

Impact of 12-hr shifts in general hospitals: Study conducted in two intensive care units

Anne Fratissier¹ | Philippe Gauberti¹ | Rémy Morello^{2,3} | Bénédicte Clin^{1,2,4} 

¹CHU Caen, Service de santé au travail et pathologie professionnelle, Caen, France

²INSERM U1086 «ANTICIPE», Caen, France

³CHU Caen, Unité de biostatistique et recherche clinique, Caen, France

⁴Université de Caen Normandie, Caen, France

Correspondence

Bénédicte Clin, Service de Santé au Travail et Pathologie Professionnelle (Occupational Health Department), C.H.U. (University Hospital) Côte de Nacre, 14033 CAEN Cedex, France.
Email: benedicte.clin14@orange.fr

Abstract

Aim: To evaluate the impact of 12-hr shifts on health status, working conditions and satisfaction among nurses and healthcare auxiliaries in medical and surgical intensive care units in a general hospital.

Design: This study was a descriptive and prospective questionnaire study of personnel involved in the organization of 12-hr shifts.

Methods: The EVREST questionnaire was used, with the addition of two questions on respondents' health status and five questions on their job satisfaction. The study consisted of a first phase immediately before work was organized in 12-hr shifts and a second within 7–9 months of application of this organization.

Results: Positive effects were found among day nurses including decreased periods of pressure during the working day and improved work–life balance. Conversely, night nurses, who are not in favour of 12-hr shifts, reported dissatisfaction caused by a deterioration both in working conditions and in work–life balance.

KEYWORDS

12-hr shifts, general hospital, intensive care, nurses, nursing, occupational health, shift work

1 | INTRODUCTION

In health facilities, permanent care is required to ensure the management of patients 24 hr a day, 7 days a week. This public service mission imposes a shift-based organization covering this entire period for caregivers. The traditional 8-hr shift organizational model is increasingly being replaced by a system of two 12-hr shifts. In April 2017, the general hospital involved in this study set up a 12-hr shift organization for paramedical personnel in intensive care units for adults. Many reservations had been expressed, in particular because of uncertainties concerning schedules, the loss of the fixed 2-week schedule for the night shift and questions concerning work reorganization. An opinion poll conducted by management in March 2016 within the teams revealed that 42% of participants were

unfavourable to 12-hr shift organization, mainly among night workers (the participation rate in this survey was 83%).

More generally, the 12-hr shift is the subject of some controversy: It raises both economic issues (using this type of organization would lead to an economic gain for institutions) and regulatory issues (organization in 12-hr shifts is exceptional), but also working conditions and the health and safety of employees and patients. Organization and the sense of work are also questioned for these extended positions. Before the generalization of this working time organization, based on the extension of daily working hours, we believed essential to assess its impact on the state of health, working conditions and satisfaction of the staff concerned. The effects of shift work on health have been reported in the literature (Bae & Fabry, 2014; Chen et al., 2014; Geiger-Brown et al., 2012;

This is an open access article under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2020 The Authors. *Nursing Open* published by John Wiley & Sons Ltd

Han et al., 2011; Hansen, 2017; Harris et al., 2015; IARC, 2007; Li et al., 2016; Lin et al., 2015; Oh & Yim, 2018; Proper et al., 2016; Scott et al., 2006; Wang et al., 2014; Zoghipaydar, 2017); however, there is no consensus on the specific effects of extended shifts. These differences show that the question of the impact of 12-hr shift work on health must be studied in its particular context, the variable “12 hr” being combined with a multiplicity of other factors which also influence employee health. It is in this context that we sought to objectively examine the elements expressed by the staff concerned by this reorganization and to accompany them during its transition.

2 | THE STUDY

2.1 | Aims

This aim of the study was to evaluate the impact of this change in work schedules on health status, working conditions and satisfaction among nursing and auxiliary staff in the medical and surgical intensive care units of a general hospital in Normandy. The secondary objective was to define recommendations to improve the working conditions of these staff members, to avoid or limit deterioration of their health.

2.2 | Design

This study was a descriptive and prospective epidemiological study, by questionnaire, involving staff from the intensive care units of a general hospital in Normandy.

2.3 | Participants

The study was carried out among staff whose work was to be organized in 12-hr shifts, replacing an organization in two alternating day shifts (morning or afternoon) and one night shift in 10 hr. Inclusion criteria associated nurses and nursing auxiliaries who were working by day or night in the hospital's two adult, medical and surgical intensive care units. Employees working on shift arrangements, whose working time organization has not changed, were excluded from the analysis.

2.4 | Data collection

The EVREST (*Evolutions et relations en santé au travail*, Changes and Relationships in Occupational Health) questionnaire (Site EVREST), which includes indicators on working conditions, lifestyle and health, was used. To this standard questionnaire, we added two questions relating to respondents' state of health (complaints or clinical signs over the last 6 months and supposed link with work) and 5 questions related to their job satisfaction.

The part of the questionnaire relating to working conditions and lifestyle was completed alone by the caregiver, and the part relating to health status and satisfaction was jointly completed by the caregiver and the investigator (Occupational Health Intern or General Hospital Occupational Physician).

The questionnaire, together with the EVREST briefing note, was made available to staff in the different units of the intensive care department. The study consisted of two phases. The first phase (“time 1”) was conducted immediately before the implementation of 12-hr shifts, which began on 1 April 2017. The second (“time 2”) was conducted after a period of 7–9 months working on a 12-hr shift basis. The period of data collection was between 1 April 2017–1 January 2018. Prior information was provided to the relevant staff and management before the start of the survey (objectives, modalities, reporting of results). The questionnaire, together with the EVREST briefing note, was made available to staff in the various intensive care units. Staff wishing to participate in the survey could thus complete the first part of the questionnaire. The second part was completed, either with an Occupational Health Intern who joined the intensive care units, or with an occupational physician, during medical visits in the Occupational Health Department. To assess the potential existence of a difference between the two study periods, comparisons were made only for the caregiver population participating in both phases of the study.

2.5 | Ethical considerations

According to local regulations, no formal ethical scrutiny was required or undertaken.

2.6 | Data analysis

We chose to study the following variables, which we deemed to be the most relevant to assess the impact of the change in work schedule: time constraints and in particular the rating of time pressure difficulties, on a scale ranging from 0 (not difficult)–10 (very difficult); reconciliation between work and non-work life; the physical load of the workplace; condition of the cardiovascular system; neuropsychic condition; and osteo-vascular condition. We also focused on the presence of associated symptoms in the last 6 months, imputed to work. For sleep disorders, we first studied taking treatment within the last 7 days and then the presence of sleep disorders over the last 6 months, imputed to work. Concerning satisfaction, four of the five additional questions were analysed, those concerning working hours, the duration and schedule of breaks and meal times, hand-overs and opinion on 12-hr shifts. The methods of response were presented in 4 categories. For the sake of clarity, we grouped the response categories for most analyses (e.g. “somewhat” and “absolutely,” or “somewhat favourable” and “entirely favourable”).

We compared these different variables over time (evolution between the first and second phase of the study). When considered

relevant, the following indicators were also compared with staff characteristics: day or night assignment, nursing profession or caregiver, or age. During a second phase, we sought to determine the elements with an influence on overall opinion on 12-hr shifts, once implemented and experienced. To do so, among the results collected during the second phase of the study, we looked for a statistically significant association between the answers to the last question on the satisfaction questionnaire ("what is your opinion on work in 12-hr shifts?") and the answers to the following questions: time pressure, work-life balance, physical load of the workstation perceived as difficult or strenuous, the existence during the last 6 months of cardiovascular symptoms, fatigue and/or weariness, sleep disturbances, complaints in the upper limbs and dorsolumbar region, imputed to work, and satisfaction with work schedules and handovers.

Data are presented with the usual dispersion indicators in the form of a mean standard deviation or percentage depending on the quantitative or qualitative/categorical nature of the variable considered. The percentages were compared using the chi-square test or, if validity conditions for the chi-square test were not met, using the accurate Fisher test. For patients present during both periods, we used the Mc Nemar test for matched data. Analysis of variance (ANOVA) enabled means to be compared after verifying the hypothesis of equality of variances thanks to the Levene test. Post hoc analyses were conducted using the Bonferroni test. For patients present during both periods, repeated-measures ANOVA was used. If ANOVA was not valid, the ad hoc non-parametric tests allowed comparisons to be made: Mann-Whitney or Kruskal-Wallis for independent data, and Wilcoxon or Friedman for matched data. All analyses were conducted bilaterally for a risk $\alpha = 5\%$ with IBM®-SPSS® 22.0 software.

3 | RESULTS

One hundred and seventy-seven questionnaires were collected in the first phase of the study, 162 in the second. One hundred and sixteen employees completed the questionnaire for both phases of the study, that is 47% of the total population of intensive care

staff. The characteristics of responding staff are detailed in Table 1. The sample interviewed in both phases of the study (116 patients) was representative of the total population of intensive care staff, in terms of day or night assignment distribution ($p = .333$), nursing or auxiliary distribution ($p = .339$) and age distribution around 45 years ($p = .142$).

The average time pressure experienced at "time 1" was 5.43 ± 1.65 , evaluated on a scale of 0 to 10. It decreased significantly ($p = .032$) to 4.72 1.99 at "time 2." After implementation of 12-hr shifts, the time pressure experienced at work decreased significantly for day-shift workers ($p = .001$), however, became greater for night workers. This result contrasts with the result observed for "time 1" (Table 2).

Concerning establishing a satisfactory work-life balance, a statistically significant difference was observed at "time 2" of the study, depending on the day or night assignment, day workers describing a better work-life balance than night workers ($p = .001$) (Table 3).

A statistically significant increase in the number of patients reporting treatment for cardiovascular symptoms in the past 7 days ($p = .001$) was found, along with an increase in the number of patients reporting cardiovascular symptoms (almost exclusively venous disorders of the lower limbs) in the past 6 months, which they believed to be work-related ($p < .001$) (data not shown).

Between the two study times, we did not observe a statistically significant difference in terms of fatigue and/or weariness, experienced in the past 6 months and attributed to work among day staff ($p = .327$), or night staff ($p = .375$). At both times of the study, significantly more fatigue was attributed to work by night-shift workers than by day-shift workers ($p = .003$ and $.001$) (data not shown).

At "time 1," 39 caregivers (including 16 day and 23 night) reported that they had experienced sleep disorders in the past 6 months, which they believed to be work-related. This figure increased to 49 (19 day workers and 30 night workers) at "time 2" ($p = .11$). Night-shift workers reported significantly more sleep disorders attributed to work than day-shift workers, both before and after implementation of work on a 12-hr shift basis ($p < .001$) (data not shown).

For complaints concerning the upper limbs in the past 6 months attributed to work, we did not observe a statistically significant

	First questionnaire		Second questionnaire		Respondents to both questionnaires		Total population in the resuscitation dept.	
	N	(%)	N	(%)	N	(%)	N	(%)
	Day	108	(61%)	101	(62.3%)	76	(65.5%)	156
Night	69	(39%)	61	(37.7%)	40	(34.5%)	91	(36.8%)
Nurse	112	(63.3%)	102	(63%)	77	(66.4%)	154	(62.3%)
Nursing auxiliary	65	(36.7%)	60	(37%)	39	(33.6%)	93	(37.7%)
<45 years	131	(74%)	126	(77.8%)	92	(79.3%)	180	(72.9%)
≥45 years	46	(26%)	36	(22.2%)	24	(20.7%)	67	(27.1%)
Total	177		162		116		247	

TABLE 1 Characteristics of staff members having completed the questionnaires

TABLE 2 Mean time pressure perceived, in the total sample, and among day and night staff members

Perceived time pressure	Time 1		Time 2		p
	Mean	Standard deviation	Mean	Standard deviation	
Day (N = 76)	5.79	±1.43	4.54	±1.83	<.001
Night (N = 40)	4.75	±1.85	5.05	±2.25	.163
p	.001		.190		
Total (N = 116)	5.43	±1.65	4.72	±1.99	.032

TABLE 3 Mean work-life balance, in the total sample, depending on the day or night assignment, in time 1 and time 2

Work-life balance (moderately to highly in favour)	Time 1		Time 2		p
	N	(%)	N	(%)	
Day (N = 76)	67	(88.2%)	71	(93.4%)	.508
Night (N = 40)	31	(77.5%)	25	(62.5%)	.227
p	.173		.001		
Total (N = 116)	98	(84.5%)	96	(82.8%)	.824

difference after implementation of 12-hr shifts, neither among nurses or auxiliaries aged under 45 ($p = .307$), nor those aged over 45 years of age ($p = .727$). Similarly, complaints concerning lumbar vertebrae attributed to work, whether observed among nurses or auxiliaries, did not yield significantly different results in the first ($p = .435$) or the second time of the study ($p = .553$) (data not shown).

3.1 | Satisfaction questionnaire

Prior to implementation of 12-hr shifts, night workers were significantly more satisfied with their work schedules than day workers

TABLE 4 Satisfaction with regard to work schedules prior to implementation of 12-hr shifts, in the total sample, depending on the day or night assignment, in time 1 and time 2

Satisfaction with regard to work schedules prior to implementation of 12-hr shifts (moderately to highly in favour)	Time 1		Time 2		p
	N	(%)	N	(%)	
Day (N = 76)	53	(69.7%)	68	(85.5%)	.036
Night (N = 40)	36	(90.0%)	17	(35.0%)	<.001
p	.020		<.001		
Total (N = 116)	89	(79.7%)	79	(69.1%)	.203

TABLE 5 Satisfaction with regard to handovers prior to implementation of 12-hr shifts, in the total sample, depending on the day or night assignment, in time 1 and time 2

Satisfaction with regard to handovers prior to implementation of 12-hr shifts (moderately to highly in favour)	Time 1		Time 2		p
	N	(%)	N	(%)	
Day (N = 76)	68	(89.5%)	40	(52.6%)	<.001
Night (N = 40)	36	(90%)	6	(15%)	<.001
p	1.000		<.001		
Total (N = 116)	104	(89.7%)	46	(39.7%)	<.001

($p = .020$). Eight months after implementation of the 12-hr schedule, a reversal was observed: day workers becoming more satisfied ($p < .001$) (Table 4).

Dissatisfaction about handovers appears both among day and night-shift workers, but significantly more for night workers. Whereas, prior to the implementation of 12-hr shifts, both day and night-shift workers expressed the same satisfaction with regard to handovers ($p = 1$), a difference was observed at time 2 of the study: night workers reporting more dissatisfaction than day workers ($p = .001$) (Table 5). Results showed a link between the opinion on 12-hr shifts and satisfaction with handovers ($p = .001$): the proportion of staff dissatisfied with the quality of handovers being higher among those who were not in favour of 12-hr shift works.

3.2 | Relationship between the opinion on 12-hr shifts and other indicators

A statistically significant association between the time pressure felt at work and the 12-hr shift opinion was observed: the most favourable staff working in 12-hr shifts were those experiencing lower time pressure ($p = .014$). Similarly, a statistically significant association between the 12-hr shift opinion and work-life balance was observed

($p = .001$): the caregivers who were most in favour of working 12 hr were the ones who were best able to reconcile their work and non-work life.

The most unfavourable caregivers to 12-hr shifts were those who reported the most fatigue and/or fatigue in the past 6 months, which they believed to be work-related ($p = .009$). We also found a statistically significant association with sleep disorders ($p = .001$): caregivers most likely to work in 12-hr shifts reporting fewer sleep disorders imputed to work. Analyses allowed us to highlight a link between the 12-hr work opinion and satisfaction with work schedules ($p = .001$): the caregivers most likely to work in 12-hr shifts were more satisfied with their work schedules than those who were not.

The results show a link between the 12-hr work opinion and handover satisfaction ($p = .001$): the proportion of staff dissatisfied with the quality of handovers was higher among those who were unfavourable to work in 12-hr shifts, than among those who were in favour. We found no statistically significant association between the 12-hr shift opinion and the physical load of the workstation deemed to be difficult or painful ($p = .892$), cardiovascular symptoms ($p = .1$) and osteo-articular symptoms of the upper limbs ($p = .907$) and dorso-lumbar region ($p = .702$) for the last 6 months, imputed to work.

4 | DISCUSSION

Concerning working conditions, we have demonstrated that difficulties linked to perception of time pressure decreased significantly with the implementation of the 12-hr work schedule exclusively in day workers. Caregivers explained that the 12-hr shifts increased the ability to plan and allocate their tasks. Our results on time pressure reduction over 12-hr shifts are consistent with those of other studies. The National Association of Occupational Medicine and Ergonomics of Hospital Personnel (ANMTEPH) conducted a 12-hr work survey in 2014. Staff-perceived benefits included better workload regulation within 12 hr. Other studies also report similar results, with carers believing that the organization of the working day is facilitated over a 12-hr shift, which limits the sensation of leaving unfinished tasks to co-workers over the following time slot (Richardson et al., 2007).

Concerning establishing a satisfactory work-life balance, before the 12-hr shift schedule was implemented, we observed in our study a difference in work-life balance between day and night-shift workers, day workers reporting improved balance compared with night workers, but this difference is not statistically significant. Eight months after setting up work in 12-hr shifts, the difference observed in the first phase of the study increased to become highly statistically significant, with a reported improvement for day workers and a deterioration for night staff. The improvement described by day workers in our study seems to be mainly due to the greater number of days off, as well as a feeling of less "social gap" (fixed hours, less frequent morning shift and less late evening shift). On the other hand, the night-shift workers say they have a strong impact by taking

a more frequent shift in the evening (19.30 instead of 21.00 before the introduction of the 12-hr shifts), so much encroaching on social life-family, and by the loss of the fixed schedule they had before the 12-hr shifts. These various elements are consistent with the results of other 12-hr work studies. Many report an improvement in the quality of personal and family life (McGettrick & O'Neill, 2006) linked in particular to an increase in leave days, a reduction in home-work commuting, the possibility of a statistically significant disconnection for staff working in services with a high mental burden and lower childcare expenses. A recent study among nurses in a resuscitation unit reported that work interfered less with their private lives when on 12-hr shifts, that the percentage of over-invested nurses in their work was significantly lower in 12-hr shift workers and that psychosocial quality of life was also significantly improved (Huret, 2017).

Regarding effects on health, we observed a significantly large increase in cardiovascular symptoms. In most cases, these symptoms were in the form of the onset or the aggravation of venous disorders of the lower limbs. Caregivers reported an increase in the sensation of heavy legs. After approximately 8 months work in 12-hr shifts, respondents were almost five times more likely to have taken treatment for this category of symptoms in the past seven days (venous compression stockings) and more than seven times as many attributed these disorders to work. Similar results have already been highlighted in other studies (Vallery & Hervet, 2005). Sleep disorders did not increase significantly after work was organized in 12-hr shifts, nor did treatment intake in the last 7 days, nor troubles in the past 6 months, for both day work and night work. In the same way as for fatigue, however, a large difference was observed depending on the day or night assignment: the proportion of patients reporting work-related sleep disorders was three times higher for night workers than day workers ($p = .001$) at both study times.

Our non-significant results reflect the contradictory evidence reported in recent studies among caregivers working 12 hr. A study on paramedics working in a resuscitation unit reported better quality of life scores among those working in 12-hr shifts, whilst fatigue levels and sleep disorders were comparable to those working 8 hr a day and 10 hr a night (Dall'Ora et al., 2019; Webster et al., 2019). Another study, also carried out in a resuscitation unit, showed an overall improvement in the subjective quality and length of sleep of the staff concerned, 6 months after setting up work in 12 hr in that service. The authors suggest that this improvement may be the result of a change in sleep patterns, as well as an increased need for recovery from working 12-hr shifts (Huret, 2017). This same study also found lower levels of daytime sleepiness at work for 12-hr schedules. Finally, an interview study has provided information on fatigue: caregivers indicated increased fatigue at the end of the day and on the third day of work when the schedule called for three consecutive days of work, but pointed out that the greater number of days off made it possible to compensate for this fatigue (Thompson, 2019). The presence of osteo-articular disorders of the upper limbs during the last 6 months, attributed to work, did not vary significantly among all caregivers after implementation of the 12-hr shift, also for low back pain.

The lack of statistically significant degradation of health indicators, except for venous disorders of the lower limbs, should be interpreted with caution: indeed, the indicators explored by the EVREST questionnaire are self-reporting. It can be assumed that caregiver statements may have been influenced by a more favourable context, particularly for day-shift carers. We can also make the hypothesis that the absence of any deterioration of the state of health is related to a too short duration of work experimentation in 12-hr schedule (8 months on average in our study), health effects being likely to occur only in the longer term. Finally, our results could have been different if some thirty personnel, mainly in night schedule, had not left the service before the job was set up in 12 hr, inducing a possible healthy worker effect. Among all the caregivers interviewed in our study, satisfaction with working hours remained unchanged after the introduction of the 12-hr schedule.

Detailed analysis according to the day or night assignment provides interesting elements: we observed a highly statistically significant inversion, satisfaction increasing and becoming higher for the day staff, whilst declining sharply for night workers. For the day staff, this increase would be related to an improvement in their work life/private life balance and a decrease in their fatigue and sleep disorders. Other studies have reported similar results: caregivers working 12-hr shifts were more satisfied with their work schedules than those working 8-hr shifts (Stone et al., 2006). On the other hand, night-shift workers see their work/personal life balance deteriorates with the introduction of work in 12-hr schedule. They are also the ones that describe the most fatigue and sleep disorders. This is consistent with the results of other studies, which have shown that in terms of perceived health, the shift workers who report the most health problems are those who feel that their work adversely affects their non-work life (Stone et al., 2006; Wilson et al., 2019).

The clear decrease in satisfaction with regard to the quality of handovers highlighted in our study is explained by the caregivers by the disappearance of overlap times between teams, no longer allowing the performance of oral transmissions between all members of the team. Information is provided in writing. This result is consistent with the results of other studies, where the carers declare themselves dissatisfied with handovers, particularly their duration (Gillespie & Curzio, 1996). In a questionnaire study of resuscitation nurses, the score of the "organisation that does not allow communication" dimension appears to be worsening with the introduction of 12-hr shifts (Dall'Ora et al., 2019; Huret, 2017).

In the first phase of the study, only half of the staff were in favour, in principle, of working 12 hr. Around 8 months after its introduction, the number of favourable opinions increased significantly to 73.3% ($p = .001$). These results appear to be consistent with those of other studies conducted in this area. Caregivers working 12-hr shifts appear to be more satisfied with their work schedules than those working 8-hr shifts (Stone et al., 2006; Witkoski Stimpfel et al., 2019), benefits including more time for family and friends and improved sleep (Arne et al., 1998).

Our study has some limitations. Indeed, the power of our statistical analyses may be limited due to the small number of comparison

groups (particularly caregivers over the age of 45). Furthermore, the use of self-reported data may have rendered our results susceptible to motivational factors. The anonymization protocol and data protection were well explained to the survey participants, and questionnaire data were entered anonymously on the national database. However, at the time of collection of the paper questionnaire, the identification data (surname, first name, date of birth) required to be completed by the employee, which may have led to a fear of being identified and, thus, a potential reporting bias. We can also consider a possible selection bias, participation in the survey being on a volunteer basis: the subjects the most affected by this change in pace of work may have been more motivated to answer the questionnaires.

Regarding the content of the questionnaire, it may have been relevant to consider the family situation of responding staff members (number of children, dependent or not, marital status, spouse's occupation, etc.), which has a clear influence on the establishment of a work-life balance and may have enabled us to interpret the results of this question more accurately. We chose to add questions related to health status, covering the 6-month period immediately prior to the completion of the questionnaire. We deemed the extension of this period (initially set to seven days in EVREST) more appropriate for the evaluation of the impact on long-term health status and for the establishment of a potential link between reported symptoms and work, but this may have generated a memory bias. It would also have been interesting to add a question relating to the work schedule of the past week, to analyse items concerning health status more precisely over the last seven days. The EVREST questionnaire explores a very large number of indicators: we decided to analyse those which seemed most relevant to the evaluation of the effects of this new hourly organization. Within the optional questionnaire we constructed, the wording of the satisfaction question about call-backs on days off led to misinterpretation on the part of caregivers. This was why we decided not to present the results of this question. Finally, the 8-month delay between the two phases of our study may have been insufficient to highlight the effects of the change in work schedule on indicators exploring health status, these effects being more likely to appear in the longer term.

Although methodologically flawed, our work is original, since at present, we are not aware of any other published studies on the impact of working 12 hr in a hospital setting using the EVREST system. The protocol that we set up, based on the "EVREST in enterprise" principle, is perfectly suited for longitudinal data monitoring. The use of this national occupational health monitoring and research system has several advantages. It is a validated questionnaire, which facilitates the performance of subsequent evaluations, allowing follow-up over time of the various indicators explored. In the standard questionnaire, we chose to add additional questions, via the optional questionnaire provided by the system, concerning caregiver satisfaction. We deemed these satisfaction data essential in establishing an overall assessment of the impact of the change in schedule organization and were particularly awaited by the staff of the Normandy hospital centre

concerned by this study, for a global view of opinions. To collect the questionnaires and, especially, to complete the second part, we chose to travel to meet caregivers, in the intensive care units, over several half-days and nights. This procedure, although very time-consuming, made it easier for caregivers to complete questionnaires, since they could do so without leaving their workplace: the participation rate of our study reached 71.7% in the first phase of the study and 65.6% in the second phase. Caregivers who participated in both phases of the study represent 47% of the total CPR population at the facility; our sample is representative of the population of interest, in terms of day and night assignment distribution, of occupation and age over or under 45 years. Moreover, these numerous periods of exchange and meetings, at the workplace, enabled—through the establishment of a relationship of trust—the collection of many verbalized elements from the caregivers, offering a highly valuable contribution for the interpretation of our quantified results. We note that our study was part of an institutional approach. The protocol and objectives of the study were presented to the directorates and local management before the first phase of the evaluation was carried out. The involvement of local managers enabled us, on the one hand, to facilitate the setting up of the necessary material conditions (with the provision of a suitable room within departments, allowing interviews to be conducted in a confidential setting). On the other hand, the role of management in communicating with the teams concerned is to be emphasized, for it encouraged the involvement of caregivers in the completion of questionnaires. The results of our study, together with our recommendations, were presented at institutional level to the facility's management department, to the staff concerned and to their managers and finally to the establishment's Health, Safety and Working Conditions Committee (CHSCT). The presentation of our results to the staff concerned enabled us to validate certain interpretations.

Our results could also be compared with national data in future work.

5 | CONCLUSION

The organization of working time on the basis 12-hr shifts in studied units led to an improvement for day staff, who are generally in favour of working 12-hr shifts. Benefits concern work organization, with less time pressure, improved work–life balance and better job satisfaction. These improvements are to the detriment of night workers, who are generally dissatisfied and not in favour of working 12-hr shifts: they describe a deterioration in working conditions, greater dissatisfaction with handovers and a deterioration in their work–life balance.

Our results underline the need for a sufficiently concerted and in-depth preparation before the implementation of these new organizational schedules, to avoid last-minute adjustments and a polemical climate, as was the case in intensive care units in the studied hospital, particularly among night staff.

In view of this dissatisfaction among night workers, several recommendations must be taken into account (stability of schedules and strict adherence to rest days, creation of a night replacement pool in 12 hr, implementation of genuine breaks and naps, improvement of handover procedures) and are essential to avoid the risk of having an impact on the health and safety of caregivers and their patients. Lack of deterioration in health indicators for neuropsychic and osteo-articular disorders is to be interpreted with caution and will require subsequent evaluation to monitor the evolution of these indicators over time.

These results may have been different if around 30 patients had not left the intensive care units before the transition to 12-hr shifts, due to a probable unsuitability for long shifts, hence potentially inducing a healthy worker effect. These departures also led to a loss of skills and the training of new recruits required to be ensured by the confirmed staff who remained.

Our results, from a study conducted in intensive care units, where carers are supervised under regulatory conditions and are of a generally young age, cannot be extrapolated to other types of hospital department. The generalization of these long shifts, which are contrary to standard working time regulations, must not be considered for all hospital departments (essentially for night staff) but must remain strictly reserved for situations where no other organization is possible to ensure continuity of care.

CONFLICT OF INTEREST

No conflict of interest has been declared by the authors.

AUTHORS' CONTRIBUTIONS

Fratissier A, Morello R, Gauberti P, Clin B: Work conception and design. Fratissier A, Morello R, Gauberti P: Acquisition, analysis, or interpretation of data for the work. Fratissier A, Morello R, Gauberti P, Clin B.: Drafting or critical revision of the work for important intellectual content. Fratissier A, Morello R, Gauberti P, Clin B: Final approval of the version to be published.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author, [BC], upon reasonable request.

ORCID

Bénédicte Clin  <https://orcid.org/0000-0001-9138-5265>

REFERENCES

- Arne, L., Kecklund, G., Axelsson, J., & Åkerstedt, T. (1998). Change from an 8-hour shift to a 12-hour shift, attitudes, sleep, sleepiness and performance. *Scandinavian Journal of Work, Environment & Health*, 24(3), 69–75.
- Bae, S. H., & Fabry, D. (2014). Assessing the relationships between nurse work hours/overtime and nurse and patient outcomes: Systematic literature review. *Nursing Outlook*, 62(2), 138–156.
- Chen, J., Davis, K. G., Daraiseh, N. M., Pan, W., & Davis, L. S. (2014). Fatigue and recovery in 12-hour dayshift hospital nurses. *Journal of Nursing Management*, 22(5), 593–603.

- Dall'Ora, C., Ball, J., Redfern, O., Recio-Saucedo, A., Maruotti, A., Meredith, P., & Peter Griffiths, P. (2019). Are long nursing shifts on hospital wards associated with sickness absence? A longitudinal retrospective observational study. *Journal of Nursing Management*, 27(1), 19–26.
- Geiger-Brown, J., Rogers, V. E., Trinkoff, A. M., Kane, R. L., Bausell, R. B., & Scharf, S. M. (2012). Sleep, sleepiness, fatigue and performance of 12-hour-shift nurses. *Chronobiology International*, 29(2), 211–219.
- Gillespie, A., & Curzio, J. (1996). A comparison of a 12-hour and eight-hour shift system in similar medical wards. *Nursing Times*, 1(5), 358–364.
- Han, K., Trinkoff, A. M., Storr, C. L., & Geiger-Brown, J. (2011). Job stress and work schedules in relation to nurse obesity. *Journal of Nursing Administration*, 41(11), 488.
- Hansen, J. (2017). Night shift work and risk of breast cancer. *Current Environmental Health Reports*, 4(3), 325–339.
- Harris, R., Sims, S., Par, J., & Davies, N. (2015). Impact of 12h shift patterns in nursing: A scoping review. *International Journal of Nursing Studies*, 52(2), 605–634.
- Huret, J. (2017). *Passer des « 3x8 heures » aux « 2x12 heures » : Quelles conséquences sur le sommeil et la qualité de vie au travail et hors travail ? étude réalisée auprès des infirmiers et des aides-soignants de réanimation du CHRU de Lille*. Thèse d'exercice: Médecine: Lille 2.
- IARC (2007). *Monographs on the evaluation of carcinogenic risks to humans* (Vol. 98). Shiftwork. Retrieved from <http://monographs.iarc.fr/ENG/Monographs/vol98/mono98-8.pdf>
- Li, M., Huang, J. T., Tan, Y., Yang, B. P., & Tang, Z. Y. (2016). Shift work and risk of stroke: A meta-analysis. *International Journal of Cardiology*, 214, 370–373.
- Lin, X., Chen, W., Wei, F., Ying, M., Wei, W., & Xie, X. (2015). Night-shift work increases morbidity of breast cancer and all-cause mortality: A meta-analysis of 16 prospective cohort studies. *Sleep Medicine*, 16(11), 1381–1387.
- McGettrick, K. S., & O'Neill, M. A. (2006). Critical care nurses-perceptions of 12-h shifts. *Nursing in Critical Care*, 11(4), 188–197.
- Oh, J. I., & Yim, H. W. (2018). Association between rotating night shift work and metabolic syndrome in Korean workers: Differences between 8-hour and 12-hour rotating shift work. *Industrial Health*, 56(1), 40–48.
- Proper, K. I., Van de Langenberg, D., Rodenburg, W., Vermeulen, R. C. H., Van der Beek, A. J., Van Steeg, H., & van Kerkhof, L. W. M. (2016). The relationship between shift work and metabolic risk factors: A systematic review of longitudinal studies. *American Journal of Preventive Medicine*, 50(5), e147–e157.
- Richardson, A., Turnock, C., Harris, L., Finley, A., & Sarah Carson, S. (2007). A study examining the impact of 12-hour shifts on critical care staff. *Journal of Nursing Management*, 15(8), 838–846.
- Scott, L. D., Rogers, A. E., Hwang, W. T., & Zhang, Y. (2006). Effects of critical care nurses' work hours on vigilance and patients' safety. *American Journal of Critical Care*, 15(1), 30–37.
- Site EVREST. *Evolution et relation en santé travail* [Internet]. Retrieved from <http://evrest.istnf.fr/page-0-0-0.html>
- Stone, P. W., Du, Y., Cowell, R., Amsterdam, N., Helfrich, T. A., Linn, R. W., Gladstein, A., Walsh, M., & Mojica, L. A. (2006). Comparison of nurse, system and quality patient care outcomes in 8-hour and 12-hour shifts. *Medical Care*, 44(12), 1099–1106.
- Thompson, B. J. (2019). Does work-induced fatigue accumulate across three compressed 12 hour shifts in hospital nurses and aides? *PLoS One*, 7(2), e0211715.
- Vallery, G., & Hervet, C. (2005). Impact of the different organizational modalities of shiftwork on sleep, eating behavior, social and family life: The case of nursing staff in a French hospital environment. *Perspectives Interdisciplinaires Sur Le Travail Et La Santé*, 7(1), 1–39.
- Wang, F., Zhang, L., Zhang, Y., Zhang, B., He, Y., Xie, S., Li, M., Miao, X., Chan, E. Y. Y., Tang, J. L., Wong, M. C. S., Li, Z., Yu, I. T. S., & Tse, L. A. (2014). Meta-analysis on night shift work and risk of metabolic syndrome. *Obesity Reviews: an Official Journal of the International Association for the Study of Obesity*, 15(9), 709–720.
- Webster, J., McLeod, K., O'Sullivan, J., & Bird, L. (2019). Eight-hour versus 12-h shifts in an ICU: Comparison of nursing responses and patient outcomes. *Australian Critical Care*, 32(5), 391–396.
- Wilson, M., Permito, R., English, A., Albritton, S., Coogle, C., & Van Dongen, H. P. A. (2019). Performance and sleepiness in nurses working 12-h day shifts or night shifts in a community hospital. *Accident Analysis and Prevention*, 126, 43–46.
- Witkoski Stimpfel, A., Fletcher, J., & Kovner, C. (2019). A comparison of scheduling, work hours, overtime and work preferences across four cohorts of newly licensed registered nurses. *Journal of Advanced Nursing*, 75(9), 1902–1910.
- Zoghipaydar, M. R. (2017). The effects of consecutive night shifts and shift length on cognitive performance and sleepiness: A field study. *International Journal of Occupational Safety and Ergonomics*, 23(2), 251–258.

How to cite this article: Fratissier A, Gauberti P, Morello R, Clin B. Impact of 12-hr shifts in general hospitals: Study conducted in two intensive care units. *Nurs Open*. 2021;8:656–663. <https://doi.org/10.1002/nop2.670>