

Job satisfaction among radiology assistants: a multicentre cross-sectional study in Italy

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KEY WORDS

Occupational health; job satisfaction; cross-sectional study; survey; radiology

PAROLE CHIAVE

Salute occupazionale; soddisfazione professionale; studio trasversale; sondaggio; radiologia

SUMMARY

Objectives: *Job satisfaction among physicians is an important occupational health issue since it is related to different factors such as work motivation or career decisions. The aim of this study was to investigate job satisfaction among radiology assistants for the first time in Italy.* **Methods:** *In 2012, a cross-sectional survey was conducted among a convenience sample of radiology assistants drawn from all Italian regions who submitted an electronic or paper-based self-administered questionnaire. The data collected were analysed using logistic regressions in order to assess the role of socio-demographic variables.* **Results:** *Overall, 574 radiology assistants were interviewed. More than half of the subjects were males and were younger than 40 years old. Around 76% of the sample was not satisfied as regards salary. Moreover, the majority of the participants (66.1%) was not satisfied with the professional refresher courses. Compared with males, females were more satisfied in terms of professional enrichment (OR=1.79, 95% CI: 1.23-2.62) but less satisfied with their relationships with superiors (OR=0.57, 95% CI: 0.38-0.85).* **Conclusions:** *Since radiology assistants and, in general, healthcare workers assist medical doctors, thus playing a significant role in safeguarding patients' health, it would be desirable to give due importance to the issue of job satisfaction, from all points of view.*

RIASSUNTO

«**Soddisfazione in ambito professionale fra i tecnici sanitari in radiologia medica: uno studio multicentrico condotto in Italia**». **Introduzione:** *La soddisfazione professionale degli operatori sanitari è un argomento di particolare importanza nell'ambito della salute occupazionale e sembra essere correlata a diversi fattori come, per esempio, la motivazione sul lavoro o le decisioni relative alla carriera. Questo studio ha l'obiettivo di valutare la soddisfazione professionale dei tecnici sanitari in radiologia medica (TSRM) in Italia.* **Metodi:** *Nell'anno 2012, un campione di convenienza è stato estrapolato dall'elenco dei TSRM iscritti alla Federazione Nazionale Collegi Professionali TSRM, i quali sono stati invitati a compilare un questionario in forma cartacea o elettronica. I dati raccolti sono stati analizzati tramite modelli di regressione logistica multivariata per valutare il ruolo dei fattori socio-demografici*

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sugli outcome di interesse. **Risultati:** Dei 547 TSRM intervistati, più della metà del campione è costituito da soggetti di sesso maschile e più giovani di 40 anni. Circa il 76% degli intervistati si è dichiarato non soddisfatto del proprio stipendio e il 66% si è dichiarato non soddisfatto dei corsi di aggiornamento professionale. I modelli di regressione logistica multivariata hanno mostrato come le donne abbiano, rispetto agli uomini, più probabilità di essere soddisfatte in merito ai corsi di aggiornamento (OR=1,79, 95% CI: 1,23-2,62) ma meno probabilità di essere soddisfatte del rapporto professionale con il loro diretto superiore (OR=0,57, 95% CI: 0,38-0,85). **Conclusioni:** Dal momento che i TSRM assistono i medici giocando un ruolo rilevante per la salute dei pazienti, sarebbe auspicabile attribuire la corretta importanza alla questione della soddisfazione professionale, focalizzando l'attenzione su alcuni aspetti poco soddisfacenti dell'attività professionale dei tecnici radiologi.

INTRODUCTION

Job satisfaction is an important occupational issue and can affect work motivation, career decisions and even personal health and relationships with colleagues (8, 31). In the scientific literature several studies can be found on this topic focused on medical doctors (7, 16), since physicians satisfied with their job usually take care of their patients better than dissatisfied doctors (15). Radiologists are no exception. For example, findings from the study by Ramirez et al. showed that a higher proportion of clinical radiologists reported a low level of personal accomplishment, with reduced levels of competence and achievement at work than other specialists (49% versus 36%) (28). There are many scientific studies that highlight the issue of job stress and satisfaction among clinical radiologists (2-6, 8, 9, 14, 22, 24-26, 31). These studies aimed at examining which personal characteristics of radiologists or which features of their work and work settings could affect job satisfaction. For example, Buddeberg-Fisher et al. mentioned factors which could be related to lower professional satisfaction, such as high workload, inconvenient working hours, unsatisfying career perspectives and time pressure (4). Also, Czekańska-Chehab et al. found that low salaries, lack of sufficient data on patients and fear of misdiagnosis were the main factors responsible for work-related stress (9). In this regard, radiologists face a variety of occupational stress factors that create feelings of discomfort and may lead to a higher frequency of clinical errors. Indeed, they might have excessive workloads and insufficient time for reporting results

or formulating treatment plans, poor work organization and a non-cooperative and tense work climate. These difficult working conditions are linked to an increasing number of errors which cause the discomfort at the basis of lower job satisfaction (11).

Few studies in the scientific literature are focused on radiology assistants. For example, a survey carried out in Germany assessed the level of job satisfaction among a sample of radiologists working in cancer care and highlighted that the greatest source of job stress stemmed from structural conditions such as underpay and telephone calls (29). Moreover, Ludwig et al. focused their attention on radiology assistant levels of supervision required for advanced-practice technicians (23). To date, in the scientific literature there are no studies assessing the issue of job satisfaction among radiology assistants in Italy. The aim of this study was to investigate the sources of job stress and levels of satisfaction among a sample of radiology assistants for the first time in Italy.

MATERIAL AND METHODS

From July 2011 to February 2012, a cross-sectional survey was carried out among a convenience sample of radiology assistants drawn from all the Italian regions. Participants were contacted through the Italian association of radiology assistants and asked to answer a self-administered questionnaire, with a choice between an electronic format or a paper format. Participation was voluntary, anonymous and without remuneration. The researchers assured that anonymity was maintained and ethical

principles followed. The study was approved by the Institutional Review Board of the Department of Public Health Sciences of the University of Torino. Returning the completed survey was accepted as consent by the participants.

Eligibility criteria for participation:

- Membership of the Italian association of radiology assistants
- Working in the Italian health service

The present manuscript was written according to the STROBE Statements (21).

The questionnaire

The questionnaire was developed and then validated by a pilot study on 25 radiology assistants employed at the Hospital of Chivasso, a small town near Turin. It was self-administered and consisted of eight sections with a total of 36 items.

The first part of the questionnaire investigated the socio-demographic characteristics of the radiology assistants interviewed, such as gender, age, place of residence, marital status, number of children, years of service, professional field and type of work shifts.

The other parts of the questionnaire were aimed at evaluating a number of outcomes:

- Wage satisfaction (adequacy of salary with respect to work load and length of service);
- Professional enrichment (usefulness of the professional refresher courses);
- Relationship with superiors (consideration of needs and requirements of staff by superiors);
- Work conditions (organization of work shifts and holiday shifts, safety of the work equipment, working environment adequate and comfort);
- Relationship with colleagues;
- Professionalism and competence (quality of training concerning technology in use, organization of work shifts so as to allow all workers to use all technologies);
- Communication (consideration of workers' suggestions and patients' satisfaction by the hospital coordinator);

Each outcome was assessed by a group of questions. A 5-point Likert-scale, where responses ranged from "Strongly disagree" to "Strongly agree", was used.

Statistical analysis

The results were analyzed using StataMP13 statistical software (Stata Corp., College Station, TX, 2011). First, a descriptive analysis of the sample was conducted considering the distribution of gender, age, marital status, having (or not having) children, area of residence in Italy, professional field, years of service and type of work shift. The results were expressed in frequencies and percentages.

The outcomes were dichotomized as "Not satisfied" and "Satisfied" by calculating an average score of the answers to the different groups of questions. Average scores ranging between 1 and 2.5 were considered as "Not satisfied" while average scores between 2.6 and 5 were considered as "Satisfied".

For each outcome logistic regression models were then carried out in order to assess the role of socio-demographic variables (gender, age, marital status, having or not having children, area of residence in Italy, professional field, years of service, type of shift). The covariates to be included in the final model were selected using a stepwise forward selection process, with an univariate p-value <0.25 as the main criterion (17), with age and gender as potential confounders. Results were expressed as Odds Ratio (OR) with 95% Confidence Intervals (CI), and a two-tailed p-value ≤ 0.05 was considered significant for all analyses.

RESULTS

Characteristics of the sample

A total of 574 radiology assistants took part in the study. The majority of participants (69.0%) were recruited online while 31.0% participated via a paper-based questionnaire. More than half of the sample (56.1%) were males and belonged to age groups " ≤ 30 " (28.1%) or "31-40" (24.4%). Almost half of the participants (42.2%) were married and 51.5% reported not having children.

The overwhelming majority of the radiology assistants who participated in the study (77.5%) were resident in the north of Italy. With regard to years of service, around one third of the sample (29.8%)

had been working for less than 5 years, one third (27.7%) had worked for a period ranging from 6 to 15 years, slightly less than one third (25.5%) had worked between 16 and 25 years, and 17% of the participants had worked for a period longer than 26 years. 74.4% of the sample worked in the traditional radiology field whereas the percentage of radiology assistants working in the areas of nuclear medicine or radiotherapy was respectively 12.2% and 13.4%. The main part of the sample (40.6%) worked a single shift (from 8 am to 4 pm) with rest over the weekend, 32.1% rotated shifts over 12 hours (from

8 am to 4 pm and from 12 am to 7 pm) with rest over the weekend and 27.3% rotated shifts over 24 hours (table 1).

Job satisfaction among radiology assistants

The great majority of the sample (76.0%) reported they were not satisfied with their salary, declaring that the wage was not adequate for the work load and the length of service. Also with regard to professional enrichment, 66.1% of the participants declared they were not satisfied because they consid-

Table 1 - Description of the sample (N=574)

		N (%)
Method of administration of the questionnaire	Online questionnaire	396 (69.0)
	Paper-based questionnaire	178 (31.0)
Gender	Male	318 (56.1)
	Female	249 (43.9)
Age	≤30	161 (28.1)
	31-40	140 (24.4)
	41-50	178 (31.1)
	51-60	92 (16.1)
	>61	2 (0.3)
Marital status	Unmarried	130 (22.6)
	In a relationship	84 (14.6)
	Cohabiting	86 (15.0)
	Married	242 (42.2)
	Divorced	31 (5.4)
	Widowed	1 (0.2)
Children	No	292 (51.5)
	Yes	275 (48.5)
Area of residence in Italy	North	445 (77.5)
	Centre	64 (11.1)
	South	65 (11.3)
Professional field	Traditional radiology	427 (74.4)
	Nuclear medicine	70 (12.2)
	Radiotherapy	77 (13.4)
Years of service	<5	170 (29.8)
	6-15	158 (27.7)
	16-25	145 (25.5)
	>26	97 (17.0)
Shifts	Single shift (8 am-4 pm)	230 (40.6)
	Rotation over 12 hours	182 (32.1)
	Rotation over 24 hours	155 (27.3)

ered the professional refresher courses useless. Almost 70% of the radiology assistants who took part in the survey did not report any problems in terms of relationships with superiors and colleagues. Indeed, they declared that their superiors usually considered the needs and requirements of the staff, helped them to solve possible problems and promoted team work. Also, the radiology assistants stressed that they usually met their colleagues also out of work and that the working environment was collaborative and friendly. Half of the sample (50.3%) was not satisfied with communication, saying that the medical director of the hospital did not usually take into account any kind of workers' suggestions and did not pay attention to patients' satisfaction. Around 80% of the participants reported satisfaction regarding working conditions, such as organization of shifts and the working environment, and regarding professionalism and competence, since they received training concerning the technology used and the organization of shifts allowed all workers to use all technologies (table 2).

The results of the logistic regression models (table 3) showed that females, when compared with males, were more satisfied in terms of professional enrichment (OR=1.79, 95% CI: 1.23-2.62) and less satisfied in relation to all other outcomes, but

the only statistically significant variable was the relationship with superiors (OR=0.57, 95% CI: 0.38-0.85). Moreover, with regard to relationships with colleagues, increasing age seemed to be a factor influencing low job gratification (OR=0.44, 95% CI: 0.22-0.85 for the age group 31-40 years and OR=0.28, 95% CI: 0.09-0.84 for people between 51 and 60 years). Marital status and having children were linked, respectively, to greater satisfaction regarding salary in the married participants (OR=2.07, 95% CI: 1.05-4.06) with respect to the unmarried ones and to lower satisfaction regarding professionalism and competence for radiology assistants with children (OR=0.43, 95% CI: 0.20-0.89). The area of residence seemed to be related to work gratification: radiology assistants living in the centre and south of Italy reported lower satisfaction than residents in the north of Italy for every outcome considered, with statistical significance for the relationship with superiors (OR=0.44, 95% CI: 0.24-0.79 in the centre and OR=0.48, 95% CI: 0.27-0.86 in the south), working conditions (OR=0.38, 95% CI: 0.21-0.68 in the south), communication (OR=0.41, 95% CI: 0.23-0.76 in the south) and wage satisfaction (OR=0.42, 95% CI: 0.19-0.93 for the centre). With regard to professional field, working in nuclear medicine seemed to be better than

Table 2 - Job satisfaction among radiology assistants (N=574)

		N (%)	Missing data (N)
Wage satisfaction	Satisfied	138 (24.0)	-
	Not satisfied	436 (76.0)	
Professional enrichment	Satisfied	194 (33.9)	1
	Not satisfied	379 (66.1)	
Relationship with superiors	Satisfied	391 (69.1)	8
	Not satisfied	175 (30.9)	
Work conditions	Satisfied	454 (79.1)	-
	Not satisfied	120 (20.9)	
Relationship with colleagues	Satisfied	388 (67.1)	1
	Not satisfied	185 (32.3)	
Professionalism and competence	Satisfied	460 (80.1)	-
	Not satisfied	114 (19.9)	
Communication	Satisfied	284 (49.7)	3
	Not satisfied	287 (50.3)	

Table 3 - Multivariate results on job satisfaction amongst radiology assistants (N=574)

	Wage satisfaction O.R. (95% C.I.)	Professional enrichment O.R. (95% C.I.)	Relationship with superiors O.R. (95% C.I.)	Work conditions O.R. (95% C.I.)	Relationship with colleagues and competence O.R. (95% C.I.)	Professionalism and competence O.R. (95% C.I.)	Communication O.R. (95% C.I.)
Gender							
Male	1	1	1	1	1	1	1
Female	0.80 (0.52-1.23)	1.79 (1.23-2.62)	0.57 (0.38-0.85)	0.78 (0.50-1.22)	0.87 (0.59-1.29)	0.84 (0.54-1.33)	0.91 (0.63-1.32)
Age							
≤ 30	1	1	1	1	1	1	1
31-40	1.24 (0.61-2.49)	1.41 (0.82-2.43)	1.48 (0.75-2.93)	0.89 (0.42-1.89)	0.44 (0.22-0.85)	1.14 (0.52-2.51)	1.30 (0.69-2.47)
41-50	0.87 (0.33-2.26)	0.70 (0.39-1.26)	1.91 (0.81-4.53)	0.65 (0.25-1.68)	0.44 (0.19-1.05)	0.80 (0.30-2.11)	1.28 (0.56-2.92)
51-60	1.66 (0.46-6.05)	1.47 (0.74-2.90)	1.29 (0.39-4.26)	0.58 (0.15-2.19)	0.28 (0.09-0.84)	0.56 (0.15-2.03)	1.08 (0.37-3.18)
>61	-	3.07 (0.17-54.3)	-	-	-	-	-
Marital status							
Unmarried	1	1	1	1	1	1	1
In a relationship	1.45 (0.74-2.85)	1.27 (0.68-2.36)	1.71 (0.87-3.35)	1.23 (0.60-2.53)	1.05 (0.55-1.99)	1.03 (0.49-2.17)	0.86 (0.46-1.60)
Cohabiting	1.42 (0.70-2.90)	0.63 (0.33-1.21)	1.23 (0.65-2.33)	1.35 (0.66-2.77)	1.20 (0.64-2.25)	1.33 (0.62-2.85)	1.49 (0.81-2.74)
Married	2.07 (1.05-4.06)	1.16 (0.67-2.00)	1.42 (0.80-2.52)	1.22 (0.65-2.31)	1.16 (0.67-2.03)	2.02 (0.85-4.77)	1.64 (0.94-2.84)
Divorced	0.67 (0.17-2.67)	1.17 (0.46-2.94)	1.48 (0.55-3.97)	0.93 (0.32-2.69)	2.26 (0.83-6.12)	2.01 (0.61-6.65)	1.97 (0.79-4.90)
Widowed	-	-	-	-	-	-	-
Children							
No	-	-	-	-	-	1	-
Yes	-	-	-	-	-	0.43 (0.20-0.89)	-
Area of residence in Italy							
North	1	1	1	1	1	1	1
Centre	0.42 (0.19-0.93)	0.66 (0.36-1.21)	0.44 (0.24-0.79)	0.76 (0.39-1.46)	0.86 (0.48-1.54)	0.60 (0.32-1.13)	0.82 (0.46-1.46)
South	0.77 (0.39-1.50)	0.68 (0.36-1.25)	0.48 (0.27-0.86)	0.38 (0.21-0.68)	0.58 (0.33-1.02)	0.83 (0.43-1.61)	0.41 (0.23-0.76)
Professional field							
Traditional radiology	1	1	1	1	1	1	1
Nuclear medicine	0.65 (0.31-1.33)	0.72 (0.38-1.37)	2.02 (0.99-4.14)	3.47 (1.16-10.34)	1.13 (0.61-2.09)	2.92 (1.16-7.35)	2.03 (1.12-3.66)
Radiotherapy	1.36 (0.74-2.50)	2.15 (1.24-3.74)	1.26 (0.67-2.36)	1.04 (0.50-2.17)	2.19 (1.11-4.30)	2.01 (0.92-4.42)	2.56 (1.42-4.62)
Years of service							
≤5	1	-	1	1	1	1	1
6-15	0.36 (0.18-0.71)	-	0.42 (0.22-0.81)	1.14 (0.56-2.33)	1.65 (0.86-3.15)	0.92 (0.43-1.96)	0.55 (0.30-1.03)
16-25	0.28 (0.11-0.73)	-	0.39 (0.16-0.93)	1.47 (0.57-3.82)	1.32 (0.57-3.06)	0.91 (0.34-2.45)	0.68 (0.30-1.56)
>26	0.25 (0.07-0.89)	-	0.89 (0.27-2.95)	2.72 (0.72-10.32)	1.62 (0.54-4.80)	2.24 (0.60-8.34)	1.03 (0.35-2.99)
Shifts							
Single shift (8-16 h) with rest over week end	1	1	1	1	1	1	1
Rotation over 12 hours (8-16 h and 12-19 h) with rest over week end	1.03 (0.63-1.69)	0.75 (0.47-1.18)	1.25 (0.77-2.04)	0.53 (0.29-0.94)	0.98 (0.61-1.57)	1.10 (0.63-1.92)	0.96 (0.62-1.48)
Rotation over 24 hours with rest over week end	0.73 (0.41-1.30)	1.46 (0.88-2.40)	0.64 (0.38-1.08)	0.30 (0.16-0.56)	0.67 (0.40-1.11)	0.73 (0.41-1.30)	0.51 (0.31-0.86)

* Analysis adjusted for gender, age, marital status, with or without children, area of residence in Italy, professional field, years of service, type of shift

working in traditional radiology as regards working conditions (OR=3.47, 95% CI: 1.16-10.34), professionalism (OR=2.92, 95% CI: 1.16-7.35) and communication (OR=2.03, 95% CI: 1.12-3.66). Also in the field of radiotherapy workers had a higher probability of being satisfied with professional enrichment (OR=2.15, 95% CI: 1.24-3.74), relationships with colleagues (OR=2.19, 95% CI: 1.11-4.30) and communication (OR=2.56, 95% CI: 1.42-4.62), compared with the field of traditional radiology. Interestingly, the longer the years worked, the lower the gratification for both wage satisfaction and relationships with superiors. In terms of working conditions, the logistic regression models showed that radiology assistants working shifts rotating over 12 hours with rest over the weekend (OR=0.53, 95% CI: 0.29-0.94) and those working shifts rotating over 24 hours (OR=0.30, 95% CI: 0.16-0.56) were less satisfied than workers with a single shift with rest over the weekend.

DISCUSSION

This study aimed at assessing the level of job satisfaction among radiology assistants in different regions of Italy. To our knowledge, there are several studies that investigated this topic among clinical radiologists but none focused on radiology assistants.

Our findings showed that overall radiology assistants were not satisfied in terms of wage and professional enrichment. Indeed, the overwhelming majority were not satisfied with their salary which they deemed was not adequate for the work load and length of service. In general, feeling adequately rewarded in financial terms plays an important role in overall career satisfaction among physicians (21). This issue takes on increasing importance especially for radiologists and radiology assistants who have briefer patient contact compared with other medical doctors, assuming that patient contact is a major source of job satisfaction for physicians (19, 20, 31). A Swiss study which evaluated the determinants of radiologists' professional satisfaction confirmed our findings, describing financial pressure and workload as the most common reasons for low satisfaction (4).

With respect to professional enrichment, although 80% of the participants reported having a good level of competences thanks to training in the technologies used and the organization of the work shifts so that all technologies could be used by all workers, around two thirds of the participants declared they were not satisfied because they deemed the refresher courses proposed by their directors to be useless. This is an issue of interest, which was even examined in a study by Hojat et al. (16), which showed that lifelong learning activities and motivation to learn are related to job satisfaction, since continuous learning provides opportunities for career advancement.

The radiology assistants interviewed had a good level of satisfaction in terms of relationships with colleagues and superiors and, in general, in terms of working environment. Indeed, our findings showed how superiors usually took into consideration the needs and requirements of staff, helping them to solve any problems. Moreover, the participants reported that they usually met their colleagues not only at work but also out of work, which contributed to creating a friendly and collaborative working environment. These results were confirmed by a literature review by Bragard et al. (1), which showed how working in a friendly work environment was positively related to physicians' career satisfaction, and by an Italian study conducted among radiologists by Magnavita et al. (25) that confirmed the role of organizational factors and work climate as the main determinants of professional satisfaction. In the same article, physical working conditions were also identified as an important factor of job satisfaction. In this regard, our study produced good results, since around 80% of the sample declared they were satisfied regarding this issue, reporting that work shifts and holidays were well organized, working equipment was safe and the working environment was adequate and comfortable.

Of interest are the findings of the logistic regression model. Female radiology assistants were more satisfied than males in terms of professional enrichment, but were less satisfied with regard to relationships with superiors, probably because they usually receive less recognition for their work and because the workload is often badly distributed, with a

greater share of repetitive tasks for the women (25). Other studies found gender differences. For example, an American study which assessed satisfaction of radiologists showed greater professional satisfaction in females than males (31). However, a Swiss study reported that female radiologists were less satisfied because they received less career support and mentoring (4). Magnavita et al. carried out a survey among a sample of Italian radiologists and found that women stressed the need to make major efforts to succeed in their job tasks and that they obtained less remuneration for the work performed compared to men (27). Interestingly, increasing age was related to job dissatisfaction, in particular regarding relationships with colleagues. Leigh et al. performed a study to evaluate career satisfaction among different specialties of medical doctors and confirmed that there was greater satisfaction in the younger generations, but also found that a high percentage of physicians over 65 years old reported being very satisfied. This may be due to greater enthusiasm among the younger generations of radiology assistants and to self-selection among the mature subjects. Indeed, workers who do not like their work probably retire by the age of 65 years. Those who do not retire are probably more satisfied with their job (21). Our results demonstrated that length of service also plays an important role as a determinant of work satisfaction, especially regarding relationships with superiors and salary. These findings are in contrast with another study which showed that 42% of participants were in general more satisfied than five years previously (4).

Of particular interest were the results concerning work shifts. The results of the logistic regression models showed that radiology assistants working shifts on a 12-hour rotation with rest over the weekend and those working shifts on a 24-hour rotation were less satisfied than workers working a single shift with rest over the weekend. Indeed, high workload, inconvenient working hours and time pressure are the main factors affecting job satisfaction (4). An Italian survey which assessed the quality of life among medical doctors, nurses and occupational safety and health technologists found that healthcare workers who worked more than 40 hours per week had a lower vitality score than those who

worked less than 40 hours. These long working hours could limit their free time and potentially affect job satisfaction (18). Moreover, long or inconvenient work shifts could cause sleep deprivation, which is an important factor that can reduce both ability to perform intellectual tasks and motivation to perform routine tasks, leading to poor job satisfaction (1). Besides work shifts, the work sector also showed differences in terms of job satisfaction; our findings showed that working in nuclear medicine seemed to be better than working in traditional radiology services. A previous study carried out on a sample of Italian radiology physicians already showed that radiotherapists are more satisfied than radiologists, confirming our results, and differences in working conditions, relationships with superiors, freedom to choose work method and job safety were all variables closely associated with job satisfaction (25).

Lastly, our findings showed significant differences in terms of geographic areas of residence (workers living in the south of Italy were less satisfied than those working in the north) and professional field of work, showing that radiology assistants working in nuclear medicine or radiotherapy were more satisfied than those working in traditional radiology. Perhaps the characteristics of these field of work and the patients who need these particular diagnostic or therapeutic techniques lead to a more stimulating work environment and thus to greater satisfaction.

This study presents several strengths. Firstly, to our knowledge it is the first study investigating this issue among radiology assistants in the scientific literature. Secondly, the size of the sample was larger than in other studies assessing similar topics in clinical radiologists (4, 25) and was drawn from all Italian regions. None of the participants refused to complete the questionnaire, resulting in a high response rate.

However, we must acknowledge some limits. First of all, the overwhelming majority of the radiology assistants who participated in the study (77.5%) resided in the north of Italy. Also, the study was based on a very small sample. For both of these reasons the survey cannot be considered as representative of the Italian situation. Moreover, although face-to-face interviews are considered the gold standard method of survey administration, we used a self-adminis-

tered questionnaire (13). A self-administered survey could lead to a recall bias, caused by differences in the accuracy or completeness of the recollections retrieved by the study participants and to under- or over-reporting of respectively incorrect or correct behaviour and attitudes (10). Lastly, the sample was not perfectly homogeneous given that three-quarters of the participants came from the north of Italy and only a quarter from the centre or the south.

In conclusion, the present study demonstrated that quite a high level of relational and human satisfaction exists among Italian radiology assistants, thanks to a friendly and collaborative work environment and to good relationships with superiors. However, job satisfaction usually decreases as regards salary and professional enrichment. Since radiology assistants and, in general, healthcare workers assist medical doctors, thus playing an important role in patients' health, it would be desirable that due importance be given to the issue of job satisfaction, from all points of view. For example, it would be important to increase the quality of refresher courses, also using new communication tools. For instance, there is a strongly felt need to improve knowledge about healthcare-associated infections that represent a cogent issue affecting work fitness radiology assistants (12). Further studies are needed to examine this issue more in depth.

NO POTENTIAL CONFLICT OF INTEREST RELEVANT TO THIS ARTICLE WAS REPORTED

Authorship

SC and GG contributed to the acquisition of data. RG, MRG, FB and GS contributed to statistical analysis. RG, MRG, FB and GS drafted the manuscript. MRG contributed to the conception and design of the study. MRG, FB and RS contributed to the critical revision of the manuscript.

Ethical approval

This study involved human participants and all procedures performed were in accordance with the ethical standards of the University institutional and national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from all individual participants included in the study.

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