

# Dual diagnosis among medical residents: a systematic review

## *Diagnóstico dual en médicos residentes: una revisión sistemática*

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### Abstract

The post-graduate period as a resident doctor (MIR, in Spanish) is usually associated with high emotional distress due to new professional demands and to other psychosocial factors. The objective of this study is to determine the characteristics of dual diagnosis among MIRs. A systematic review was carried out in MEDLINE (PubMed), Web of Science and Google Scholar databases, selecting articles published in English and Spanish between 1984 and 2017. A total of 2,415 articles were obtained: 2,276 were excluded by their title, 105 by the abstract and 17 after a complete review of the article; 17 papers were finally included. The prevalence of depressive symptoms among MIRs ranges from 10.2% to 70%, while the prevalence of anxious symptoms varies from 13.2% to 33.9%, from 6.7% to 25% reported suicidal ideation, 20% hazardous drinking, 2%-13.4% self-prescribed psychotropics, and 2.7%-14% used other drugs. Most studies present important methodological limitations, thus complicating adequate understanding of the phenomenon. High variations in prevalence data are related to differences in the psychometric scales and to disparity in diagnosis criteria, among other limitations. However, most studies report that alcohol and drug use is correlated with severe distress among MIRs. More research is needed to ascertain the nature of dual diagnosis in this professional group in order to effectively prevent and treat its serious consequences.

**Keywords:** Resident doctor; Substance use disorders; Mental disorders; Dual diagnosis; Self-treatment.

### Resumen

El período de preparación como médico residente (en español, MIR) suele asociarse a una elevada sobrecarga emocional tanto por las nuevas exigencias profesionales como por otros factores psicosociales. El objetivo de este estudio es conocer las características del diagnóstico dual en los MIRs. Se llevó a cabo una revisión sistemática de las bases de datos MEDLINE (PubMed), Web of Science y Google Scholar, seleccionando artículos publicados en inglés y español entre 1984 y 2017. Se obtuvieron 2.415 artículos: se excluyeron 2.276 por título, 105 por el contenido del resumen y 17 por el contenido del artículo. En la revisión final se incluyeron 17 artículos. La prevalencia de clínica depresiva varía del 10,2% al 70%, de ansiedad entre 13,2% y 33,9%, de ideación suicida entre 6,7% y 25% mientras que el consumo de riesgo de alcohol se encuentra aproximadamente en torno al 20%, entre 2% y 13,4% se auto-prescriben medicamentos psicótrópicos y del 2,7% al 14% consumen otras sustancias. La mayoría de los estudios analizados adolecen de limitaciones metodológicas importantes lo que dificulta una adecuada comprensión del fenómeno. Las variaciones en las cifras de prevalencia tienen que ver con la disparidad de escalas y de criterios diagnósticos empleados, entre otros factores. Aún así, los estudios muestran que el consumo de alcohol y/u otras sustancias se correlacionan positivamente con el malestar emocional en los MIRs. Se hace necesario mejorar el conocimiento del diagnóstico dual en este grupo profesional para que se puedan prevenir y tratar sus consecuencias de manera más eficaz.

**Palabras clave:** Médico residente; Trastorno por uso de sustancias; Trastornos mentales; Diagnóstico dual; Auto-tratamiento.

Received: November 2018; Accepted: October 2019.

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The period of postgraduate training as a resident doctor in Spain, known in Spanish as MIR (Médico Interno Residente), has a reputation for being highly stressful for reasons associated specifically with professional practice, with the characteristics of the respective institution and the teams into which resident doctors need to integrate, as well as with the life changes that this vital transitional period involves (Blancafort, Masachs, Valero & Arteman, 2009; Tyssen, Vaglum, Gronvold & Ekeberg, 2000). Most salient among occupational factors are the new professional requirements at a technical level since most students move from more theoretical training to clinical practice. Demands on professional competence intensify as the years of training (either four or five) go by to ensure that when they finish, residents have the necessary skills to exercise their profession properly. Other occupational factors have to do with the integration into broad and multi-disciplinary professional teams, as well as with the characteristics of the institution in which they develop their specialty.

The sources of emotional overload change throughout the long period of training. A high level of stress usually accompanies the first year of residence (R1), in which residents are confronted by the real world, a new situation where they are expected to begin to develop different practical skills, previously lacking. As time goes by, the causes of distress vary and may be linked to: the characteristics of each specific new stage, the progressive increase of autonomy in decision-making, aspects related to team integration or the possibilities of continued training (Tyssen et al., 2000).

Beyond strictly occupational aspects, medical residents can also face situations such as: change of place of residence (even of country), leaving the family unit behind, or changes in significant affective relationships (Blancafort et al., 2009).

These new professional and contextual demands can lead to situations of emotional distress, especially in cases of abandonment of self-care (Brooks, Gerada & Chalder, 2011; Pereira-Lima, Loureiro & Crippa, 2016; Tyssen & Vaglum, 2002) or when they impact people whose personality traits or previous history hinder healthy coping with distress (neuroticism, perfectionism, self-criticism, obsessive-compulsive traits, personal and/or family history of psychopathology or early bonding problems) (Tyssen et al., 2002; Brooks et al., 2011).

Although the preparation of resident physicians varies from country to country, several studies have shown an increase during this formative period in the incidence of psychological distress and the use of alcohol or other drugs, some of which are self-prescribed (Blancafort et al., 2009). In addition, there has been an increase among medical trainees in the prevalence of suicidal ideation, attempted and completed suicides (Lindeman, Läärä, Hakko & Lönnqvist, 1996; Mousa, Dhamoon, Lander & Dhamoon, 2016; Pereira-Lima et al., 2016).

Prevalence data vary from one study to another because, among other factors, the characteristics of the training vary by country, as do the methods of detecting psychiatric symptoms and the criteria for delimiting harmful from pathological drug use. Moreover, most studies have to date been limited to reporting the prevalence figures for mental pathology and/or substance use independently, but few go as far as to analyze the causes or reasons which can account for the concurrence of both. Regarding the etiology, an attempt has been made to establish a relationship between alcohol use and depression in medical students, but longitudinal studies have yielded conflicting results regarding the causal relationship between the two (Clark, 1988). It is not clear whether alcohol problems precede ("harm" hypothesis) or follow ("self-treatment" hypothesis) depressive symptoms.

With regard to the prevalence of depression or anxiety in resident doctors, estimates are usually based on the presence of mere symptoms or depression-risk indicators. Thus, it is estimated that between 20.9% and 43.2% of the world's resident doctors have depressive symptoms, while this would affect 16% of the general population of the same age and socio-economic level (Mata et al., 2015). A 1986 survey in Spain revealed that 1% of residents had requested sick leave due to emotional problems and that 5% of these MIRs had attempted suicide of which almost half ended as completed suicides (Smith, Denny & Witzke, 1986).

One of the main longitudinal studies of medical trainees in Europe is the "The Young Doctor Cohort of the Longitudinal Study of Norwegian Medical Students and Doctors (NORDOC)". Its main objective was to identify early risk factors in medical students which could lead to the development of depression throughout their professional life. A cohort of students graduating in 1993 and 1994 from 4 medical schools in Norway (n = 631) was followed. Responses were collected at five points in time: T1 (final year of training); T2 (resident physician and first year after graduating); T3 (fourth year after graduating); T4 (tenth year after graduating) and T5 (15 years after graduating). Of all respondents, 219 completed the entire longitudinal assessment. It was observed that the youngest and those with the highest levels of neuroticism presented a risk of depression over time of up to 3 times greater, while suffering from early severe depressive symptoms doubled the risk (Støen Grotmol, Gude, Moum, Vaglum & Tyssen, 2013).

Another longitudinal study, also based on the NORDOC cohort, concluded that a negative parental bond, manifested as low self-esteem and maladaptive coping mechanisms for stress, may be a risk factor for developing severe depressive symptoms over time (Grotmol et al., 2010a).

With respect to substance use and its relationship with a primary psychopathological profile, the NORDOC study indicates that alcohol and psychotropic drug use is acknowledged by up to 21.4% and 13% of respondents re-

spectively as a strategy to alleviate distress. A study some years earlier had already observed that up to 20.3% of the students surveyed met the criteria for alcohol abuse or dependence in the 12 months prior to the interview (Flaherty & Richman, 1993).

One prospective study lasting six years attempted to determine whether doctors' expectations that alcohol reduces emotional stress could predict harmful drinking, and, moreover, whether such an effect would be mediated by the belief that alcohol improved coping with emotional stress (drinking to cope). In this study, 'harmful drinking' was defined as drinking at least 2 or 3 times a month, and to assess beliefs about the effects of alcohol, the "Alcohol Expectancy Questionnaire" was used as a specific instrument. Results showed that the expectation of alcohol's capacity to improve the ability to cope with distress is more important than harmful drinking per se when predicting later problematic use. The behavior differentiated between men and women, with the former clearly associating alcohol with emotional stress relief. Unfortunately, the relationship between specialization and alcohol use was not specifically analyzed, nor was a specific analysis performed on the comorbidity between harmful drinking and/or other mental disorders. Nevertheless, the study did conclude that, if the likelihood of developing pathological alcohol use is to be reduced, it is essential to assess and correct irrational beliefs about the effects of alcohol (Grotmol et al., 2010b).

Some residents begin to prescribe themselves psychotropic medications at the start of their professional life. They may resort to sedatives to relieve emotional distress or stimulants as "performance enhancers" (Arria & DuPont, 2010). Some years previously, an article had already observed that, compared to other medical students, residents consume more benzodiazepines (22.7% versus 19.6%) and barbiturates (8.5% versus 7.3%), while cocaine use was lower (29.2% versus 32.5%) (Hughes et al., 1992). Among trainee anesthesiologists, the most abused substances are, in order of frequency, fentanyl, alcohol, cannabis, cocaine, midazolam, oral opioids, other anesthetics such as propofol or inhalers (Mayall, 2016).

In a recent longitudinal study carried out in Catalonia with MIRs (Salamero & Baranda, 2018), the risk of suffering from mental disorder, according to the General Health Questionnaire, was 17.8% higher in the first years of residence and 29.7% higher in the final years. At the same time, self-perceived health, hours of sleep, available free time and self-care habits (such as regular physical exercise) gradually declined.

With respect to hazardous drinking, defined as  $\geq 28$  SDUs per month for men or  $\geq 17$  SDUs for women, or having 5 consecutive drinks at least once a month, this was greater in men (29% initially, 33% during the first year and 17% at the end of the fourth) than in women (12%, 10% and 5%,

respectively). The most frequently correlated factor in the greater or lesser use of alcohol was family situation (those living with a partner or having children are at lower risk).

Sixty-five percent of respondents acknowledged having taken medication (especially analgesics and/or anti-inflammatories) in the 15 days prior to the survey, with an increase from 73% the first year to 78% at the end of the fourth. The use of hypnotics, tranquilizers and/or antidepressants rose from 7% at the beginning of residence, to 12.8% during the first year and up to 15.7% in the fourth. Self-medication, with or without psychotropics, is greater in women than in men.

Regarding substance use, 50% of the MIRs in Catalonia acknowledged having tried some at some time in their life but only 10% in the previous 30 days. Men were usually more frequent users (11%) than women (6%), and use increased at the beginning of residence and during the first year, while remaining stable at the end of the fourth year. The most used substance was cannabis, with approximately half of the MIRs having tried it at some point, and 6-7% using it recently, while use among MIRs born outside Spain was higher. Amphetamines were taken by up to 10% of respondents and cocaine by between 3% and 5%.

Like the rest of the medical profession, residents do not find it easy to ask for help when they suffer from a mental disorder, and this is exacerbated in the case of addiction (Braquehais et al., 2016). Added to the culture of invulnerability associated with the practice of medicine instilled in undergraduates, there is also the stigma associated with mental or emotional suffering, one which is even greater among health professionals. While some defense mechanisms may be effective in practicing as a doctor, they can lead to denial, rationalization or minimization of one's distress when it comes to dealing with one's own suffering, which only contributes to worsening it in the medium and long term (Gera-da, 2019; Schwenk, Davis & Wimsatt, 2010).

Failure to adequately address emotional distress among medical residents has negative implications for their professional practice given its association with higher medical error rates, greater difficulties in interpersonal and inter-professional relationships, and a decrease in learning capacity (Brooks et al., 2011; Fahrenkopf et al., 2008; Pereira-Lima et al., 2016), while also reducing levels of patient satisfaction (Saipanish, 2003).

The main objective of this study is to investigate the prevalence and risk factors specifically of dual diagnosis in medical residents through a systematic review of articles published to date on this phenomenon.

## Methods

A systematic review was carried out in the MEDLINE (PubMed), Web of Science and Google Scholar databases and studies published in Spanish and English between

01/01/1984 to 07/01/2017 were selected. The approach recommended by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Liberati et al., 2009) was used to structure the systematic review.

The type of studies selected included: case reports, original articles, meta-analyses, multicenter studies, observational studies, reviews, scientifically rigorous reviews and systematic reviews.

Keywords were: “internship or residency” or “resident” or “interns” or “medical resident” or “resident internal doctor” or “MIR”. Those mentioning “interns” (undergraduate intern) were excluded as this term does not correspond to the definition of “resident doctor” (MIR, in Spanish). Once the articles were selected, the search continued with the terms: “substance related disorders”, “cannabis”, “marihuana”, “cocaine”, “alcohol”, “opioid”, “burnout”, “stress”, “mental disorders”, “addiction”, “depressive disorders” or “suicide”.

Of the 2,415 articles obtained, 2,276 were excluded by title, 105 by the content of the abstract and 17 by the complete article content; the final review included the 17 articles dealing specifically with dual diagnosis (or pathology) (see Figure 1).

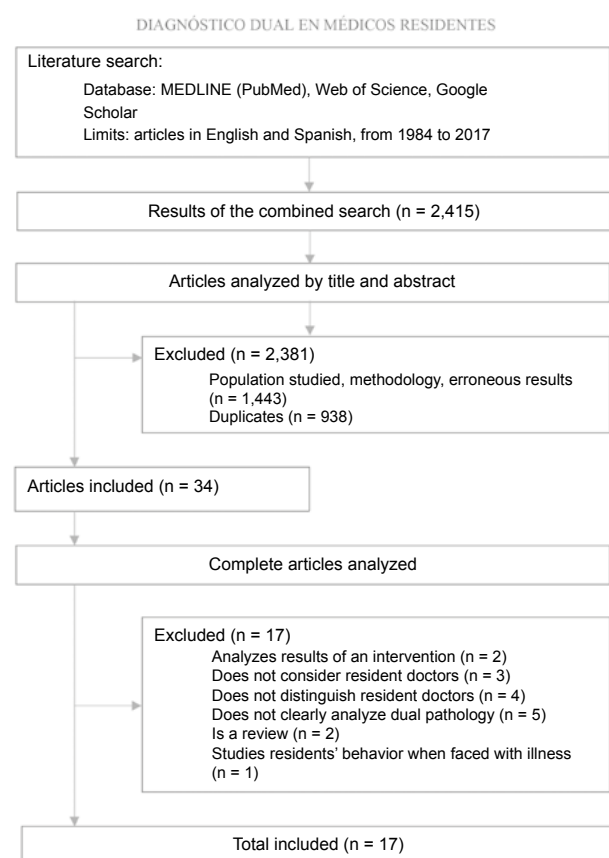


Figure 1. Systematic review methodology

## Results

Of the studies included in this review, about 60% ( $n = 10$ ) were conducted in the United States, United Kingdom and Canada, 17% ( $n = 3$ ) in South America (Brazil), 6% ( $n = 1$ ) in Lebanon, 6% ( $n = 1$ ) in Turkey and 11% ( $n = 2$ ) in Nigeria (see Table 1). The majority are cross-sectional studies. The most frequent comorbidity reported was the presence of a depressive symptoms and alcohol use (Koran & Litt, 1988; Lebensohn et al., 2013; Martinez et al., 2016; Talih, Warakian, Ajaltouni, Shehab & Tamim, 2016).

It is worth highlighting that according to one article, almost 50% of residents experienced stress during residency. The most important factors contributing to stress in men were financial situation (33.3%), economic status (23.8%) and time pressure (14.3%), while for women, work situation (33.3%), time pressure (20%) and work status (20%) were the most relevant (Ogunsemi, Alebiosu & Shorunmu, 2010). Another article found professional relationships to be source of stress, and 46% of residents reported fear of being labeled “trouble makers” if they complained about their residency programs (Koran et al., 1988).

The different studies show that prevalence of depressive symptoms varies from 10.2% to 70%, and of anxious symptoms from 13.2% to 33.9% (Akvardar, Demiral, Ergor & Ergor, 2004; Earle & Kelly, 2005; Fagnani Neto, Obara, Macedo, Cítero & Nogueira-Martins, 2004; Koran et al., 1988; Lebensohn et al., 2013; Lydall, Malik, Blizard & Bhugra, 2009; Matheson et al., 2016; Melo et al., 2016; Mousa et al., 2016; Ogunsemi et al., 2010; Olagunju, Ogundipe, Lasebikan, Coker & Asoegwu, 2016; Talih et al., 2016; Zisook et al., 2016). When psychiatric diagnostic instruments were used instead of symptoms, the prevalence of major depressive disorder ranged from 13% (Earle et al., 2005) to 22% (Talih et al., 2016), generalized anxiety from 4.9% (Olagunju et al., 2016) to 12% (Earle et al., 2005); obsessive compulsive disorder (OCD) has a prevalence of 3.4% (Olagunju et al., 2016), simple phobias 2.4% (Olagunju et al., 2016), panic disorder 2% (Earle et al., 2005) and social phobia 1.5% (Olagunju et al., 2016). Interestingly, one author established a prevalence of 30.5% for social phobia, according to the *SPIN* (*Social Phobia Inventory*) questionnaire (Melo et al., 2016).

Among the factors associated with symptoms of anxiety and depression we find lower competence in social skills, personality traits such as neuroticism, social and family instability and work overload ( $> 8$  on-call shifts per month) (Pereira-Lima et al., 2016; Talih et al., 2016). Other factors positively correlated with these symptoms were sleep deprivation, both acute and chronic (Mansukhani, Kolla, Surani, Varon & Ramar, 2012), the use of illicit drugs and alcohol, burnout, suicidal behavior and the presence of life stressors at the family and/or social level (Mansukhani et al., 2012; Mousa et al., 2016; Talih et al., 2016).

Table 1. Articles selected for review

Source	Country	Type of study	Type of population	Design	Results
Mousa et al., 2016	USA	Transversal	336 MS, 126 HS	Study based on self-administered questionnaire and scales <i>PHQ-2</i> , <i>GAD-7</i>	HS: Screening: 15.1% positive for depression, 15.9% positive for moderate to severe anxiety. Coping: 21.4% reported using alcohol and 2% self-prescribed psychopharmaceuticals
Martínez et al., 2016	USA	Transversal	411 MS, 267 HS, 398 practicing doctors	Study based on self-administered questionnaire and scales <i>Modified stress and depression questionnaire includes items on use of alcohol, drugs, PHQ-9 and suicide</i> .	Prevalence of depressive disorder not established in HS. HS: 27% reported "drinking more than normal" and 18% "drinking too much".
Pereira-Lima et al., 2016	Brazil	Transversal	270 medical residents	Study based on self-administered questionnaire and scales <i>PHQ-4</i> , <i>AUDIT-3</i> , <i>NEO-FFI-R</i> , <i>SSI-Del-Prette</i>	Alcohol addiction: 15.93%. Anxiety and/or depressive symptoms: 41.85%. Association of personality traits such as neuroticism, deteriorating social skills, work overload (number of on-call shifts >8/month) with anxiety and/or depressive symptoms. Male sex, surgical resident, work overload (number of on-call shifts >8/month), extraversion with alcohol addiction.
Melo et al., 2016	Brazil	Transversal	59 Psychiatry residents	Study based on self-administered questionnaire and scales <i>BDI-II</i> , <i>BAI</i> , <i>SPIN</i> , <i>AUDIT-10</i> , <i>Fägerstrom test</i> .	Anxiety symptoms: 33.9%. Social phobia disorder: 30.5%. Depressive symptoms 19%. Alcohol use: 81.4%. Harmful alcohol use: 22%.
Olagunju et al., 2016	Nigeria	Transversal	204 medical residents	Study based on questionnaire ( <i>GHQ-12</i> ), and structured interview ( <i>SCID-1/NP</i> ) based on <i>DSM-IV</i>	Emotional stress: 28.9%. Clinical anxiety: 13.2%, with 4.9% meeting <i>GAD</i> criteria. <i>TOC</i> : 3.4%. Specific phobia: 2.4%. Social phobia: 1.5%. Substance induced anxiety disorder: 1%.
Talih et al., 2016	Lebanon	Transversal	118 medical residents	Study based on self-administered questionnaire and scales. <i>PHQ-9</i> (question 9 assesses autolytic ideation), <i>BM</i> , <i>GAD-7</i> , <i>AUDIT-10</i> , <i>DAST-10</i>	Mild depressive symptoms: 30%. Moderate to severe depressive symptoms: 22% ( <i>MDD</i> ). Autolytic ideation, associated with severity of depression and emotional burnout syndrome: 13%. Residents with <i>MDD</i> and suicidal ideation: 58%. Alcohol use: 59%, of which harmful use: 10%. Abuse of illicit drugs: 14%.
Zissok et al., 2016	USA	Transversal	369 MS, 237 HS, 396 medical specialists	Study based on <i>HEAR Stress and Depression questionnaire (includes PHQ-9)</i>	HS: depressive syndrome: 10.2% (minimal 38.2%, mild: 39.1%, moderate: 15%, moderate-to-severe depression: 7.7%). Suicide risk (ideation and previous attempts): 10.5%. Drinking more than normal: 25.3%. Feel they drink a lot: 17.3%. Use of other substances/self-prescribed drugs: 4.6%.
Matheson et al., 2015	Canada	Transversal	232 medical residents	Study based on <i>Kessler-10</i> self-administered online questionnaire.	Medical residents: psychological stress: 44.3% (high or very high stress: 9%). Alcohol use: 75.8%. Use of other drugs (unspecified): 2.7%. Suicidal ideation in previous 12 months: 6.7%.
Lebensohn et al., 2013	USA	Transversal	168 FM residents (1 <sup>st</sup> year)	Study based on questionnaires and scale. <i>PSS</i> , <i>CES-D</i> , <i>MBI</i> , <i>SWLS</i> , <i>Wellness behavior survey</i> .	Risk of clinical depression: 23%. Drinking more than 3 SDUs per week: 19%. Use of medication for anxiety, mood or sleep: 10% (not stated whether self-prescribed); reported more by women (94.4%).
Mansukhani et al., 2012	USA	Systematic review	14,836 medical residents	Search of studies assessing the effects of sleep deprivation.	Severe and chronic sleep deprivation results in increased use of alcohol, psychotropic medication (such as zolpidem, 2.4%, and modafinil, 21.8%) and deterioration of mood.
Ogunsemi et al., 2010	Nigeria	Transversal	58 medical residents	Study based on self-prescribed questionnaire	Reporting significant stress during residency: 50%. To cope with stress, many residents reported using alcohol (5.2%), nicotine (1.7%), drugs and medication (8.6%) and eating more (15.5%).
Lydall et al., 2009	UK	Transversal	1,002 medical residents	Study based on self-administered online questionnaire (designed by the authors).	Four of more depressive symptoms: 70%. Autolytic ideation: 23%. Alcohol use: 37%.
Earle et al., 2005	Canada	Transversal	254 FM residents	Study based on self-administered questionnaires and scales, designed by the authors (based on <i>DSM-IV</i> diagnostic criteria).	Depressive syndrome: 20% ( <i>MDD</i> , 13%, other depressive disorders, 7%). <i>GAD</i> : 12%. Panic disorder: 2%. Regarding alcohol and substances: 61.8% recreational, 1.2% addiction, and 5.9% as a coping mechanism. Medication with psychotropics as coping mechanism: 13.4% (not stated whether self-prescribed).
Fangnani Neto et al., 2004	Brazil	Retrospective study	233 Master's or Doctorate students, medical residents (24%) and nursing residents	Semi-structured questionnaire (designed by the authors). Main diagnoses covered in <i>ICD-10</i>	Medical residents: autolytic ideation: 25%. Alcohol use: 45.1%. First year of residency considered the most stressful.
Akvardar et al., 2004	Turkey	Transversal	52 MS, 73 medical residents, 80 practicing doctors	Study based on self-administered questionnaires and scales. <i>Fägerstrom test</i> of nicotine addiction, <i>CAGE scale</i> , <i>HAD</i> .	Depressive symptoms: 40%. Anxiety symptoms: 19.2%. Risk of alcohol abuse: 8.9%. Use of benzodiazepines (the most frequently used hypnotics): 8.2%. Prevalence of illicit drug use: 5.5%. Most frequently used drug: cannabis (prevalence not stated).
Bunch et al., 1992	USA	Transversal	80 surgical residents, 179 other surgical specialties, 1,495 other specialties	Study based on self-administered questionnaires (designed by the Center for the Study of Impaired Professionals)	Low level of alcohol use, similar to other specialties (70% drink 10 times per month). Low level of use of marijuana, cocaine or other drugs, lower than in other non-surgical specialties (prevalence not stated). Low levels of irritability and hostility, high level of tiredness (sign of stress).
Koran et al., 1988	USA	Transversal	281 medical residents	Study based on self-administered questionnaire (designed by the authors).	Depressive or anxiety symptoms: 40%. Substance abuse: 12% (greater use of alcohol, marijuana or cocaine), and increase in use of sedatives, stimulants and opioids since the start of residency. Of those reporting increased use of alcohol, marijuana or cocaine, 79% also reported increased use of sedatives, stimulants or opioids.

**Note. Abbreviations:** MS medical students; HS house staff, FM family medicine, MDD major depressive disorder, GAD generalized anxiety disorder, BAI Beck anxiety inventory, AUDIT alcohol use disorders identification test, SPIN social phobia inventory, PHQ patient health questionnaire, GHQ general health questionnaire, BM burnout measure, GAD-7 generalized anxiety disorder 7, DAST-10 drug abuse screening test 10, PSS perceived stress scale, CES-D Center for Epidemiologic Studies depression scale, MBI Maslach burnout inventory, SWLS satisfaction with life scale, NEO FFI R neo five-factor inventory revised, SSI Del-Prette Del-Prette social skills inventory.

In terms of suicide ideation, this was found to be prevalent in between 6.7% and 25% of residents surveyed in five studies (Fagnani Neto et al., 2004; Lydall et al., 2009; Matheson et al., 2016; Talih et al., 2016; Zisook et al., 2016). Suicidal ideation was associated with the severity of depression and the presence of emotional burnout; indeed, when diagnostic criteria for major depressive disorder were met, suicidal ideation was present in 58% of respondents (Lydall et al., 2009; Talih et al., 2016; Zisook et al., 2016). One study observed that suicidal ideation and previous suicide attempts were moderately correlated with six variables: year of residency, specialty, presence of professional burnout, major depressive disorder, self-prescription of psychotropic drugs, and stressful life events. However, after multivariate analysis, only professional burnout and stressful life events maintained a statistically significant correlation with suicidal ideation (Talih et al., 2016).

While some studies show that the depressive and anxiety symptoms increase throughout residency (Earle et al., 2005; Mousa et al., 2016), others point to greater distress in the first year (Fagnani Neto et al., 2004). One author found a positive correlation between the presence of stressful situations and the appearance of anxiety symptoms, which are experienced by 50% of residents (Olagunju et al., 2016).

With regard to sex, while some studies did not find significant differences between the two (Earle et al., 2005; Koran et al., 1998; Lebensohn et al., 2013), others pointed to a higher prevalence of psychological distress (either as anxiety or depressive symptoms) in women (Fagnani Neto et al., 2004; Matheson et al., 2016).

In terms of specialty, one study with psychiatry residents (Melo et al., 2016) showed high levels of anxious symptomatology (33.9%) and prevalence of social phobia (30.5%). As for resident family/community doctors, 23% are said to be at risk of depression during the first year (Lebensohn et al., 2013) and 20% if the entire training period is taken into account (Earle et al., 2005). In another study (Talih et al., 2016) it was observed that the resident training in internal medicine, pediatrics and anesthesiology were more likely to present depressive symptoms than those in surgical specializations, although the differences ceased to be statistically significant on performing multivariate analysis.

Regarding the prevalence of alcohol use among residents, estimates range from 20% to 81.4% (Akvardar et al., 2004; Bunch, Dvorch, Storr, Baldwin & Hughes, 1992; Earle et al., 2005; Fagnani Neto et al., 2004; Koran et al., 1988; Lydall et al., 2009; Matheson et al., 2016; Melo et al., 2016; Mousa et al., 2016; Ogunsemi et al., 2010; Talih et al., 2016; Martinez, et al., 2016; Zisook et al., 2016). Such variation in the prevalence figures may result from the diverging criteria used to define use which is harmful or at risk of becoming pathological. Two studies (Martinez, et al., 2016; Zisook et al., 2016), for example, use the concepts of drink-

ing "more than usual" and "too much", yielding a prevalence of 25.3 - 27% and 17.3 - 18% respectively among surveyed residents. One author reported that 19% of residents drank in excess of 3 units of alcohol per week (Lebensohn et al., 2013). In another article, an AUDIT-3 score of over 3 units corresponded to alcohol dependence and that 15.93% of the residents met this criterion (Pereira-Lima et al., 2016). Other authors, however, identify pathological use at AUDIT-10 scores of higher than 8 points, representing 10% (Talih et al., 2016) and 22% (Melo et al., 2016) of the respondents. For others, the pathological use criterion is a score of greater than 2 on the CAGE Scale, which is met by 8.9% of residents studied (Akvardar et al., 2004).

Among the factors associated with alcohol use are: being male, residents of surgical specialties, extraversion, sleep deprivation, greater number of on-duty shifts, depressive symptoms, anxiety symptoms, active suicidal ideation, previous suicide attempts, illicit drug use and greater perceived stress (Bunch et al., 1992; Lebensohn et al., 2013; Mansukhani et al., 2012; Martinez, et al., 2016; Olagunju et al., 2016; Pereira-Lima et al., 2016).

Some authors (Earle et al., 2005; Lebensohn et al., 2013; Martinez, et al., 2016; Mousa et al., 2016; Talih et al., 2016) found an association between drinking and depressive symptoms. This comorbidity is related to greater severity of depressive symptoms, intense moods, active suicidal ideation, history of suicide attempts, and the use of other psychoactive substances. Some articles suggest that up to 21.4% of resident use alcohol as a method of coping with symptoms of depression or anxiety (Earle et al., 2005; Lebensohn et al., 2013; Martinez, et al., 2016; Ogunsemi et al., 2010). Some authors, on the other hand, observed that the most frequent motivations for drinking were to relax after a tense day (31.5%) and/or reduce stress (17.8%) (Akvardar et al., 2014). Several authors point out that, since the residency period is usually associated with greater stress, there is an increased risk of developing pathological alcohol use as an unhealthy coping mechanism when facing emotional overload (Bunch et al., 1987; Pereira-Lima et al., 2016; Talih et al., 2016).

Regarding the self-prescription of psychotropics for handling distress, studies reveal prevalence figures that fluctuate between 2% and 13.4% (Akvardar et al., 2004; Earle et al., 2005; Fagnani Neto et al., 2004; Koran et al., 1988; Lebensohn et al., 2013; Mousa et al., 2016; Ogunsemi et al., 2010; Talih, et al., 2016; Zisook et al., 2016). One article specifies that it is the benzodiazepines which are most frequently self-prescribed (8.2%) (Akvardar et al., 2004). In a study cited in a systematic review (Mansukhani et al., 2012), 38% of residents reported having used a sedative-type drug to sleep after an on-call night shift, 2.4% said they used zolpidem, and up to 21.4% used the modafinil psychostimulant. While some authors (Lebensohn et al., 2013) report that women report greater self-adminis-

tration of sedatives than men, others find no differences between the sexes (Earle et al., 2005).

One article reported an association between self-prescription of drugs and use of illicit drugs (Talih et al., 2016), and in terms of substance use, the prevalence figures vary from 2.7% to 14% (Akvardar et al., 2004; Earle et al., 2005; Matheson et al., 2015; Ogunsemi et al., 2010; Talih et al., 2016; Zissok et al., 2016). According to one article, the illicit drug most frequently used among residents was cannabis, although its prevalence was not clearly defined (Akvardar et al., 2004). A study with surgical residents describes them as less likely to use marijuana, cocaine, tobacco, tranquilizers, amphetamines, LSD, barbiturates, opiates or heroin in the previous year than other trainees (Bunch et al., 1992).

Other authors point out that 79% of those who started using alcohol, marijuana or cocaine also ended up using sedatives, stimulants or opioids (Koran et al., 1988). A more recent study mentions that substance use correlates positively with the abuse of psychotropic drugs and alcohol, and the severity of depressive symptoms (Talih et al., 2016).

The negative impact of emotional distress and substance use on the quality of care is reflected in several studies. In some studies, 3% of residents acknowledge that their professional performance may have been diminished by alcohol use (Martinez, et al., 2016). Others mention that anxiety and depression impair performance in at least 33% of the cases studied (Mousa et al., 2016). Among psychiatry residents, high levels of anxiety and depressive symptoms are associated with worse relationships with peers, preceptors and patients (Melo et al., 2016). Additionally, those whose use of alcohol increased during their training period showed greater deterioration in the interprofessional relationships and increased concern regarding the worsening of anxiety/depressive symptoms, with fear of failure in interpersonal relationships. Some authors point out that the onset of impaired professional performance in a resident may be an alarm signal leading to suspicion of depression, an anxiety disorder, and ultimately contributing to the development of alcohol or drug addiction (Minter et al., 2014).

## Discussion

Most studies conducted to date on medical residents focus their attention on analyzing the state of participants' mental health, identifying those at risk of developing mental disorders and understanding the characteristics of alcohol and/or other drug use. By limiting the scope of the systematic review to those studies specifically addressing dual diagnosis among residents, the number of articles was significantly restricted. Most of these are cross-sectional, which therefore only allow correlations to be established between variables without determining possible causal relationships. Regarding the identification of psychological

distress and substance use, the definitions and the threshold used to define normal pathology vary significantly across the studies. Many simply identify the presence of anxiety or depressive symptoms without a clear diagnosis of mental disorder. As for substance use, the definitions of risk behaviors vary widely and few studies show the presence of a defined addiction disorder. The studies also lack a clear description of the characteristics of this training period in the different countries. Given the above, it can be said that the phenomenon of comorbidity between mental and addictive disorder is, at least, poorly defined in the literature to date despite the existence of enough data to raise awareness of the importance of analyzing the coexistence of both among medical residents in depth.

In the studies analyzed, the prevalence of depression and anxiety among resident doctors varies from 10.2% to 70%, and from 13.2% to 33.9% respectively, with the lowest figures pointing to the presence of a defined mental disorder and the highest reflecting the presence merely of anxiety or depression symptoms or the risk of developing a mental disorder. In any case, these estimates exceed the prevalences within the general population of an equivalent socio-economic and educational level. Between 6.7% and 25% of studies report that the residents studied had suicidal ideation at the time of the evaluation.

For some authors, depressive and anxiety symptoms increase throughout the residency, which is probably related to growing responsibilities and new challenges over the years (Earle et al., 2005; Mousa et al., 2016), but others suggest that it is at the beginning of the residency when the emotional distress is greatest (Fagnani Neto et al., 2004).

Some personality traits of residents (such as neuroticism), certain work circumstances typical of the residence period (work overload, time pressure, sleep deprivation), in addition to the concurrence of other family and/or social stressors (Mansukhani et al., 2012; Ogunsemi et al., 2010; Talih et al., 2016; Zissok et al., 2016), have been associated with the presence of emotional distress in this period.

In relation to alcohol use, prevalence is estimated to range from 20% to 81.4%, although hazardous drinking is closer to 20%. Regarding the self-prescription of psychotropics for coping with distress, studies reveal prevalence figures fluctuating between 2% and 13.4%, with those of a sedative or hypnotic type being more frequently used, although the use of stimulants is not negligible, in some cases exceeding 20%. Substance use, meanwhile, is estimated at between 2.7% and 14%, with cannabis the most frequently used.

Most studies concur that the presence and severity of emotional distress symptoms (anxious and/or depressive) is associated with increased drinking and greater use of illicit drugs and/or psychotropic drugs. Moreover, higher alcohol use is positively correlated with the self-prescription of psychotropic drugs and substance use. Drinking is also



associated with the presence of active suicidal ideation and previous suicide attempts.

Results regarding sex differences are not consistent, probably because of the differences in detection methods and temporal and spatial divergence of the studies. An increased risk of anxiety/depressive symptoms is apparent in women using sedatives, which may be related to factors such as a tendency to internalize psychological conflicts, greater number of demands in training programs, difficulty in achieving a career-life balance, as well as the lack of role models in leadership positions (Matheson et al., 2016). Nevertheless, the use of alcohol and illicit drugs is greater in men.

Regarding medical specialties, there are some which continue to be identified by some studies as being at greater risk (psychiatry, anesthesiology, internal medicine and family medicine), compared to others, such as in the surgical field, where the known prevalence of emotional distress and/or addictive behaviors is lower.

Studies agree that a decline in professional performance not previously present may be a significant alarm signal for depression, anxiety disorder or perhaps something which could develop into an addiction to alcohol and/or other drugs (Minter et al., 2014).

This systematic review raises awareness of the importance of taking dual diagnosis into account in medical residents. From a methodological point of view, we recommend that future studies:

- Expand sample size.
- Use structured diagnostic interviews following the initial screening surveys. Merely carrying out self-administered surveys increases the likelihood of bias both in terms of selection and those related to the self-report of symptoms or problematic behaviors.
- Use only definitions and scales which have been standardized and internationally validated when analyzing substance use.
- Conduct longitudinal or prospective studies which help analyze the etiological relationships between drug and/or alcohol use and other mental disorders.
- Provide a clear description of the characteristics of the residency period covering: weekly work hours, remuneration, number of on-call shifts, number of patients at the healthcare facility, number of residents per year, transversal and longitudinal competencies of the resident.
- Perform a differentiated analysis by specialization or by year of training, and a differentiated analysis by sex.

Despite the methodological limitations mentioned above, the link between severity of resident doctors' emotional distress and the presence of risky behaviors regarding substance use, from alcohol to self-prescribed medication and even illicit drugs is clear. Improving our knowledge of residents' psychological distress in and, in

particular, of the simultaneous appearance of mental and addictive disorders, is vital when laying the foundations for promoting the healthy exercise of medicine, while ensuring that professional practice is safe from the start. From the preventive point of view, offering therapeutic or interpersonal support during residency is known to be a fundamental protective factor in preventing the onset of mental disorders (Tyssen et al., 2007). In addition, the percentage of residents requesting emotional support and self-care supervision services during their training is growing (Matheson et al., 2016). Specialized services engaging with doctors as patients, such as the Program for Comprehensive Care of the Sick Physician (PAIME) in Spain (Braquehais, Tresidder & DuPont, 2015) and training activities for trainee doctors and tutors, such as those developed by entities such as Fundació Galatea in Catalonia, can be inspirational in improving the personal well-being of these professionals, while also positively improving the quality of care.

## Conflicts of interest

None.

## References

- Akvardar, Y., Demiral, Y., Ergor, G. & Ergor, A. (2004). Substance use among medical students and physicians in a medical school in Turkey. *Social Psychiatry and Psychiatric Epidemiology*, 39, 502–506. doi:10.1007/s00127-004-0765-1.
- Arria, A. M. & Dupont, R. L. (2010). Nonmedical prescription stimulant use among college students: Why we need to do something and what we need to do. *Journal of Addictive Diseases*, 29, 417–426. doi:10.1080/10550887.2010.509273.
- Blancafórt, X., Masachs, E., Valero, S. & Arteman, A. (2009). *Estudio sobre la salud de los residentes de Cataluña*. Barcelona: Fundación Galatea. Retrieved at [www.fgalatea.org/pdf/estudi\\_mir\\_cast.pdf](http://www.fgalatea.org/pdf/estudi_mir_cast.pdf).
- Braquehais, M. D., Tresidder, A. & DuPont, R. L. (2015). Service provision to physician with mental health and addiction problems. *Current Opinion in Psychiatry*, 28, 324–329. doi:10.1097/YCO.0000000000000166.
- Braquehais, M. D., Eiroa-Orosa, F. J., Holmes, K. M., Lusilla, P., Bravo, M., Mozo, X. & Sher, L. (2016). Differences in physicians' and nurses' recent suicide attempts: An exploratory study. *Archives of Suicide Research*, 20, 273–279. doi:10.1080/13811118.2014.996693
- Brooks, S. K., Gerada, C. & Chalder, T. (2011). Review of literature on the mental health of doctors: Are specialist services needed? *Journal of Mental Health*, 20, 146–156. doi:10.3109/09638237.2010.541300.
- Bunch, W. H., Dvonch, V. M., Storr, C. L., Baldwin, D. W. C. & Hughes, P. H. (1992). The stresses of the surgi-



- cal residency. *Journal of Surgical Research*, 53, 268–271. doi:10.1016/0022-4804(92)90046-3.
- Clark, D. C. (1988). Alcohol and drug use and mood disorders among medical students: Implications for physician impairment. *QRB - Quality Review Bulletin*, 14, 50-54. doi:10.1016/S0097-5990(16)30190-7.
- Earle, L. & Kelly, L. (2005). Coping strategies, depression, and anxiety among Ontario family medicine residents. *Canadian Family Physician Médecin de Famille Canadien*, 51, 242–243.
- Fagnani Neto, R., Obara, C. S., Macedo, P. C. M., Cítero, V. A. & Nogueira-Martins, L. A. (2004). Clinical and demographic profile of users of a mental health system for medical residents and other health professionals undergoing training at the Universidad de Federal de São Paulo. *Sao Paulo Medical Journal*, 122, 152–157.
- Fahrenkopf, A. M., Sectish, T. C., Barger, L. K., Sharek, P. J., Lewin, D., Chiang, V. W. & Landrigan, C. P. (2008). Rates of medication errors among depressed and burnt out residents: Prospective cohort study. *British Medical Journal*, 336, 488–491. doi:10.1136/bmj.39469.763218.BE.
- Flaherty, J. A. & Richman, J. (1993). Substance use and addiction among medical students, residents, and physicians. *The Psychiatric Clinics of North America*, 16, 189–197. doi:10.1016/S0193-953X(18)30201-6.
- Gerada, C. (2019). Clare Gerada: Doctors and their defences. *BMJ*, I871. doi:10.1136/bmj.I871.
- Grotmol, K. S., Ekeberg, Ø., Finset, A., Gude, T., Moum, T., Vaglum, P. & Tyssen, R. (2010a). Parental bonding and self-esteem as predictors of severe depressive symptoms: A 10-Year follow-Up study of norwegian physicians. *Journal of Nervous and Mental Disease*, 198, 22–27. doi:10.1097/NMD.0b013e3181c8189c.
- Grotmol, K. S., Vaglum, P., Ekeberg, Ø., Gude, T., Aasland, O. G. & Tyssen, R. (2010b). Alcohol expectancy and hazardous drinking: A 6-year longitudinal and nationwide study of medical doctors. *European Addiction Research*, 16, 17–22. doi:10.1159/000253860.
- Hem, E., Stokke, G., Tyssen, R., Grønvold, N. T., Vaglum, P. & Ekeberg, Ø. (2005). Self-prescribing among young Norwegian doctors: A nine-year follow-up study of a nationwide sample. *BMC Medicine*, 3. doi:10.1186/1741-7015-3-16.
- Hughes, P. H., Brandenburg, N., Baldwin, D. C., Storr, C. L., Williams, K. M., Anthony, J. C. & Sheehan, D. V. (1992). Prevalence of substance use among US physicians. *Journal of the American Medical Association*, 267, 2333-2339. doi:10.1001/jama.1992.03480170059029.
- Koran, L. M. & Litt, I. F. (1988). House staff well-being. *The Western Journal of Medicine*, 148, 97–100.
- Lebensohn, P., Dodds, S., Benn, R., Brooks, A. J., Birch, M., Cook, P. & Maizes, V. (2013). Resident wellness behaviors: Relationship to stress, depression, and burnout. *Family Medicine*, 45, 541–549.
- Lerner, R. M. (2002). The differential approach. In: B. Webber (Ed.), *Concepts and Theories of Human Development* (pp. 409-437). Nueva Jersey: Lawrence Erlbaum Associates.
- Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P. & Moher, D. (2009). The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. *Journal of Clinical Epidemiology*, 62, 1-34. doi: 10.1016/j.jclinepi.2009.06.006.
- Lindeman, S., Läärä, E., Hakko, H. & Lönnqvist, J. (1996). A systematic review on gender-specific suicide mortality in medical doctors. *British Journal of Psychiatry*, 168, 274–279. doi:10.1192/bjp.168.3.274.
- Lydall, G. J., Malik, A., Blizard, R. & Bhugra, D. (2009). Psychological impact of systemic training failure on mental health and career satisfaction of UK trainees: Lessons from an online attitudes survey. *International Journal of Social Psychiatry*, 55, 180–190. doi:10.1177/0020764008095031.
- Mansukhani, M. P., Kolla, B. P., Surani, S., Varon, J. & Ramar, K. (2012). Sleep Deprivation in Resident Physicians, Work Hour Limitations, and Related Outcomes: A Systematic Review of The Literature. *Postgraduate Medicine*, 124, 241–249. doi:10.3810/pgm.2012.07.2583.
- Martinez, S., Tal, I., Norcross, W., Newton, I. G., Downs, N., Seay, K., ... Zisook, S. (2016). Alcohol use in an academic medical school environment: A UC San Diego Healer Education Assessment and Referral (HEAR) Report. *Annals of Clinical Psychiatry : Official Journal of the American Academy of Clinical Psychiatrists*, 28, 85–94.
- Mata, D. A., Ramos, M. A., Bansal, N., Khan, R., Guille, C., Di Angelantonio, E. & Sen, S. (2015). Prevalence of depression and depressive symptoms among resident physicians: A systematic review and meta-analysis. *JAMA*, 314, 2373-2383. doi:10.1001/jama.2015.15845.
- Matheson, K. M., Barrett, T., Landine, J., McLuckie, A., Soh, N. L. & Walter, G. (2016). Experiences of psychological distress and sources of stress and support during medical training: A survey of medical students. *Academic Psychiatry*, 40, 63–68. doi:10.1007/s40596-015-0395-9.
- Mayall, R.M. (2016). Substance abuse in anesthetists. *British Journal Academy Education*, 16, 236-241. doi:10.1093/bjaed/mkv054.
- Melo, M. C. A., De Bruin, V. M. S., Das Chagas Medeiros, F., Santana, J. A. P., Lima, A. B., & De Francesco Daher, E. (2016). Health of Psychiatry Residents: Nutritional Status, Physical Activity, and Mental Health. *Academic Psychiatry*, 40, 81–84. doi:10.1007/s40596-015-0458-y.
- Minter, R. M., Dunnington, G. L., Sudan, R., Terhune, K. P., Dent, D. L. & Lentz, A. K. (2014). Can this resident

- be saved? Identification and early intervention for struggling residents. *Journal of the American College of Surgeons*, 219, 1088–1095. doi:10.1016/j.jamcollsurg.2014.06.013.
- Mousa, O. Y., Dhamoon, M. S., Lander, S. & Dhamoon, A. S. (2016). The MD Blues: Under-Recognized Depression and Anxiety in Medical Trainees. *PLoS ONE*, 11, 1–10. doi:10.1371/journal.pone.0156554.
- Ogunsemi, O. O., Alebiosu, O. C. & Shorunmu, O. T. (2010). A survey of perceived stress, intimidation, harassment and well-being of resident doctors in a Nigerian teaching hospital. *Nigerian Journal of Clinical Practice*, 13, 183–186.
- Olagunju, A. T., Ogundipe, O. A., Lasebikan, V. O., Coker, A. O. & Asoegwu, C. N. (2016). Pattern of anxiety psychopathology experienced among postgraduate medical trainees. *Bangladesh Journal of Medical Science*, 15, 25–32. doi:10.3329/bjms.v15i1.20497.
- Pereira-Lima, K., Loureiro, S. R. & Crippa, J. A. (2016). Mental health in medical residents: Relationship with personal, work-related, and sociodemographic variables. *Revista Brasileira de Psiquiatria*, 38, 318–324. doi:10.1590/1516-4446-2015-1882.
- Saipanish, R. (2003). Stress among medical students in a Thai medical school. *Medical Teacher*, 25, 502–506. doi:10.1080/0142159031000136716.
- Salamero, M. & Baranda, L. (2018) Longitudinal study of health, lifestyles and working conditions of resident doctors of Catalonia. Barcelona: Fundació Galatea. Retrieved at <https://www.fgalatea.org/Upload/Documents/5/4/542.pdf>.
- Schwenk, T. L., Davis, L. & Wimsatt, L. A. (2010). Depression, stigma, and suicidal ideation in medical students. *JAMA*, 304, 1181–1190. doi:10.1001/jama.2010.1300.
- Smith, J. W., Denny, W. F. & Witzke, D. B. (1986). Emotional impairment in internal medicine house staff: Results of a national survey. *JAMA*, 255, 1155–1158. doi:10.1001/jama.1986.03370090077024.
- Støen Grotmol, K., Gude, T., Moum, T., Vaglum, P. & Tyssen, R. (2013). Risk factors at medical school for later severe depression: A 15-year longitudinal, nationwide study (NORDOC). *Journal of Affective Disorders*, 146, 106–111. doi:10.1016/j.jad.2012.08.047.
- Talih, F., Warakian, R., Ajaltouni, J., Shehab, A. A. S. & Tamim, H. (2016). Correlates of depression and burn-out among residents in a Lebanese academic medical center: A cross-sectional study. *Academic Psychiatry*, 40, 38–45. doi:10.1007/s40596-015-0400-3.
- Tyssen, R., Vaglum, P., Grønvold, N. T. & Ekeberg, Ø. (2000). The impact of job stress and working conditions on mental health problems among junior house officers. A nationwide Norwegian prospective cohort study. *Medical Education*, 34, 374–384. doi:10.1046/j.1365-2923.2000.00540.x.
- Tyssen, R. & Vaglum, P. (2002). Mental health problems among young doctors: An updated review of prospective studies. *Harvard Review of Psychiatry*, 10, 154–165. doi:10.1080/10673220216218.x.
- Tyssen, R., Dolatowski, F. C., Røvik, J. O., Thorkildsen, R. F., Ekeberg, Ø., Hem, E. & Vaglum, P. (2007). Personality traits and types predict medical school stress: A six-year longitudinal and nationwide study. *Medical Education*, 41, 781–787. doi:10.1111/j.1365-2923.2007.02802.x.
- Zisook, S., Young, I., Doran, N., Downs, N., Hadley, A., Kirby, B., ... Tiamson-Kassab, M. (2016). Suicidal ideation among students and physicians at a U.S. medical school: A Healer Education, Assessment and Referral (HEAR) Program Report. *OMEGA (United States)*, 74, 35–61. doi:10.1177/0030222815598045.