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The burnout phenomenon among student radiographers: a single centre experience

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ABSTRACT. Purpose. Burnout syndrome is a condition that may occur not only for staff in human service sectors/jobs, involving intensive interactions with others, but also people that are engaged in activities psychologically similar to work, such as students. Radiographers in training suffer double stress, first linked to the status of being a university student and secondly as early career workers who have relations with the public of the health system. Aim of our study was to investigate the prevalence and levels of burnout syndrome among radiographers in training in an University Hospital.

Methods. In order to gain a better understanding of nature of the burnout syndrome a modified version of Maslach's questionnaire (investigating three areas: emotional exhaustion, depersonalization and reduced personal accomplishment), was administered to two groups selected from a cohort of radiographers University students (from the 1st and 3rd year of course).

Results. 62/62 questionnaires were completed, returned and analysed. The research outcomes highlighted a clear difference between group I and group II in relation to one of the three areas of the Maslach's model: "depersonalization" ($p < 0.001$). Moreover, the third year students group presented a significantly higher risk to develop burnout. On the other hand, the third area examined, the reduced personal accomplishment domain, was surprisingly high even among first-year students.

Conclusion. The research outcomes seem to suggest that the presence of emotional burnout, or risk of burnout, among third year students is statistically significant, compared to the first year students, being a significant aspect to investigate further in this class of students. It is also assumed that the high degree of "past failures, feeling of self failure" observed among all student, is related to a feeling of poor efficacy and poor self worth that appear to grow from the beginning of the course. This topic needs further investigation in the light of the result of this study.

Key words: radiographers in training, burnout syndrome, stress.

RIASSUNTO. IL FENOMENO DEL BURNOUT TRA GLI STUDENTI DI TECNICHE RADIOLOGICHE: ESPERIENZA IN UN SINGOLO CENTRO. Scopo. Il burnout è una sindrome che può interessare operatori e professionisti che sono impegnati quotidianamente e ripetutamente in attività che implicano le relazioni interpersonali, lavorando a stretto contatto con il pubblico, ma anche persone impegnate in attività psicologicamente simili al lavoro, come gli studenti. Gli studenti di tecniche di radiologia sono sottoposti ad un doppio stress, sia a quello legato allo stato di studente, che a quello legato allo stato di lavoratore a contatto con il pubblico durante il loro periodo di tirocinio professionale. Scopo del nostro studio è stato quello di investigare la prevalenza della sindrome da burnout tra i tecnici di radiologia in formazione in un Ospedale Universitario.

Introduction

Burnout syndrome (BOS) is considered a psychological state resulting from prolonged exposure to job stressor. Maslach & Jackson defined burnout as a syndrome of emotional exhaustion, depersonalization, and reduced personal accomplishment that can occur among individuals who do "people work" of some kind (1). It is the pathological result of a stressor process related to occupations characterized by intense interpersonal relationships, when professionals do not adequately respond to workloads caused by combination of stress and hard-work (2).

This condition may be applied to all individuals who engage in activities that are psychologically similar to work, such as students (3-5).

In this case this condition is manifested by fatigue, indifference and detachment from the studies. It consists of a feeling of exhaustion due to the studies, a cynical and detached behaviour towards their studies and especially the feeling of being a student incompetent.

This psychological condition may be exacerbated by a number of conditions such as fear of examinations, poor communication with the teaching staff, stress for class schedules and training courses, the uncertainties of the future.

Exist three main dimensions of burnout that are assessed in the Maslach Burnout Inventory (MBI) (1, 6), the worldwide leading instrument for the assessment of BOS:

- emotional exhaustion: feeling tired, private of all energy (for students: due to educational demands);
- depersonalization: loss of any positive attitude towards himself, the world and others (for students: indifference/apathetic attitude toward academic activities);
- reduced personal accomplishment/low professional efficacy: feelings of frustration, anger, loss of self-esteem and desire to change or leave the job (for students: perception of incompetence as a student) (7).

Example of burnout syndrome was described in people who work in the caring professions, such as the health services, social workers, psychologists, teachers and policemen (2, 8-11). Moreover the problem could be quite relevant in medical students, such as radiographers in training, that suffer double stress, first linked to the status of being a university student and secondly as early career workers who have relations with the public of the health system.

Metodi. Per ottenere una migliore comprensione della natura della sindrome da burnout è stato somministrata una versione modificata del questionario di Maslach (che investiga 3 aree: esaurimento emotivo, depersonalizzazione e ridotta realizzazione personale) a 2 sottogruppi selezionati da una coorte di studenti Universitari in tecniche di radiologia (del 1° e 3° anno di corso). **Risultati.** Sono stati completati, consegnati ed analizzati 62/62 questionari. I risultati della ricerca hanno evidenziato una chiara differenza tra i 2 gruppi in una delle tre aree del modello di Maslach: la “depersonalizzazione” ($p < 0.001$). Inoltre, la terza area esaminata, la ridotta realizzazione personale, è risultata sorprendentemente elevata anche tra gli studenti di primo anno. **Conclusioni.** I risultati della ricerca suggeriscono che la presenza di burnout emozionale, o il rischio di burnout, tra gli studenti del terzo anno sia statisticamente significativa se confrontata con i risultati degli studenti del primo anno di corso, rendendolo un aspetto da investigare più a fondo in questa classe di studenti. Si suppone che l'alto livello di senso di fallimento personale osservato tra gli studenti, sia correlato con un sentimento di scarsa autostima che sembra crescere dall'inizio del corso.

Parole chiave: tecnici di radiologia in formazione, sindrome da burnout, stress.

Numerous studies have found that many medical trainees experience burnout (12-14), but to date no study have been carried out among our population of study, so the aim of our study was to explore the phenomenon of burnout during the years of the degree program among a sample of radiographers in training.

Materials and methods

We conducted a prospective study offering a questionnaire (Figure 1) to a sample of radiographers in training at the University of Palermo Policlinico Hospital. The sample consisted of two groups of students of the training programme in diagnostic and therapeutic radiography; the first group was composed by students of the first year course ($n=31$, mean age 21 yrs), the second group from those of the third and final year course ($n=31$, mean age 23,5 yrs).

To explore the burnout phenomenon a multiple-choice questionnaire designed on the base of the MBI (6, 15), was administered 6 months after the start of the course; the questionnaire (that is considered the ideal instrument for measuring burnout), in this study have been modified, according to previous study (15), to adapt it to our sample consisting of university medical students.

Students were repeatedly informed about the investigation in lectures and written information several weeks prior to onset of the study. Students who agreed to participate in the study gave written informed consent. This study was approved by the local University authority.

The questionnaires were handed out during routine university lessons, by a psychologist that request the participants to fill it anonymously and individually and return it back in the same day. As the survey was completely anonymous, there was no chance to re-survey other information excluding those in the questionnaire.

The questionnaire consisted of 22 items (divided on the three dimension as usual) (1), exploring the three dimensions that characterize BOS, according to the MBI (1, 6), namely:

- emotional exhaustion (9 items);
- depersonalization/cynicism (5 items);
- reduced personal accomplishment/low professional efficacy (8 items).

This questionnaire allowed a quantitative analysis of the responses provided by the subjects through the operations of computation of numerical values corresponding to the variables of the instrument (qualitative analysis).

The items are constructed according to the model of the Likert-type scale of judgment (16) [scale from 0 to 6: 0 (never), 1 (once a year or less), 2 (once a month or less), 3 (a few times a month), 4 (once a week), 5 (a few times a week), and 6 (every day)], in order to allow a quantitative analysis of the answers given by the students, allowing us to explore the size and intensity of the measured attitudes.

We used data from the 22-items MBI to compare prevalence rates of burnout between the two subgroups of radiographers in training.

We defined participants to be at risk of burnout (or to have a moderate level of burnout) if they reach at least moderate score on the 3 dimensions analysed (for emotional

- 1) I feel emotionally involved in my educational path
- 2) At the end of a training day I feel an object
- 3) I feel tired since the morning to the idea/thought of having to face another day of study and training
- 4) I easily identify in the feelings of patients that I meet.
- 5) I realize I consider some patients as objects
- 6) Working with people all day for me is really a stress
- 7) I deal with very well the problems of patients
- 8) I feel worn out from my studies and training
- 9) I feel positively influenced by the experience of others during the training practice
- 10) I have become more indifferent toward others since I undertook this training course
- 11) I worry that this training activity is hardening me
- 12) I feel full of energy
- 13) I feel very frustrated during the training practice
- 14) I do not care what happens to patients
- 15) I think I spend too many hours to training practice
- 16) To be in direct contact with the people is very stressful
- 17) I can easily create a relaxed atmosphere with patients
- 18) I feel exhausted after a day of training practice
- 19) I have had many gratifications during my training activity
- 20) I feel on the brink of the abyss
- 21) During the internship I face emotional problems very quietly
- 22) It seems that patients vent their problems with me

Emotional exhaustion: items 1, 2, 3, 6, 8, 13, 14, 16, 20

Depersonalization: items 5, 10, 11, 15, 22

Personal accomplishment: items 4, 7, 9, 12, 17, 18, 19, 21

Figure 1. Questionnaire: Modified Maslach Burnout Inventory proposed to our study population

exhaustion score greater than 17, for depersonalization score greater than 5, and for professional efficacy score lower than 40), and burnt-out if they reach a high score on the 3 dimensions (for emotional exhaustion score greater than 27, for depersonalization score greater than 10, and for professional efficacy score lower than 33).

Moreover we divided our population for each dimension in 3 subgroups, according to their results, in student with low, moderate and high risk of burnout, and we compared the results.

Three domains of the BOS, namely emotional exhaustion, depersonalization/cynicism and reduced personal accomplishment/low professional efficacy, were summarized as mean and standard deviation. We categorized scores within individual burnout domains into low, intermediate, and high scores using established cut-offs (17, 18), as previously said, and we calculated the frequency of students by each one of these three categories. As a further analysis, burnout domains were normalized as $(\text{domain} - \min(\text{domain})) / (\max(\text{domain}) - \min(\text{domain}))$ and a global burnout indicator was built on as the average of its three normalized domains. It ranged between 0 and 1 to indicate increasing levels from absent burnout to complete burnout. The Student's t-test was used to assess statistical significance of the difference between assistants in training by first and third year for the global burnout indicator and its three dimensions. The chi-square test and the Fisher's exact test, as appropriate, were used to assess homogeneity of burnout domains by first and third year. Results with a $P \leq 0.05$ were considered statistically significant.

Results

In the studied sample, the average age was 21 ± 2.38 years on the first year students and 23.5 ± 4.08 years for students on the third year ($p=0.005$). The global average age was 22.3 ± 3.54 years, 45% of the population was composed by female students.

On a total of 62 radiographers in training enrolled, all of them completely filled the questionnaire, so 62/62 questionnaires were completed, returned and analysed.

Table I shows the demographics characteristics and the results of the survey, divided for the 3 domains evaluated.

Figure 2, 3 and 4 show the bar chart of the different percentage in the three subgroups for each domain.

The two groups differ in the results obtained in the three dimensions examined in accordance with the Maslach model.

The distribution of radiographers in training by categories of burnout domains was statistically significant for depersonalisation only ($p<0.001$), with the majority of first year's assistants reporting low score (68%) and the majority of third year's assistants reporting intermediate score (52%) (Table I, Figure 3).

Analogously, when considering each quantitative domain of the burnout indicator, statistically significant difference was found among the two training years for depersonalisation only ($p=0.028$), with first year's students

Table I. Demographic characteristic and results of the survey

Characteristic	1 st year students (n = 31)	3 rd year students (n = 31)	p
Demographic			
Male, no. (%)	16	18	0.610
Mean Age, yrs (SD)	21 (2.38)	23.5 (4.08)	0.005
Burnout index *			
<i>Emotional exhaustion</i>			0.061
High level, no. (%)	0 (0)	4 (12.9)	
Intermediate level, no. (%)	10 (32.3)	13 (41.9)	
Low level, no. (%)	21 (67.7)	14 (45.2)	
<i>Depersonalization</i>			<0.001
High level, no. (%)	5 (16.1)	10 (32.2)	
Intermediate level, no. (%)	5 (16.1)	16 (51.7)	
Low level, no. (%)	21 (67.8)	5 (16.1)	
<i>Reduced personal accomplishment †</i>			0.429
High level, no. (%)	27 (87)	27 (87)	
Intermediate level, no. (%)	2 (6.5)	4 (13)	
Low level, no. (%)	2 (6.5)	0 (0)	
<i>Burned out, no. (%) ‡</i>	0 (0)	4 (13)	0.113
<i>Risk of Burn-out §</i>	6 (19.4)	11 (35.5)	0.255

* Measured using the full Maslach Burnout Inventory. We categorized scores within individual burnout domains into low, intermediate, and high scores using established cutoffs [11, 26, 27].

† A low level of personal accomplishment is a symptom of burnout.

‡ We used a high emotional exhaustion or depersonalization score on the Maslach Burnout Inventory (indicating a frequency of weekly or more often) to categorize a respondent as "burned out."

§ We used at least an intermediate exhaustion or depersonalization score on the Maslach Burnout Inventory to categorize a respondent as at risk of burn-out.

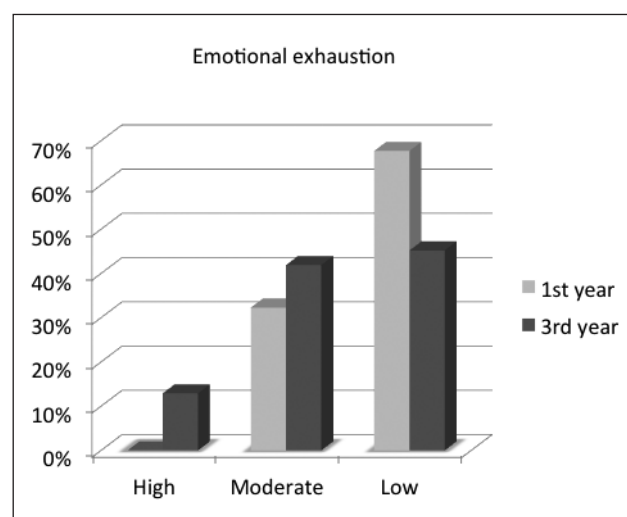


Figure 2. Percentage results of emotional exhaustion for both our subgroups

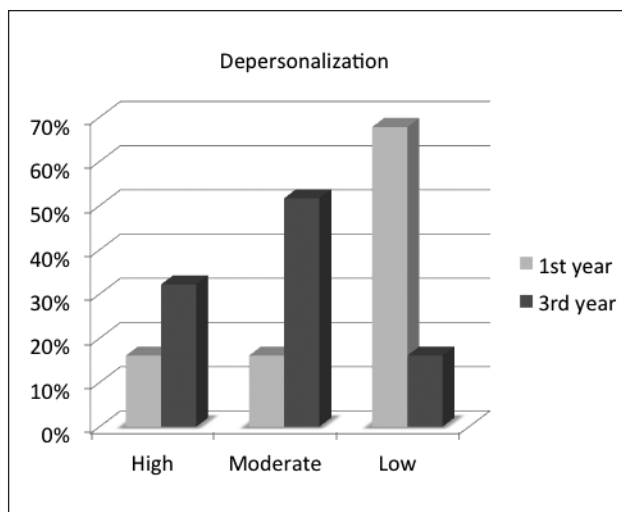


Figure 3. Percentage results of depersonalization for both our subgroups

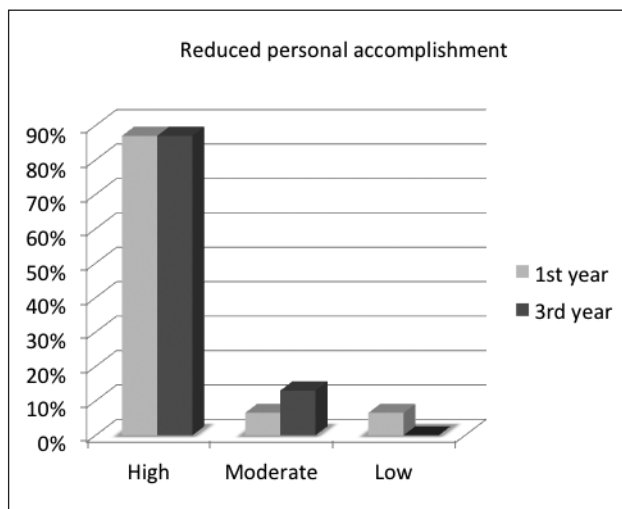


Figure 4. Percentage results of reduced personal accomplishment for both our subgroups

Table II. The global burn-out indicator and its dimensions

Characteristic	1 st year students (n = 31) Mean (SD)	3 rd year students (n = 31) Mean (SD)	p
<i>Emotional exhaustion</i>			0.261
raw	4.81±6.31	16.90±8.13	
normalized	0.40±0.20	0.47±0.25	
<i>Depersonalisation</i>			0.028
raw	6.16±4.34	8.58±4.04	
normalized	0.25±0.22	0.38±0.20	
<i>Reduced personal accomplishment</i>			0.519
raw	27.39±5.96	28.32±5.37	
normalized	0.52±0.20	0.49±0.18	
<i>Global burn-out</i>			0.083
normalized	0.39±0.10	0.44±0.13	

reporting lower normalized score (0.25±0.22) than third year’s assistants (0.38±0.20).

However, the difference in the global burnout indicator between the two groups (0.38±0.16 and 0.45±0.16 respectively) was not statistically significant if we considered the three dimensions overall (Table II).

Indeed only 1 student of the third year fit the tri-dimensional criteria diagnosis for BOS. If we consider a bi-dimensional criteria to diagnose BOS (with only high emotional exhaustion and high depersonalization, as it has done previously, (19)), our prevalence increase a little on the third year students (4 student with bi-dimensional BOS criteria), even if the difference between the two subgroups continue to be not statistically significant.

On the other hand, a statistically significant number of student of the third year (48.4%) was at risk of burnout (accordingly to the cut-off previously described), compared with the first year students group (p<0.05).

In the third area examined, the “reduced personal accomplishment” (Figure 4), no significant differences were found, with a p value always higher than 0.05% for the comparison on mean values and percentage of presentation of the three subgroups; as a matter of fact, this area was surprisingly high even among first-year students (with 90% of both sample with a score on the test for this area lower than 34).

Finally 89% of the student of the first year present at least one symptom of burnout, and the percentage reach the 97% on the third year students, and in the majority of the case there was a value agree with burnout level for reduced personal accomplishment area.

Generally third year students were more likely to report higher values of emotional exhaustion and depersonalization, and in general more prone to present burnout, or its symptoms, than the first year students sample.

Discussion

The recognition of burnout as a public health problem led to its inclusion in the list of occupational diseases related to work, not only in workers but also in students (3, 5, 6, 10).

Among the workers, healthcare professionals (8, 20), such as nurses (8, 21, 22), various medical subspecialties (including anesthesiologists, radiologists, psychiatrists and paediatricians) (11, 23-26), and medical trainees (4, 10, 14, 19), experience higher level of burnout, in respect of other professional groups, for their emotionally commitment working in closer contact with the patients.

As we previously said, our sample, consisting in radiographers in training, is subjected to a dual-type of stress, both as students and as a healthcare workers, being more prone to experience the burnout from a dual front, and each aspect of their role could influence differently the three area examined with our questionnaire.

Indeed, radiographers students are subjected, to different types of stress, first of all like students, and in this case starting university can be a stressful experience. During the training course, students may begin to view

academic activities as stressful, often without seeing meaning or gratification in their efforts. Consequently, these students feel less efficacious. The way that the student faces stress allows to understand if it could be a problem for his health (27, 28). Indeed, close to the exams sessions, when the exam anxiety is excessive, it can inhibit intellectual performance, impede concentration and memory, worsening significantly the performance of the student whose fear is not only to receive a low rating, but also losing the esteem of their parents or see compromise their social judgment. This anxiety might affect the psyche of these students, and consequently affect also their internship and the relationship and interactions with the patients encountered during the internship time.

Indeed in the specific case of radiographers in training, as we previously said, they not only have to follow the university courses, with the paired stress, but they must also attend an internship, which is a fundamental part of the training program (consisting to a third of their university career), aimed at the knowledge of the equipment and the proper execution of radiological examinations, thus acquiring practical skills as well as notions.

During the internship, the student comes into contact with patients, often a carrier of discomfort or illness (21); this condition can lead to emotional involvement accompanied by feelings of inadequacy or ineffectiveness. The consequences of this, along with other variables (such as the anxiety consequent to the university student position), and in the absence of adequate coping strategies, can result in the onset of burnout symptoms.

Moreover, as previously explained, the burnout is a multiple dimensions problem, where different areas have to be evaluated, and each of this dimension is quite important to understand the possibility of BOS in this category of study. In particular examining separately the three areas explored we noted the following findings.

In particular, in our population of radiographers in training, the first feeling that they meet during the training process, is fatigue, subsequent to continuous tension for relationship with others, probably due to a twofold cause: on one hand the complex organization to follow classes and to organize the study, with consequent interpersonal interactions; on the other hand the relationship with patients during the hours of training, that are usually carriers of a physical and psychological discomfort.

Firstly, looking closely the student population results we could notice that most of them, during their studies, arrive to a loss of motivation and interest in what they do, according with the high level reached in the reduced personal accomplishment area, probably due to the high workload to which they are subjected.

Paradoxically, the basic cause of stress, that is the workload, can become the only source of satisfaction for those subjects experiencing burnout, and separation from it – closely to the end of the training period, with the uncertain working future that in few months the third and last year students will try – can be very distressing.

The moderate-high level of emotional exhaustion recorded in older students of our sample (in the 55% of the population), is guaranteed by minimization of contact with

people, according to various shades of cynicism; this defence mechanism can be initially used to protect the operator from suffering, but can lead to the inability to open to others and put themselves available to others.

The ability to manage the patient depends on the student inclination, which can be more or less empathic. Empathy is, in fact, an important aspect for people that work with other people, in particular in the health system, and indicates the ability to enter into emotional contact with the others (8, 29, 30). The operator that detaches itself from the patient, becomes unable to give help, reaching the stage of “depersonalization”, which represents a real defence mechanism characterized by personal accomplishment and coldness, in an attempt to protect themselves from ‘emotional exhaustion’ (1, 2, 6), and in our study we noted a statistical significant increasing in the percentage of students characterized by higher level of depersonalization on the third year compare to students of the first year.

The last area that we examined was the “reduced personal accomplishment”, characterized by a high percentage (90%) reached in both groups. Although we expect a high index only in the students of the third year, as a result of the high values recorded in the other two dimensions, the lack of personal fulfilment remains surprisingly high even among the students of the first year.

This result is due probably to the feeling of incompetence and lack of confidence in their abilities that starts to mature already during the first year of training and that, if it is not supported, brings a certain amount of anxiety and stress. Probably the initial feeling of strong enthusiasm towards the future work is undermined by the evidence of the facts, and especially by the lack of support in their training.

If we considered as burnt out students that present a high level in the first 2 dimension analysed (emotional exhaustion and depersonalization, as previously done) (19), we found that none students reached these parameters on the first year group, whereas among the third year students 4 of them can be classified as burned out, and even if not statistically significant this difference is quite important to be highlighted. Investigating radiographers in training, at risk for burnout, we detected a considerably higher proportion of susceptible significant percentage of students among the third year subgroup, indicating that going on with their studies the stress level increase in this particular type of students.

There are some limitations to our study. It could not establish the etiological factors related to burnout as it was a cross sectional study. Therefore, longitudinal studies are necessary to establish which variables show true causal relationships with BOS or some of its symptoms in this population. Sample size refers to a single centre and we do not compare burn out phenomena, that in student radiographer may be composed by the double condition of student and worker trainees, with different categories of student that have less practical training involvement.

Further studies should be carried out to explore the reason and prevalence of stress and burnout among radiographers students in other institutions with similar pro-

files, increasing the sample number and evaluated more variable that could influence and increase the stress in this category of study.

Despite these limitations, we have presented new data suggesting that the mental health of radiographers in training may begin deteriorating early in their medical training. The higher prevalence of burnout among physicians in practice or medical residents, has been previously reported (10, 14, 18, 19, 24-26), but ours is the first study, to our knowledge, to report burnout rates in radiographers students.

From the above considerations and the results of our research we can say that, although we cannot talk about real significant burnout syndrome in our cohort of students (even if third years student have an higher level of depersonalization compared to 1st year students, and are significantly at risk to develop burnout), the problems encountered are similar to those documented by many researches on workplace risk burnout (2, 9, 18), and our population presented symptoms of burnout, with a higher percentage among the third year students. Certainly, trainees are under substantial stress. Empathy, altruism, and professionalism with patients may decrease during the training time.

Crucial prevention of burnout, to work on the dysfunctional aspects that emerge during the period of study /training, would be the institution of small working group.

The most classic and comprehensive definition of "group" is the one provided by Lewin (1948): "the group is something more, or better, something different from the sum of its members, has its own structure, special purpose, and details relationships with other groups. What constitutes its essence is not the similarity or dissimilarity found among its members, but their interdependence" (31).

The importance of Lewin theory is an especially dynamic aspect, stressing the interactions and interdependencies among its members.

The group in our case can be used as a working tool, as it allows a comparison face to face both with colleagues or with tutors/trainers but, especially for its symbolic value, the group becomes a container of anxieties and frustrations.

Within the framework of the group the subject can expose themselves and talk about his hardships (32).

In conclusion, we think, would be desirable, during the years of the degree course, work on the prevention of the burnout phenomenon through a multidimensional approach.

Of primary importance, for the prevention of the phenomenon, it would be important sensitize students and workers about the problem and help them to tackle it, as well as the need for psychological support for students. It would be also desirable, the involvement of tutors in underline the phenomena and support thus effectively intervening whenever dysfunctional dynamics should emerge, throughout the training period. As second step of our research we plan to extend the evaluation of burnout among this group of students creating/organizing focus groups/discussion groups on a weekly basis, bringing together students divided by year; it would also be desirable, during some meetings, the presence of the coordinator of the internship and/or the President of the degree course.

Next to the focus group approach, through which is always monitored the level of stress of the students and could help to work on it, it would be desirable the opening of one-stop listening to the student in training, with the help of professional psychologists.

The interventions must be able to produce long-term changes, not only in individuals but also in the whole organization that, through such training, should make those who are part of it aware of the impact that the burnout could have on their work and on their lives.

As burnout may adversely affect the competency and professionalism of physicians and the quality of care provided to patients, further research is needed to identify effective solutions to address distress in trainees of the health-care system.

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