugal. However, it does not uncover the reasons or correlates of burnout. Understanding what leads to the emergence of this syndrome may allow tackling it before it reaches serious dimensions.

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Appendices

Appendix 1 - Study Approval



FACULDADE DE MEDICINA
UNIVERSIDADE DE COIMBRA

COMISSÃO DE ÉTICA DA FMUC

Of. Ref^o **051-CE-2016**
Data 11/3/2016

C/conhecimento ao aluno Exmo Senhor
Prof. Doutor Armando Carvalho
Coordenador do Gabinete de Estudos
Avançados da FMUC


Assunto: Projecto de Investigação no âmbito do Mestrado em Saúde Pública (ref^o CE-052/2016)

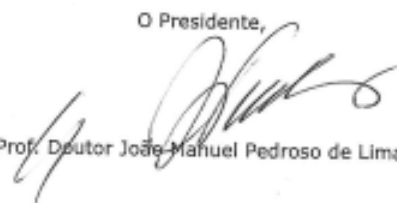
Candidato(a): Jéssica Machado Guerra

Título do Projecto: *"Burnout em Técnicos de radioterapia em Portugal".*

A Comissão de Ética da Faculdade de Medicina, após análise do projecto de investigação supra identificado, decidiu emitir o parecer que a seguir se transcreve:

"Parecer favorável não se excluindo, no entanto, a necessidade de submissão à Comissão de Ética, caso exista, da(s) Instituição(ões) onde será realizado o Projecto".

Queira aceitar os meus melhores cumprimentos 

O Presidente,

Prof. Doutor João Manuel Pedroso de Lima

HC

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Appendix 2 – Permission to use the MBI-HSS questionnaire

Your Mind Garden order is ready on Transform.

MindGarden, Inc. <invite@mindgarden.com>
To: Miguel Patricio <miguelpatricio@gmail.com>

23 December 2016 at 15:49

Dear Miguel Patricio,

Welcome to Transform, a web-based document storage system by Mind Garden, Inc. (www.mindgarden.com).

Your order for MBI Remote Online Survey License - may be found on your Participant page after you log in.

You will need to establish your identity (login) in Transform (if you havent already done so). For this process, your User ID will be your email address; you will set your own password. To begin the login process, click on the following link:

<http://transform.mindgarden.com/login/457893/452576>

You may need to copy and paste this URL into your web browser if clicking on the URL does not work.

Once you get to your page, you can see your order added to the Documents page.

To return to Transform at any time, simply enter your e-mail address and the password you created to log back in. <http://transform.mindgarden.com/login/457893/452576>

Your email address is: miguelpatricio@gmail.com

As always, we are available weekdays (US) to answer any questions you may have. Reach us by email by going to the "Contact" link on our website <http://www.mindgarden.com/contact.htm>, or call us at 650-322-6300 (US Pacific).

Sincerely,

The Mind Garden Team

Appendix 3 – Questionnaire

As the actual questionnaire used cannot be fully reproduced, only a few sample questions of the MBI-HSS will be presented here.

1. O meu trabalho esgota-me emocionalmente

	0	1	2	3	4	5	6	
Nunca	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Todos os dias

2. Sinto-me exausto no fim de um dia de trabalho

	0	1	2	3	4	5	6	
Nunca	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Todos os dias

3. Sinto-me cansado quando me levanto de manhã e tenho de enfrentar um novo dia de trabalho

	0	1	2	3	4	5	6	
Nunca	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Todos os dias