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Original article

Psychological impact of the SARS-CoV-2 outbreak on the staff of a French hospital

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A B S T R A C T

Background: The outbreak of SARS-CoV-2 has resulted in anxiety, depression and post-traumatic stress disorder (PTSD) among hospital staff. The factors associated with this psychological impact remain to be determined.

Methods: A cross-sectional study using an online questionnaire completed by the staff of a French hospital, two months after the SARS-CoV-2 outbreak.

Results: Among the 353 participants (of whom 67% were healthcare professionals), 32% had symptoms of anxiety, 16% of depression and 16% of PTSD. Eleven per cent had initiated or increased treatment with sleeping pills, and 6% with anxiolytics. In a multivariate analysis, factors independently associated with anxiety were: change of professional team, having a relative infected by SARS-CoV-2 and a new/increased treatment with sleeping pills or anxiolytics. The only factor associated with depression was the feeling of risk during professional practice. The factors associated with PTSD were: having a relative infected by SARS-CoV-2, the feeling of risk during professional practice, the increase in smoking and treatment with sleeping pills. The observance of transmission preventive measures (TPM) was not associated with the psychological impact of SARS-CoV-2. A personal history of SARS-CoV-2 infection and age < 36 years were associated with insufficient use of protective equipment. Age < 36 years, and being a healthcare professional were associated with the non-observance of social distancing.

Conclusion: The hospital staff displayed psychological consequences, resulting in the use of anxiolytics and sleeping pills. Belonging to a group with low-risk of severe disease was associated with lower observance of TPM.

1. Introduction

A SARS-CoV-2 coronavirus epidemic started in China in December 2019 and has led to more than 85 million cases and 1.8 million deaths worldwide up to January 2021. France has been affected by 2.6 million cases and 65,000 deaths. In March and April 2020, during the first outbreak, hospitals were forced to reorganise urgently to accommodate patients presenting with severe SARS-CoV-2 infections, especially in the Île-de-France and Grand-Est regions. Institutional reorganisation encountered several challenges, notably related to uncertainties about the natural history of the disease, efficient preventive measures, and tensions related to supply of medical protective material/equipment and drugs. The outbreak also had an impact on the personal life of medical staff, due to reorganisation of family life and the reduction of sleeping and rest times. Several studies conducted in China during the SARS-CoV-2 outbreak and previous studies conducted during the Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS) epidemics revealed high levels of anxiety, depression and post-traumatic stress disorders (PTSD) among healthcare professionals [1,2]. In France, studies have evaluated the psychological impact of the SARS-CoV-2 epidemic on specific populations, such as intensive care unit (ICU) healthcare professionals [3–5], radiologists [4], residents in oncology, radiotherapy, urology and surgery [7–9], community pharmacists [10] and professionals working in acute care geriatric facilities [11]. However, global data on the psychological impact of the SARS-CoV-2 epidemic on hospital staff are lacking.

Our primary objective was to assess/evaluate the psychological impact of the SARS-CoV-2 epidemic on the staff of a hospital in the Île-de-France region, two months after the first outbreak. Our secondary objectives were to identify personal and professional risk factors for anxiety, depression and PTSD, to evaluate the impact of psychological symptoms on the consumption of tobacco,
alcohol and psychotropic drugs and on the observance of measures to prevent transmission, i.e. the use of personal protective equipment (PPE) and social distancing at work.

2. Material and methods

2.1. Population

The Groupe Hospitalier Sud Île-de-France (GHSIF) includes the hospitals of Melun (350 beds) and Brie Comte-Robert consisting of 66 geriatric beds and 197 places of housing for dependent elderly people (EHPAD). During March and April 2020, the GHSIF received 830 patients infected by SARS-CoV-2. The GHSIF employs 1788 “full-time equivalent” professionals. A psychological support unit (PSU) for the hospital staff was put into place on March 23, 2020 to prevent psychological risks. From its creation until June 26 2020 (start of our study), this support unit performed 369 consultations, i.e. individual conversations and support groups, in all departments (medical and administrative), referral units and EHPADs. PSUs also offered relaxation, hypnosis and sophrology sessions, implemented by trained volunteers.

2.2. Psychological questionnaire for staff

In the overall context of outbreak feedback, the hospital staff was invited by mail and by the managers to answer a self-completed, anonymous questionnaire, available on the internal hospital website from June 15 until June 26, 2020. The questionnaire included socio-demographic data, evaluated the personal and professional organisational changes induced by the outbreak, the psychological impact, the evolution in alcohol, tobacco and psychotropic drugs consumption, the use of PPE during health care and the respect of social distancing with colleagues during meals. After answering questions regarding transmission preventive measures (TPM), participants were invited to choose one or several reasons for their attitude of compliance or non-compliance from a predetermined list.

Anxio-depressive disorders were assessed by the Hospital Anxiety and Depression Scale (HAD). This scale, developed by Zigmond and Snith [12], detects anxio-depressive disorders, excluding somatic symptoms that might skew evaluation. It has been translated and validated in many countries, notably on a population of professionals in France [13]. It comprises of 14 items, rated from 0 to 3 points. Seven questions refer to anxiety (total A) and seven to depression (total D), allowing the calculation of two scores. For each score (A and D), the interpretation is as follows: score ≤ 7, absence of symptoms, score 8–10, possible symptoms, score ≥ 11, certain symptoms. PTSD was assessed by the Impact of Event Scale – Revised (IES-R). This auto-questionnaire was developed by Horowitz et al. [14] and completed by Weiss and Marmar [15]. It investigates the main symptoms of PTSD listed in the DSM-IV, and includes 22 items distributed in 3 scales evaluating avoidance, intrusive thoughts and hypervigilance. The respondents are asked to describe the occurrence of different behaviour patterns during the 7 previous days, on a frequency scale ranging from 0 to 4 points. A total score of 40 to 55 indicates moderate PTSD symptoms, and a score above 56 severe symptoms.

2.3. Statistical analysis

Statistical analysis was performed with Epi-Info™, version 7.2.3.1. The descriptive analysis of discontinuous variables comprised frequencies and percentages, and analysis of continuous variables comprised medians and interquartile ranges. The factors associated with a psychological impact of the SARS-CoV-2 outbreak and inobservance of TPM were sought out in univariate analysis by Fisher’s exact test. Significant variables (P < 0.05) were included in multivariate analysis in a logistic regression model.

3. Results

3.1. Description of the population

The response rate was 20% of the hospital personnel having been invited to respond (n = 353), 89% of the participants were women. The description of the population is shown in Table 1. Two-thirds of the participants (n = 238, 67%) were healthcare professionals, with a high proportion of nurses, caregivers and physicians. Half of them had more than 10 years of professional experience.

During the outbreak, 20% had been temporarily separated from their family, 23% had had a family member infected by SARS-CoV-2, and 9% had been infected themselves.

| Table 1 | Characteristics of the 353 participants*. |
| --- | --- |
| **Socio-demographic data** | **n (%)** |
| Sex |  |
| Female | 312 (89) |
| Male | 38 (11) |
| Age |  |
| < 25 years | 15 (4) |
| 25 to 35 years | 90 (21) |
| 36 to 45 years | 109 (31) |
| 46 to 55 years | 108 (31) |
| > 55 years | 31 (9) |
| Marital life |  |
| Single | 162 (46) |
| Married | 253 (72) |
| Widowed | 16 (5) |
| Divorced | 1 (0.3) |
| Schoolchildren | 196 (56) |
| Individual vulnerability to SARS-CoV-2 | 66 (19) |
| Family member vulnerable to SARS-CoV-2 | 109 (31) |
| **Professional data** |  |
| Healthcare professional | 238 (67) |
| Nurse | 95 (27) |
| Caregiver | 38 (11) |
| Physician | 33 (6) |
| Health manager | 24 (2) |
| **Professional experience** |  |
| Student | 2 (1) |
| < 5 years | 75 (21) |
| 5 to 10 years | 80 (23) |
| > 10 years | 196 (56) |
| **Location** |  |
| Hospital | 326 (92) |
| EHPAD | 27 (8) |
| **Department** |  |
| Emergency unit | 25 (7) |
| Intensive care unit | 23 (7) |
| Medical department | 63 (18) |
| Others | 242 (69) |
| **Personal impact of SARS-CoV-2** |  |
| Change of residency | 11 (3) |
| Separation from family | 71 (20) |
| Personal infection by SARS-CoV-2 | 33 (9) |
| Family member infected by SARS-CoV-2 | 82 (23) |
| **Professional impact of SARS-CoV-2** |  |
| Feeling of taking risk |  |
| No | 48 (14) |
| Rarely | 118 (34) |
| Often | 181 (52) |
| **Working while being ill** |  |
| Working | 49 (14) |
| Change of professional team | 94 (27) |
| Acquisition of new professional competences | 155 (45) |
| Acquisition of new professional relations | 213 (62) |
| Dynamism of scientific research | 134 (41) |
| Disappearance of hierarchical barriers | 71 (21) |

* Total < 353 for some variables, as the questionnaire offered the opportunity to not respond.
Table 2
Results of the psychological scales and psycho-active substance consumption.

| Psychological status | n(%) |
|----------------------|------|
| HAD scale – Anxiety  |      |
| No anxiety symptomatology (≤ 7) | 240 (70) |
| Possible anxiety symptomatology (8–10) | 65 (18) |
| Certain anxiety symptomatology (≥ 11) | 48 (14) |
| HAD scale – Depression |      |
| No depression symptomatology (≤ 7) | 299 (85) |
| Possible depression symptomatology (8–10) | 34 (10) |
| Certain depression symptomatology (≥ 11) | 20 (6) |
| IES-R total score |      |
| Mild symptoms (0–39) | 295 (84) |
| Moderate symptoms (40–55) | 36 (10) |
| Severe symptoms (≥ 56) | 22 (6) |
| Smoking |      |
| No | 273 (77) |
| Yes, stable | 40 (11) |
| Yes, increased | 31 (9) |
| Yes, decreased | 7 (2) |
| Daily alcohol consumption |      |
| No | 300 (85) |
| Yes, stable | 24 (7) |
| Yes, increased | 21 (6) |
| Yes, decreased | 3 (1) |
| Daily cannabis consumption | 4 (1) |
| Initiation / increased treatment for anxiety | 22 (6) |
| Initiation / increased treatment for insomnia | 37 (11) |

\* Total < 353 for some variables, as the questionnaire offered the opportunity to not respond.

3.2. Impact of the outbreak on professional organisation

During the outbreak, 27% of participants changed their professional team and 14% worked while being ill. More than half reported a feeling of taking risks in their professional activity. However, they also said they had developed new professional relations (62%), acquired skills (45%) and observed dynamism in scientific research (41%) and the disappearance of hierarchical barriers (21%).

3.3. Psychological impact of the outbreak, consumption of tobacco, alcohol and psychootropic drugs

The medians and interquartile ranges of psychological scales were as follows: HAD-anxiety, 6 [4–8]; HAD-depression, 3 [1–6]; IES-R-avoidance, 6 [2–11]; IES-R-hypervigilance, 4 [1–8]; IES-R-intrusive thoughts 8 [3–15]; IES-R-total 19 [8–33]. The psychological scores and tobacco, alcohol and psychotropic drug consumption are detailed in Table 2. In summary, 32% of participants had symptoms of anxiety (severe 14%), 16% of depression (severe 6%) and 16% of PTSD (severe 6%). During the outbreak, 11% of participants had initiated or increased treatment for insomnia, and 6% treatment for anxiety. The treatment was allopathic medicine requiring medical prescription for 27 out of 37 patients (insomnia) and 18 out of 22 patients (anxiety); and homeopathic treatments or phytotherapy in other cases.

3.4. Use of personal protective equipment and respect of social distancing

Among 316 professionals who evaluated their use of PPE, 258 (73%) reported compliance with local guidelines, 33 (9%) insufficient use and 25 (7%) excessive use. Regarding social distancing during meals, evaluated from 340 responses, this was respected in 187 cases (53%), not respected in 138 cases (39%), and not applicable in 15 cases (4%). The main motivations of professionals who reported a correct use of PPE were the concern to protect their family and relatives (n = 214, 83%). Additional scores were: awareness of the severity of the disease (n = 211, 82%), sense of responsibility towards their patients (n = 176, 68%), duty of exemplarity (n = 118, 46%), confidence in the local recommendations (n = 105, 41%), feeling of being well-informed (n = 105, 41%) and feeling of being well-protected (n = 80, 31%). The main justifications for insufficient use of PPE were lack of PPE availability (n = 16), discomfort (n = 13), the feeling that ‘we do too much’ (n = 11) and waste of time (n = 8).

Non-compliance with social distancing during meals was mainly the result of organisational constraints (n = 92) and the need for relaxation and proximity with colleagues (n = 68).

Fifty-eight participants declared that they had changed their attitude towards preventive measures since the beginning of the epidemic. The trigger factors for change were: death of a patient infected by SARS-CoV-2 (n = 20), infection of a family-member by SARS-CoV-2 (n = 20) and personal infection by SARS-CoV-2 (n = 17). 3.5. Factors associated with the psychological impact of the SARS-CoV-2 outbreak and non-compliance with transmission preventive measures (TPM)

Factors associated with the psychological impact of the SARS-CoV-2 outbreak and the non-compliance with TPM in univariate analysis are summarised in Tables 3 and 4. In multivariate analysis (Table 5), the factors independently associated with anxiety were treatment with anxiolytics or sleeping pills, change of professional team, and having a family-member infected with SARS-CoV-2, while the only factor associated with depression was the feeling of taking risks in the exercise of one’s professional duty. The factors associated with PTSD were treatment with sleeping pills, increased smoking, the feeling of taking risks in the exercise of professional activity, and having a family member infected with SARS-CoV-2.

Personal history of SARS-CoV-2 infection and age younger than 36 years were significantly associated with insufficient use of PPE, while risk-factors for severe SARS-CoV-2 infection and a HAD-Anxiety score = 8 were associated with excessive use of PPE. Lastly, belonging to health-care personnel or being younger than 36 years old were associated with non-compliance to social-distancing during meals. Unlike univariate analysis, being a nurse and working in intensive-care unit were not associated with non-compliance to social-distancing.

4. Discussion

4.1. The main results

This study evaluating the psychological impact of the SARS-CoV-2 epidemic on hospital staff in France presents two specificities compared with previous studies: analysis of the consumption of tobacco, alcohol and psychotropic drugs, and compliance with measures to prevent transmission.

Our study, performed two months after the first SARS-CoV-2 outbreak in the Île-de-France region, shows 32% anxiety and 16% depression within the hospital staff. These percentages are much lower than the 45 to 55% anxiety and 25 to 60% depression observed in previous international reports involving the HAD scale, which were performed at the peak of the epidemic in China and Brazil [16–18]; it bears mentioning that these reports were based on a lower HAD scale cut-off value (8 points) and included “suspected” anxiety or depressive disorders. When compared to the 2 French studies using the same HAD scale cut-off value as ours (11 points), which disclosed 14.6% and 19% anxiety, and 12% and 9% depression among radiologists and ICU healthcare workers respectively [5,6], the psychological impact in our population is slightly higher than expected. Other French studies used a lower HAD scale cut-off value (8 points) [3,7], but did not mention their cut-off [4] or apply
other evaluation scales [9], which precluded comparisons with our results.

We found 16% PTSD in our population, which is higher than in the previous international studies using the IES-R questionnaire, with the exception of a Chinese study which found 35% incidence of PTSD in healthcare workers [19]. Studies in Singapore and India found rates of 7 and 8%, respectively, [20,21]. The difference between our findings and those of other previously published studies is all the more significant because we used a threshold of ≥40 IES-R points, as recommended in France, instead of the threshold of ≥24 or 26 points employed in the previous studies. However, our results are consistent with the 16% to 27% incidence of PTSD obtained with various evaluation scales (IES-R, Post-traumatic Stress Disorder Checklist for DSM-5) among French ICU professionals and pharmacists [4,5,10].

Our questionnaire included questions on treatment with psychotropic drugs, to objectively support conclusions on the psychological impact of the epidemic on the hospital staff. If the percentage of participants who initiated or increased treatment with anxiolytics or sleeping pills was low (6 and 11%, respectively), the requirement of medical prescriptions for their delivery, and significant association with the HAD scale and the IES-R, undoubtedly reveals a major impact in a small fraction of the hospital staff.

We also searched for an association between psychological condition and an increase in smoking and alcohol consumption. In the general population, Stanton et al. showed that a modification in alcohol consumption and smoking habits was correlated with anxiety and depression levels [22]. In France, a national survey involving 222 residents in oncology and radiotherapy revealed an increase in consumption of tobacco in 31% of participants, alcohol in 29% and psychostimulants in 24% during the first peak of the SARS-CoV-2 epidemic [7]. Moreover, increased consumption of alcohol and tobacco was concomitantly associated with anxiety, depression and insomnia in 1001 residents and fellows of surgery [9]. We did not find such a correlation, even though PTSD symptoms were associated with an increase in smoking in our population. Although this observation is less worrisome than an initiation or increase of psychotropic treatment, it demonstrates a tangible impact of altered psychological condition on lifestyle.

We aimed to identify risk factors for anxiety, depression and PTSD in relation to the SARS-CoV-2 epidemic. We did not find some of the risk factors previously reported in the literature, such as female sex, young age, being a nurse or a “frontline worker” or belonging to non-medical staff [1–3,6,16,19,20,23–28]. This finding might be explained, with regards to age and sex, by the proportion of males and people younger than 25 years in our population. By contrast, we identified for the first time a change of professional team as contributing to the emergence of anxiety, and the feeling of taking risks in the practice of professional activity as promoting depression and PTSD. The identification of these new risk factors should facilitate the proposal of practical measures to limit the psychological impact of the epidemic on hospital staff. If changes in professional team and medical department are required, intensive support by the managers is necessary. In addition, providing sufficient PPE and improving the employees’ training on their proper use could reduce the sense of insecurity and limit the risk of subsequent depression and PTSD symptoms. The suitability of these measures has been confirmed by a French survey, in which sufficient PPE supply decreased the risk of anxiety and depression by 31% and 25%, respectively, among young surgeons [9]. Lastly,
the impact of the SARS-CoV-2 infection of a family member had not been previously studied in healthcare professionals. Although this risk factor is neither controllable nor related to professional activity, it might be a criterion to propose remedial psychological support to affected professionals.

As our objective was not to evaluate the efficacy of psychological support units (PSU), we were unable to determine if they had an impact on the percentages of anxiety, depression and PTSD. In contrast, our results confirm the relevance of extended support of hospital staff, of which PSU might be one modality. Long-term follow-up is all the more important because, in the case of SARS-CoV-1, PTSD symptoms have been described in healthcare providers several years after the epidemic in China, Hong Kong and Canada [29–31].

We initially hypothesised that the psychological impact of the SARS-CoV-2 outbreak and non-compliance to PTM might be interdependent. We supposed that anxio-depressive symptoms and/or PTSD would result either in an excess in PPE use, or, on the
contrary, to hopelessness and negligence. In a study involving 1642 participants from the general population in Cyprus, compliance with precautionary measures was associated with low scores of depression and high levels of anxiety [32]. Finally, in cases of anxiety, we did find an excessive use of PPE. Compliance with PPE was adequate, as only 9% of the professionals reported insufficient use. Altruistic motivations (protecting one's patients and family members), predominated over individual considerations; i.e., confidence in local recommendations, and feelings of being properly informed and protected.

Good compliance with PPE contrasted with the non-compliance with social distancing during meals in 39% of participants. This type of non-compliance results from two factors: logistical constraints, unsuitable premises and the obligation for some professionals to stay in the care unit; and the need for human contact with colleagues, to relax and consolidate team-spirit. Considering the deleterious impact of grouped SARS-CoV-2 infection cases in a professional team, ensuring respect of social distancing without compromising inter-personal relations and collective dynamics is a major internal organisation issue for hospitals and health-care structures.

4.2. Limitations of the study

The monocentric design of the study did not allow us to transpose its conclusions to all types of hospital staff. However, as the GHSIF belongs to hospitals which were in the forefront of the SARS-CoV-2 outbreak, it is unlikely that the psychological impact of this epidemic has been underestimated.

Voluntary participation in the study could have constituted a selection bias, as there was a risk that only personnel strongly affected by the outbreak would participate. Heightened recognition of the positive aspects of reorganisation (development of new professional relations and new skills, scientific interest, etc.) suggests that the questionnaire was completed by a representative sample of the hospital staff.

In addition, all previous studies on the mental health of hospital staff during the SARS-CoV-2 epidemic used the same methodology, which legitimates comparison of our results with data from the literature. The responses to some HAD scale such as ‘I still enjoy the things I used to enjoy’ or ‘I look forward with enjoyment to things’ might have been affected by the practical impossibility to practice many social or recreational activities. However, this methodological limit was also common to previous studies.

Whether the psychological impact of the SARS-CoV-2 epidemic on healthcare professionals differs from that on the general population is a matter of debate. A meta-analysis of 55 studies (including 45 in China and 41 in the general population) concluded that only the incidence of insomnia, but not depression, anxiety or PTSD, differed between healthcare professionals and the general population [33]. In our study, as in most previous work on the topic, the absence of a control group in the general population prevented us from unquestionably ascribing the psychological impact of the SARS-CoV-2 outbreak to professional activity. Other factors, such as containment, probably also contributed to mental health alteration. We believe, however, that this does not diminish the relevance of our results. We aimed to identify modifiable risk factors in the professional environment, to contribute to the reconsideration of efficient actions designed to reduce psycho-social risks of hospital staff. As extra-professional factors are not accessible to preventive strategies at workplace, the difficulty of quantifying them does not deeply impact our pragmatic reflection on the improvement of hospital organisation.

The absence of an internal control group (as we did not have data on the mental health status of hospital professionals before the SARS-CoV-2 outbreak) did not allow us to formally attribute the participants’ psychological condition to the outbreak. Some of these troubles might have pre-existed; however, their association with increased tobacco, alcohol and psychotropic drug consumption strongly suggests a real impact of the SARS-CoV-2 epidemic. Previous comparable studies suffer from the same bias. The study by Cailliet et al. constitutes an exception: the authors showed a higher incidence of anxiety, depression and PTSD in ICU healthcare professionals during the first peak of the SARS-CoV-2 epidemic compared to data from the literature on ICU professionals’ mental health [4]. Unfortunately, there exist no global reference data about mental health status of hospital staff in France before the SARS-CoV-2 epidemic. Georger et al., in a survey involving the whole hospital staff of 2 French hospitals during the same period, observed that 34% of respondents presented increased moral exhaustion compared to baseline [34]. Therefore, despite the absence of internal control, our presumption that the SARS-CoV-2 outbreak has had a significant psychological impact is consistent with previous studies.

Evaluating the prevalence of burn-out would have been interesting. It was not possible for practical reasons (the length of the questionnaire would have been considerably increased); this element should nonetheless be considered in subsequent studies. Lastly, considering the resurgence of the SARS-CoV-2 epidemic, a re-evaluation of the parameters of this study on a regular basis (for example, after 6 and 12 months) is needed, in order to detect long-term psychological consequences.

5. Conclusion

Two months after the first SARS-CoV-2 outbreak, the professionals of a first-line hospital significantly suffered from anxiodepressive and PTSD symptoms. The psychological impact of the epidemic had concrete consequences, as it was associated with the prescription of psychotropic drugs (anxiolytics and sleeping pills) and with increased smoking in cases of PTSD.

Several risk factors for psychological impacts were identified: change in professional team, feeling of taking risks in professional activity, and having a family member infected with SARS-CoV-2. These factors can be prevented, or their impact attenuated, by institutional organisation measures.

Finally, we observed that PPE use was adequate, mostly for altruistic reasons, while compliance with social distancing during meals was compromised by logistical constraints and by strengthened relations between colleagues. This last point is a major improvement target. Indeed, in the perspective of an extended epidemic, supporting of team-spirit under adequate sanitary conditions is of paramount importance.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the 1964 Helsinki declaration and its later amendments.

Human and animal rights

The authors declare that the work described has not involved experimentation on humans or animals.

Informed consent and patient details

The authors declare that this report does not contain any personal information that could lead to the identification of the patient(s) and/or volunteers.
Disclosure of interest

The authors declare that they have no competing interest.

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Authors’ contributions

Clara Plateau, Coralie Noël, Aurélie Bonnafoux, Eloïde Fuentes contributed to the study design; the statistical analysis was undertaken by Clara Plateau and Coralie Noël; and the article writing by Clara Plateau, Coralie Noël, Aurélie Bonnafoux, Eloïde Fuentes, Astrid de Pontarcy, and Sylvain Diamantis.

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