Occupational Contact Dermatitis in 10,582 French Patients Reported between 2004 and 2007: A Descriptive Study

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Key Words

Occupational contact dermatitis · Lost workdays ·
Descriptive study · Work-related disease

Abstract

Background: Limited epidemiological data are available in France for occupational contact dermatitis (OCD), a non-infectious inflammatory skin condition arising from direct skin contact with substances used in the workplace. **Objective:** To estimate the occurrence of, and number of workdays lost to, OCD in France. **Methods:** Descriptive study of all OCD declared by salaried workers and recognised as occupational disease in France over a 4-year period. **Results:** 10,582 OCD cases were reported, representing 9.6% of all occupational diseases recognised. The estimated annual incidence of OCD recognised was 15.72/100,000 salaried workers (i.e. 146.87/100,000 employees for all occupational diseases). OCD cases were mainly in the construction and public works industries with 3,057 (36.7%) salaried workers affected. In the services sector, OCD predominantly affected employees aged less than 30 years (41%), particularly hairdressers (69%). OCD accounted for the loss of 395,069 working days. **Conclusion:** OCD represents a significant public health problem in France, particularly for construction workers and hairdressers.

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Introduction

Contact dermatitis is considered to be occupational if it is the direct consequence of a cutaneous contact with materials used in the workplace [1]. Occupational contact dermatitis (OCD) includes allergic contact dermatitis, irritant contact dermatitis and protein contact urticaria. The hands, important tools of communication and expression [2], are the primary site of involvement in 80–90% of cases of OCD [2, 3]. Moreover, 52% of hand dermatitis cases are caused by occupational exposure [4]. Evolving chronicity has been reported in nearly half of OCD cases, with concomitant physical and psychological consequences [5, 6], as well as a significant impact on social relations, daily life and work activities [7–9]. Indeed, OCD causes a decrease in the quality of life comparable to that reported for generalised eczema and psoriasis [10]. There is, however, little epidemiological data available in France relating to OCD. Our objective was therefore to evaluate the significance and the social and professional consequences of OCD in France using data gathered by the Professional Risks Department of the National Insurance for Salaried Workers' Illnesses (Caisse Nationale d'Assurance-Maladie des Travailleurs Salariés; CNAMTS).

Table 1. The 9 National Technical Committees of the INRS

<p>A Metallurgical industries</p> <ul style="list-style-type: none"> – Metallurgy and metal processing – Industrial and automotive repair – Shipbuilding, aerospace, space and rail – Mechanical construction – Manufacture of machinery and equipment – Manufacture of components and electrical and electronic equipment – Various activities (control equipment, optical equipment, prosthetics, etc.) <p>B Construction and public works industries</p> <ul style="list-style-type: none"> – Building: structural and finishing work – Public works – Other construction activities <p>C Transport industries, water, gas, electricity, books and communication</p> <ul style="list-style-type: none"> – Transportation and handling – Logistics – Energy, water collection and waste treatment – Communication and entertainment <p>D Services, commercial and food industries</p> <ul style="list-style-type: none"> – Food industries – Food shops – Retail – Hotels, cafes and restaurants <p>E Chemical, rubber and plastics industries</p> <ul style="list-style-type: none"> – Chemistry, petroleum, pharmaceutical – Rubber – Plastics 	<p>F Wood industries, furniture, paper and cardboard, textiles, clothing, leather and hides, rocks and petrochemicals</p> <ul style="list-style-type: none"> – Wood, furniture – Paper, cardboard – Stone and petrochemicals (quarries and materials) – Textiles, clothing, leather and animal hides – Recovery, recycling <p>G Non-food commercial</p> <ul style="list-style-type: none"> – Construction materials, do-it-yourself, hardware – Metals, petrochemicals – Vehicles, cycles and their equipment – Furniture, appliances, multimedia – Clothing, footwear, pharmacies ... – Department stores, multicommercial shops, social venture capital <p>H Service activities I</p> <ul style="list-style-type: none"> – Financial and research firms – Insurance – Local government (local and hospital authorities) – Other administrations – Social security – Teaching organisations (teachers and administrative) – Other activities (public research, home services, testing offices) <p>I Service activities II and temporary work</p> <ul style="list-style-type: none"> – Temporary work – Cleaning and disinfection – Health professions – Social work in all its forms, including personal assistance – Economic, social and cultural organisations – Other activities (contract work, surveying offices, etc.)
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Methods

Our study selected all OCD cases which had been declared by salaried workers and recognised as occupational diseases by the CNAMTS between January 1, 2004, and December 31, 2007. The declaration of a skin condition under occupational disease must be given by the patient himself and requires a descriptive initial medical certificate from a doctor (physician, occupational physician or dermatologist). The data relating to statements of occupational disease is gathered at the national level by the CNAMTS [11]. Those OCD cases included resulted in a work stoppage ranging from at least 24 h to permanent disability in the year under consideration. The affected employee received compensation covering all costs.

We calculated the annual incidence (new cases occurring each year) of OCD declared and recognised and occupational diseases from the annual number of contact dermatitis cases from the data of the National Statistics Institute and Economical Studies (Institut National de la Statistique et des Etudes Economiques; INSEE) on the working population in different occupations in France between 2004 and 2007 [12].

The following information was gathered for each OCD patient:

- Geographical region where registered.
- The profession and the activity sector according to the classification of the National Institute of Research and Safety for the prevention of work accidents and professional diseases (Institut National de Recherche et de Sécurité pour la prévention des accidents du travail et des maladies professionnelles; INRS). This classification is divided into 9 main industries in which the different activities of French enterprises are divided (table 1) [11]. There is a specific committee in the INRS for each sector of activity to carry out studies in the area of professional risks as well as means of prevention. We used INSEE data to calculate the annual incidence of OCD recognised in various sectors of activity.
- The causative agent – identified by clinical history, site or patch testing.
- Gender and age range.
- Number of workdays lost due to OCD.

All data were entered into a Microsoft Excel spreadsheet (version 2003; Microsoft, Redmond, Wash., USA), and statistical analysis was performed using version 11.5 of SPSS Statistics software (IBM, New York, N.Y., USA) for Windows. Absolute and relative frequencies were calculated for qualitative variables, and means ($\pm$ SD) were used for quantitative variables.

Table 2. Annual number of salaried workers, total occupational disease cases and OCD cases in France from 2004 to 2007

	Population of salaried workers	Occupational diseases	OCD
2004	17,523,982	23,107	2,461
2005	17,878,256	24,415	2,932
2006	17,786,989	25,755	2,725
2007	18,263,645	31,671	2,470
Total		104,948	10,582 (9.6%)
Average annual number	17,863,218	26,237	2,645.5
Incidence per 100,000 salaried workers		146.87	14.81

Results

Number of OCD Cases

Over the 4 years studied, 10,582 cases of OCD were reported, representing 9.6% of total occupational diseases ($n = 104,948$) reported among salaried workers in France during the same period (table 2).

Estimated Annual Incidence of OCD

On the basis of an average number of salaried workers of 17,863,218, the annual estimated incidence of OCD declared and recognised was 14.81 cases/100,000 employees, and the annual estimated incidence of total occupational diseases was 146.87 new cases/100,000 salaried workers.

Geographic Distribution of OCD

The distribution of OCD cases reported across France was differentiated by region (fig. 1). The three regions with the greatest number of OCD cases were, in descending order, the Paris region (20.81%), the Rhone-Alps region (12.44%) and the Provence, Alps, Côte d'Azur region (10.42%).

Distribution and Annual Incidence of OCD in Various Sectors of Activity

Within the population of 10,582 individuals affected by OCD, information on the employees' activity sector was available for 8,329 subjects, which was 78.7% of the study population (fig. 2). The three activity sectors with the largest number of OCD cases were the construction and public works industries, service activities II industry, and the metallurgical industry, with 3,057 (36.7%), 2,321 (27.9%) and 954 (11.4%) affected salaried workers, respectively. The principal professions at risk for OCD within the construction industry and public works were, in descending order, masons ($n = 1,636$; 53.5%), machinery operators and drivers ($n = 633$; 20.1%), layers of floor-

Fig. 1. Distribution of OCD by French region.

ing and tiles ($n = 205$; 6.7%), house painters and wallpaper hangers ($n = 164$; 5.4%) and handlers ($n = 141$; 4.6%). In the service activities II sector, professional hairdressers ($n = 1,039$; 44.8%), household and maintenance ($n = 880$; 38%) and health professionals ($n = 319$; 13.7%) were the three occupational groups at greatest risk of developing OCD. In the metallurgical industry, the professions most affected by OCD were sheet metal worker boilermakers ($n = 101$; 10.6%), toolmakers and related workers ($n = 95$; 9.9%), welders and cutters ($n = 69$; 7.2%), grinders, polishers and tool sharpeners ($n = 60$; 6.3%), and moulders and coremakers ($n = 44$; 4.6%).

Table 3. Annual incidence of occupational disease and OCD per 100,000 salaried workers in France from 2004 to 2007

	Average number of salaried workers	Annual incidence of occupational disease per 100,000 salaried workers	Annual incidence of OCD per 100,000 salaried workers
A Metallurgical industries	1,956,898 (11%)	269	12.2
B Construction and public works industries	1,443,838 (8%)	247	52.9
C Transport industries, water, gas, electricity, books and communication	2,027,810 (11%)	72.1	3.1
D Services, commercial and food industries	2,234,434 (13%)	273	6.6
E Chemical, rubber and plastics industries	484,671 (3%)	294	19.7
F Wood industries, furniture, paper and cardboard, textiles, clothing, leather and hides, rocks and petrochemicals	608,765 (3%)	414	20
G Non-food commercial	2,290,218 (13%)	57.6	2.52
H Service activities I	3,716,271 (21%)	28.8	0.38
I Service activities II and temporary work	3,100,812 (17%)	111	18.7

Fig. 2. Distribution and annual incidence of OCD in various business sectors.

Some industries, however, had a significantly smaller proportion of OCD, namely the trade and food industry (7%), the transport, water, gas, electricity, books and communication industries (3%), as well as the non-foodstuff shop sector (2.8%) and the service activities I sector (0.7%).

The annual incidence of OCD declared and recognised per 100,000 salaried workers allows the sectors which are most at risk to be determined (table 3). For all industrial sectors combined, the incidence of OCD was 14.81 cases/100,000 salaried workers. The annual incidence of OCD was greatest in the construction and public works industries with 52.9 cases/100,000 employees, 4.6 times higher than the rate seen in the general population. The OCD incidence was also high in the wood, furniture, paper and cardboard, textiles, clothing, leather, stonework and petrochemical industries (20 cases/100,000 salaried workers), the chemical, rubber and plastics industries (19.7 cases/100,000 salaried workers), and service activities II (which included professional hairdressers, health staff, and cleaning and maintenance workers; 18.7 cases/100,000 employees).

The Causative Agents

The three major causative agents of OCD were cement (3,016; 28.5%), plastic materials (1,144; 10.8%) and oil and fats (982; 9.3%) (table 4).

Age Groups and Gender Distribution of OCD

In our study, there was an overall male predominance of OCD cases (7,266 men; 69%). For both genders combined, the four age groups most frequently affected by OCD were, in descending order, 40–49 years (3,071 cases; 29%), 30–39 years (2,703 cases; 25.5%), 50–59 years (2,292 cases; 21.7%) and 20–29 years (1,939 cases; 18.3%) (fig. 3). Study of the distribution of OCD depending upon age and gender across industries demonstrated a male predominance of OCD in the construction industry (92.5%),

Table 4. Causative agents of OCD

Causative agents	Number of cases ^a	Risk occupation ^b
Cement	3,016 (28.5%)	Construction and public works industries 1,799 (59%) Masons 1,105 (36.6%) Concrete workers and professional finishers 246 (8.15%) Layers of flooring and tiles 113 (3.8%) Construction labourers 81 (2.7%)
Plastics materials	1,144 (10.8%)	Hairdressers and beauticians 238 (20.8%) Construction painters and wallpaper hangers 69 (6.03%) Floorers and tillers 67 (5.9%)
Oils and fats	982 (9.3%)	Trimmers and users of machine tools 296 (30.1%) Vehicle mechanics and fitters 123 (12.5%) Toolmakers and related workers 48 (4.9%) Assemblers in mechanical construction 33 (3.4%)
Metals	971 (9.2%)	Domestic helpers and household cleaners 79 (8.15%) Hairdressers 56 (5.8%) Home builders 51 (5.3%) Mechanics and vehicle adjusters 32 (3.3%) Salespeople and demonstrators in stores 31 (3.2%)
Inorganic chlorates	689 (6.5%)	Domestic helpers and household cleaners 149 (21.6%) Hairdressers 108 (15.7%) Servers and bartenders 20 (2.9%) Cooks 16 (2.3%) Orderlies 14 (2%)
Antiseptics and disinfectants	639 (6%)	Housekeeping staff and maintenance 214 (33.5%) Hairdressers 91 (14.2%) Cooks 20 (3.1%) Mechanics and vehicle fitters 17 (2.7%) Caregivers 15 (2.3%) Vendors and store demonstrators 13 (2.0%)
Solvents, resins and glues	613 (5.8%)	Housekeeping staff and maintenance 76 (12.4%) Mechanics and vehicle fitters 59 (9.6%) Hairdressers 35 (5.7%) Sheet metal workers 33 (5.4%) Lacquer polishers 29 (4.7%) Painters and wallpaper hangers 28 (4.6%)
Latex and rubber	469 (4.4%)	Maintenance personnel 150 (32.0%) Nurses 41 (8.7%) Caregivers 29 (6.2%) Hairdressers 42 (9%) Dental assistants 13 (2.8%) Butchers-fishmongers 13 (2.8%) Midwives 13 (2.8%) Doctors 8 (1.7%) Cooks 6 (1.3%)

^a Percentage of the study population is given in parentheses. ^b Percentage of OCD caused by the causative agents is given in parentheses.

Fig. 3. Distribution of OCD as a function of age and sex.

Table 5. Total and average number of days off work

	Total number of days off work	Average number of days off work per individual
A Metallurgical industries (n = 954)	43,909	46.02
B Construction and public works industries (n = 3,057)	140,805	46.05
C Transport industries, water, gas, electricity, books and communication (n = 250)	9,268	37.10
D Services, commercial and food industries (n = 587)	28,389	48.36
E Chemical, rubber and plastics industries (n = 383)	20,084	52.43
F Wood industries, furniture, paper and cardboard, textiles, clothing, leather and hides, rocks and petrochemicals (n = 489)	19,906	40.70
G Non-food commercial (n = 231)	10,394	44.90
H Service activities I (n = 57)	2,423	42.50
I Service activities II and temporary work (n = 2,321)	103,848	44.74
Undefined (n = 2,230)	15,113	6.70
Total	395,069	37.33

metallurgical industry (86%), transport, water, gas, electricity, books and communication, and wood industries (83.6%) and in the furniture, paper and cardboard, textiles and apparel industries (72.8%). For hairdressers, health care personnel and employees in cleaning and maintenance, the percentage of women with OCD was 93.7, 90.3 and 78.1%, respectively. Overall in our study, 23% of employees with OCD were over 50 years of age. These were predominantly from the transportation, water, gas, electricity, books and communication industries (31.2%), the construction industry (29.1%), the wood, furniture, paper and cardboard, textiles, clothing, hides, stone and petrochemical industries (26.4%) and the metallurgical industry (26.1%).

Working Days Lost due to OCD

Overall, OCD caused a total loss of 395,069 working days. The average number of workdays lost due to OCD was 37.3 (table 5). The loss of working days per patient was highest in the chemical, rubber and plastics industries (52.43 days), the services, business and nutritional industries (48.36 days), the construction and public works industries (46.05), the metal industry (46.02) and in the non-food commercial industry sector (44.9 days). The average number of days lost to OCD in the books and communication activity sector was 37.1 days, which was just below the overall study average.

In all activity sectors, 3,326 employees (31.4%) lost over 15 working days due to OCD. Of these, 587 (5.5%) lost between 16 and 30 days, 787 (7.4%) lost 31–60 days,

431 (4%) lost 61–90 days, 762 (7.2%) lost 91–180 days and 759 (7.1%) lost between 180 days and 1 year. The number of workdays lost was 15 or less in 810 employees with OCD (7.6%), while 6,444 employees (60.9%) with occupational diseases had no workdays lost. For a total of 2,230 OCD patients in this study, professional activity was not disclosed; of these only 115 (5.1%) lost more than 15 workdays.

Discussion

Between 2004 and 2007, the total number of occupational diseases recognised in all categories has increased from 23,107 to 31,671, which corresponds to an overall increase of 37%. However, during this same period, there was a relative stability in OCD, which only increased by 0.3% from 2,461 to 2,470. Meanwhile, there was a 4.2% increase in the number of employees between 2004 and 2007, from 17,523,982 to 18,263,645 individuals. In our study, OCD represented 9.6% of occupational diseases. It is however important to make it clear that national statistics on occupational diseases underestimate the frequency of cases of contact dermatitis as they do not take account of those occurring in individuals who are not salaried workers and cannot benefit from such recognition. Furthermore, criteria governing recognition as an occupational disease mean it is possible to pay compensation only for OCD associated with a restricted list of substances and the reporting of an occupational disease is not mandatory.

The proportion of OCD among occupational diseases recognised varies by country: 15% in the USA [13], 16% in Denmark [14] and Finland [15], 22% in the UK [16] and 34% in Germany [17].

In our study, the annual incidence of OCD declared and recognised is 14.81/100,000 salaried workers. Interpretation of the incidence of OCD recognised as an occupational disease in France must be analysed with caution as there is a time lag between a declaration and recognition which might take several months. The annual incidence of OCD declared and recognised in France is less than that reported in the Netherlands (150/100,000) [18], Denmark (80/100,000) [19], Finland (51/100,000) [15], Australia (20.5/100,000) [19] and in northern Bavaria (67/100,000) [20]. According to the US Bureau of Labor Statistics, the annual incidence was 46 cases/100,000 workers [21]. However, it is probable that the actual number of cases is higher than the number reported [21]. Indeed, it is estimated to be 10–50 times greater due to low-

severity tables not being taken into account [22]. In the UK, the EPIDERM information-gathering system established in January 1996 revealed the annual incidence of OCD to be 6.4 cases/100,000 workers and 6.5 cases per 100,000 from reports by dermatologists and occupational physicians, respectively, giving an overall rate of 12.9 cases per 100,000 patients [23]. It is probable that the annual incidence of OCD in France is much greater because there is a significant number of non-covered and non-declared skin diseases in this country [24]. In France as a whole, 43.7% of OCD cases are reported in the Paris, Rhone-Alps and the Provence, Alps, Côte d'Azur regions.

Our study indicates that, in descending order, the annual incidence of OCD recognised is the greatest in the building and public works industry, followed by the wood, furniture, paper and cardboard, textiles, clothing, leather, stone and petrochemical, chemical, and the rubber and plastics industries, and then by the service activities II industries, which includes professional salon employees, health staff, and cleaning and maintenance workers. These sectors are considered to be particularly at risk [4, 18, 25–29]. A retrospective Dutch study of a cohort of 371 nurses and 110 office workers established an OCD incidence of 6.5 cases/1,000 person-months for nurses and 1 case/1,000 person-months for office workers [30]. Another study in 74 apprentice hairdressers and nursing students showed that the incidence of eczema reached 32.8 cases/100 person-years for hairdressers and 14.5 cases/100 person-years for nurses [31]. Furthermore, a clinical study in Belgium, in which patch tests were carried out on more than 9,700 patients, established that the professional groups most affected included mechanics, household employees, metallurgical workers, cleaners, healthcare workers, office employees, construction workers, hairdressers, beauticians, bakers and restaurant workers [32].

The most common causative agent in our study was cement (28.5% of cases), mostly affecting workers in the construction and public works industries. OCD due to cement exposure has been associated with irritant contact dermatitis, which ranges from cement burns to cumulative irritant contact dermatitis. Although hairdressing is one of the professions most affected in the sector (9.8% of cases of OCD), hair products are not amongst the allergens most frequently mentioned. One might wonder about the incidence of fragrance and cosmetics in this population [33], but this cannot be studied from our data as fragrances are not grounds for recognition as an occupational disease.

In our study, OCD recognised predominantly affected male workers (7,266 men, 69% of cases). However, data from INSEE indicate that men in France made up 47.7% of salaried workers between 2004 and 2007. In our study, there was a male predominance in the construction industry and public works sector and also in metallurgical industry. Women were found to be more often affected in the healthcare, cleaning and hairdressing sectors. This indicates that occurrence of OCD depends more on exposure to environmental factors than it does on gender. Indeed, Meding [34] suggested that the higher prevalence among women in contact irritant dermatitis is probably due to exposure, both professional and non-professional, and not to inherent differences linked to gender in the sensitivity of the skin to cutaneous irritants [35].

Overall in our study, 22.4% of employees with OCD were under 20 years of age. These were predominantly working in service activities (41%), especially hairdressers (69%), workers in non-food commercial businesses (34.2%), and in the services, trade and food industries (32.4%). The average age of OCD patients varies according to the type of profession [36]. Occurrence in relatively young age groups can be explained by their lack of professional experience, with a consequence that their level of knowledge is frequently insufficient for the products used and the preventative measures which could be taken. Another hypothesis is linked to the fact that patients in young age groups have a history of atopic dermatitis, which could increase their propensity to develop OCD fairly rapidly during the first years of exposure to exogenous irritating agents and/or allergenic agents. Atopic dermatitis favours the development of an irritating contact dermatitis and as a consequence allergic contact eczema [37]. A study by McCall et al. [38] involving 611 cases of OCD recognised between 1990 and 1997 in Oregon, USA, indicated that 47% of patients had been working for less than 1 year when the cutaneous lesions appeared. It is therefore essential to immediately inform new employees of potential causative agents that they will be exposed to in their job, and to provide training as to what preventative measures can be adopted to avoid them coming into contact with the skin. It has been established that bakers contract their OCD quickly, and masons later [36]. Hairdressers present with OCD early in their career, and a certain number are forced to abandon their profession before the age of 30 years [39]. More than half of all OCD is experienced in the first 2 years of commencing work [20] due to poor knowledge of agents responsible and poor skin hygiene. This justifies establishing educational programmes in

different professional sectors [40], in particular for cleaning and maintenance employees [41], apprentice bakers [42], restaurant workers [43], hairdressers [44, 45], student nurses [46], and workers in the chemical [47] and metallurgical industries [48]. Ideally, educational measures should be put in place before a new employee starts work, i.e. before they are exposed to sensitising and irritating agents. This could help to reduce the number of days lost due to OCD which could be particularly valuable for workers with limited job tenure [38].

Our study highlights the effect of OCD on work productivity in France, with a total loss of 395,069 workdays at an average of 37.3 workdays lost per employee with OCD. It is difficult to quantify the cost inherent in the effects of OCD on work productivity which takes into account the duration of absenteeism and the necessity or not to change profession [49]. Many studies have been conducted to evaluate the consequences of OCD on work productivity. A multi-centre study carried out in 10 European centres indicated that 28% of patients with hand dermatitis were unable to work, 12% of whom were off work for more than 12 weeks [50]. Another study, which followed 954 Australian OCD patients, found that 6% were incapable of working for over 12 consecutive months [51]. Moreover, a Swedish study of 517 OCD patients indicated that 48% were declared unfit to work for a period of at least 7 days, and that 15% of patients had to change career [52]. A monitoring study in OCD patients found that 19.9% of employees had to stop work, with loss of employment occurring in 23% of cases [49]. A Canadian study of 235 workers with OCD found that 35, 14 and 17% of cases were required to stop work for more than 1 month, between 1 week and 1 month, and for less than 1 week, respectively [53]. Another Swedish study reported that 81% of hand dermatitis patients were inhibited in activities of their daily life, with 21% missing work and 8% being required to change profession [5]. Similarly, an American study demonstrated that hand dermatitis caused a reduction in patients' quality of life, and limited their activity and work performance compared with people unaffected by the disease [54]. A 10-year Danish monitoring study of 274 hand dermatitis patients reported that 12.4% had a disease-related work stoppage, while 8.5% had to change their profession [55].

Conclusion

OCD represents 9% of occupational diseases, constituting a significant public health problem. The incidence of OCD recognised is 13.81/100,000 salaried workers in France. Preventative and protective measures should be taken to reduce the risk of OCD in all professions, with particular focus on construction workers and hairdressers, who are more prone to develop the disease. It is important to put in place a monitoring strategy for professions at risk of OCD in France in order to unleash priority regional or national actions. Epidemiological studies play an important role in controlling outbreaks and disease trends, analysing risk factors and monitoring effectiveness of preventive measures. Efficient coordination between dermatologists, treating physicians, occupational physicians and the competencies of specialised services should aid patients suffering from OCD, for which the incidence rate is underestimated.

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