

## **Nurses and shift work: effects on job performance and job-related stress**

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The purpose of this research was to examine the influence of day, afternoon, night and rotating shift schedules on the job performance and job-related stress of nurses. Registered nurses from five hospitals ( $n = 463$ ) were surveyed using a structured questionnaire which measured both job performance and job-related stress. Analysis of data indicated that both the nurses' job performance and their job-related stress were related to the type of shift they worked. Overall job performance was highest for the nurses on the day shift, followed by the night, afternoon, and rotating shifts. Rotating shift nurses experienced the most job-related stress, followed in turn by the afternoon, day, and night shift nurses. The findings are interpreted within a conceptual framework which examines the social organization of work in the hospital by shift and the effects of shift work on biological rhythm synchronization.

### **SHIFT WORK**

Shift work is an established labour pattern that affects a substantial proportion of the work force. In the United States alone, a recent survey conducted by the National Centre for Health Statistics revealed that over 27% of male workers and 16% of female workers are required to rotate between day and night shifts (Danchik *et al.* 1979).

Some sections of the economy require an even larger proportion of their employees to engage in shift work. This is especially true of hospitals, where over 35% of the employees are required to work at times other than the day shift (Tasto & Colligan 1977). Hospitals also typically employ a larger number of female shiftworkers than most other industries.

Given the large segment of the work force engaged in shift work, it is important that the influence of shift work on job performance and

job-related stress be better understood. While there have been a number of studies examining the effects of shift work on male factory workers, there has been little comparable research on female shift workers. Thus the purpose of the research to be reported here is to examine the influence of shift work on the job performance and job-related stress of nurses, a largely female occupation.

Shift work exists whenever employees are required to begin working at times other than 7 to 9 in the morning. Shift work usually refers to the three working shifts (days, evenings and nights) and to the rotating shift, which requires workers to switch back and forth among the three shifts (Tasto *et al.* 1978).

The job performance of shift workers has been measured both in terms of productivity and general performance. Studies of men which have measured job performance in terms of productivity indicate that the day shift typically has a higher production rate than either the night or the evening shift (Wyatt & Marriott 1953,

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Malaviya & Ganesh 1976). Furthermore, in examining the general performance of men, studies show that the quality of work performance tends to parallel the synchronized daily cycles of body temperature and arousal (Colquhoun & Rutenfranz 1980). Examination of these daily biological rhythms, known as circadian rhythms, indicates that in general, bodily functions tend to be at their highest level during the day and at their lowest level during the night.

Studies indicate that shift work, especially rotating and night shiftwork, tends to disrupt the normal synchronization of the worker's circadian rhythms, resulting in lowered worker alertness, speed, efficiency, productivity and safety (Kleitman 1963, Colquhoun *et al.* 1968a, 1968b, 1969, Colquhoun 1976, Colquhoun & Rutenfranz 1980). Although these studies suggest that there is some adaptation of the workers' circadian rhythms to their shift work schedule, that adaptation is not complete (Colquhoun *et al.* 1968a, 1968b, 1969). Examination of workers' shift performance indicates that job performance is typically lowest on the rotating shift, followed in turn by the night, afternoon, and day shifts (Kleitman *et al.* 1937).

In relation to women, Jamal & Jamal (1982) report that nurses on rotating shift schedules were rated lower by their supervisors in terms of job performance, motivation and patient care than were nurses on fixed (non-rotating) shifts. Further, Tasto *et al.* (1978) found that nurses on rotating and afternoon shifts were the least satisfied with their job performance, followed by the night and day nurses.

The two studies most concerned with the relationship between shift work and job-related stress indicate that the shift schedule system is one of the major factors causing stress and nurse burnout. Storlie (1979) suggests that one could reduce stress by providing a choice of shifts, while Shubin (1978) feels that the enforcement of strict 8-hour shifts is necessary to reduce stress. Unfortunately, neither study examined the effects of specific shift scheduling systems on stress.

Overall, our knowledge of how shift work affects job performance and job-related stress is limited, especially in the case of women. The high proportion of female nurses working on shifts makes this an important area for study.

## METHODOLOGY

Five hospitals located in the south eastern section of the United States were studied. There was one small community hospital, two medium-sized public hospitals, a small psychiatric hospital and a large veterans hospital. Two of the hospitals were in a predominantly rural county of approximately 60 000 in population, and three were in an urban area of approximately 140 000 in population.

A prior investigation was made of each hospital's working environment, organization of nursing services, and shift schedule system. The hospitals were found to be very similar in their structures. In fact, independent observations did not reveal any essential differences among them. There were no statistically significant differences among the hospitals in the percentage of nurses working the various shifts, nor were there any essential differences in the sociodemographic backgrounds of the nurses.

### Questionnaires

Questionnaires were used to collect information on the nurses' job performance and job-related stress. Job performance was measured using selected items from the Six-Dimension Scale of Nursing Performance (Schwirian 1978). The sixth subscale on critical care was excluded because it did not apply to the work activity performed by many of the nurses. The reliability coefficients found for the five subscales were leadership ( $\alpha=0.748$ ), teaching/collaboration ( $\alpha=0.818$ ), planning/evaluation ( $\alpha=0.882$ ), interpersonal relations/communications ( $\alpha=0.795$ ), and professional development ( $\alpha=0.858$ ). Items were chosen by examining the factor loadings for each given by Schwirian (1978) and the use of these items on the other nursing performance scales.

For each item, the nurses were asked to evaluate their performance. Possible answers were: not very well, satisfactorily, well, very well, and 'does not apply'. Item scores ranged from 1 to 4, with 4 indicating the highest level. For the overall scale and the subscales, the scores were summed and divided by the total number of

TABLE 1 Questionnaire returns by hospital

Hospital	Distributed		Rate of return Returned		Usable	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
A	101	100	67	66.3	65	64.4
B	303	100	188	62.1	183	62.1
C	31	100	30	96.8	30	96.8
D	257	100	101	39.3	93	36.2
E	190	100	121	63.7	112	59.0
Total	882	100	507	57.5	482	54.6

items answered, since not all items applied to all nurses. The  $\alpha$  reliability coefficient found for the overall scale was 0.909.

A scale developed by Swiercz (1983) was used to measure job-related stress. It consists of five subscales: inadequate knowledge and technical skills ( $\alpha=0.712$ ), nature of direct patient care ( $\alpha=0.610$ ), interpersonal conflicts ( $\alpha=0.721$ ), physical working conditions ( $\alpha=0.746$ ) and management of the unit ( $\alpha=0.688$ ). Each of the 24 items in the overall scale has a possible range of scores from 1 to 4, resulting in a possible range of scores from 24 to 96 when summed. The overall job-related stress scale has an  $\alpha$  coefficient of 0.893.

In each hospital, a nursing administrator was chosen to distribute the questionnaires to the RNs. They were returned anonymously in sealed envelopes to the nursing administration office, which served as a central drop-off point. Questionnaires were distributed to the 882 RNs working on shifts in the five hospitals. Five hundred and seven (57.5%) were returned, of which 482 (54.6%) were completed sufficiently for use in the study. The rate of return by hospital is reported in Table 1.

The overall 57% return rate, and especially the 39% return rate from hospital D, necessitated a check on whether the returns were representative of the total population. Since the questionnaire had been completed anonymously, checks were made by comparing those who returned the questionnaire with the total population. This was done for each of the five hospitals. The variables checked were: age, sex, marital status, education, length of service, and shift worked. In no case were statistically significant differences found between those who had

returned the questionnaire and the total population of nurses at each hospital. However, the variation was greatest from hospital D, which had the lowest return rate. There was a tendency for younger nurses and those with higher levels of education to return the questionnaire.

Since it was the aim of the research to examine the effects of shift work on women, the 19 male nurses who completed the questionnaire were excluded from analysis. Thus, a total of 463 were used for analysis.

The distribution of RNs by shift is presented in Table 2. The pattern of distribution of nurses among shifts was quite similar for the five hospitals. Of the 463 nurses, 22.5% worked the day shift, 11.7% worked in the afternoons, 12.3% worked at night and the majority, 53.6%, worked on a rotating basis. Among the hospitals there were no statistically significant differences in the nurses' sociodemographic background characteristics in terms of age, race, sex, education, income, marital status, number of young children or length of time working as a RN. These background characteristics were used as covariates in the data analysis.

Analysis of variance was used to examine the association between job performance and type of shift worked. Analysis indicated that only one job performance subscale, professional development, was significantly related ( $P<0.05$ ) to the type of shift worked ( $\eta=0.170$ ,  $P<0.004$ ; see Table 3). None of the remaining job performance subscales — teaching/collaboration, planning/evaluation, interpersonal relations/communication, or leadership — were significantly related to the type of shift worked. Thus, findings suggest that professional development may be the area most influenced by shift work.

TABLE 2 Percentage distribution of shifts by hospital

Shift	Hospital					Total
	A	B	C	D	E	
Days	17.7 ( <i>n</i> = 11)	27.3 ( <i>n</i> = 48)	25.0 ( <i>n</i> = 7)	18.9 ( <i>n</i> = 17)	19.6 ( <i>n</i> = 21)	22.5 ( <i>n</i> = 104)
Afternoons	12.9 ( <i>n</i> = 8)	9.7 ( <i>n</i> = 17)	14.3 ( <i>n</i> = 4)	12.2 ( <i>n</i> = 11)	13.1 ( <i>n</i> = 14)	11.7 ( <i>n</i> = 54)
Nights	22.6 ( <i>n</i> = 14)	6.8 ( <i>n</i> = 12)	10.7 ( <i>n</i> = 3)	14.4 ( <i>n</i> = 13)	14.0 ( <i>n</i> = 15)	12.3 ( <i>n</i> = 57)
Rotating	46.8 ( <i>n</i> = 29)	56.3 ( <i>n</i> = 99)	50.0 ( <i>n</i> = 14)	54.4 ( <i>n</i> = 49)	53.3 ( <i>n</i> = 57)	53.6 ( <i>n</i> = 248)

$$\chi^2 = 15.59, P < 0.21.$$

TABLE 3 Correlation of shift work and job performance subscales

Job performance	Shift means				Beta	Sig. of F
	Days	Afternoons	Nights	Rotate		
Leadership	3.04	2.82	3.04	2.83	0.127	0.0576
Teaching/collaboration	2.09	2.23	1.84	2.08	0.096	0.2352
Planning/evaluation	2.45	2.51	2.47	2.45	0.021	0.9768
Interpersonal relations/communications	2.86	2.85	2.82	2.82	0.025	0.9639
Professional development	2.85	2.79	3.03	2.78	0.170	0.0038

*n* = 463.

TABLE 4 Analysis of variance for job performance and job-related stress by shift

Job performance and stress	Shift means				Beta	Sig. of F	<i>n</i>
	Days	Afternoons	Nights	Rotate			
Job performance	2.97	2.73	2.84	2.66	0.21	0.0001	463
Job-related stress	55.34	57.26	52.86	61.46	0.28	0.0000	407

The overall job performance scale was also related to shift work ( $\eta = 0.210$ ,  $P < 0.0001$ ), although the association was not strong. The day shift nurses had the highest perception of their job performance, followed by the night, afternoon, and rotating shifts respectively (see Table 4). Hence, nurses' job performance may be lowered slightly when their circadian rhythms are disturbed. Nurses appear to be less satisfied with their job performance when they are working rotating shifts and their work schedules are constantly changing.

ANOVA was also used to examine the relationship between shift work and job-related stress. All of the job-related stress subscales were found to be significantly related to the type of shift worked (see Table 5). Of these, the association between management of the unit and type of shift work was the strongest ( $\eta = 0.357$ ,  $P < 0.0000$ ).

The overall job-related stress of RNs was examined. The rotating shift nurses reported a higher level of job-related stress than any of the other shifts (see Table 4). The afternoon shift showed the next highest level of stress, followed

TABLE 5 *Correlation of shift work and job-related stress subscales*

Job related stress	Shift means				Beta	Sig. of F	n
	Days	Afternoons	Nights	Rotate			
Inadequate knowledge and technical skills	2.04	2.25	2.06	2.28	0.172	0.0046	439
Nature of direct patient care	2.30	2.47	2.32	2.52	0.187	0.0012	449
Interpersonal conflicts	2.58	2.52	2.34	2.74	0.220	0.0001	447
Physical working conditions	2.04	2.17	1.93	2.27	0.195	0.0006	452
Management of the unit	2.50	2.70	2.37	3.00	0.357	0.0000	440

by the day and night shifts ( $\beta=0.275$ ,  $P<0.0000$ ). The rotating shift is believed to be the most stress-producing for nurses, since they must often interact with a different group of people on each shift they work, making it more difficult to establish good working relationships. Further, it is difficult to deal with the unique procedures and routines of different units at different times.

As a further test of the relationships between shift work, and job performance and job-related stress, various background factors were examined to determine if, when held constant, they would show the relationships to be nothing more than an artifact of the data. The background variables considered for use as covariates were: age, marital status, the length of time married, if the respondent was ever divorced, the number of young children (under age 6), education, personal income, the unit they worked in, the position they held, the length of time they had worked actively as a nurse, the length of time they had worked at their present place of employment, the length of time they had worked on their present shift schedule, what their previous shift was, the time spent on their previous shift, the hours worked per week, if they chose the shift they worked, if they expected to leave their place of employment, and if they desired to change shifts.

### Background variables

Background variables that were found to be correlated at the 0.10 level with job performance or job-related stress were included as covariates for that particular variable. A generous level of significance (0.10) was chosen to insure that all

the covariates which were related to the dependent variable would be included. In this manner, the effect of shift work on job performance and job-related stress might best be examined. Only one variable, if the nurses were expected to leave their place of employment, was found to be associated with job performance. Analysis indicated that the more likely the nurses expected to remain at their place of employment, the higher their perceptions of their job performance ( $\beta=0.105$ ,  $P<0.033$ ). For job-related stress, both the positions the nurses held, and the length of time they had on their present shift, were found to be associated with job-related stress. The higher the position the nurse held in the hospital, the higher the job-related stress ( $\beta=0.120$ ,  $P<0.012$ ), and the longer the time the nurse had been on the shift, the higher the job-related stress ( $\beta=0.130$ ,  $P<0.043$ ).

It would seem that nurses who expect to remain at the hospital where they are presently employed tend to feel they are doing a better job than those who do not expect to stay. This could be one of their reasons for making a choice of whether to stay or leave. Higher ranking positions may result in greater responsibility which in turn creates higher job-related stress. Why a longer length of stay on a shift could result in greater job-related stress, however, is not as easily explained. It may be that length of stay is related to boredom and lack of challenges, or that expectations for performance are increased with length of tenure. At the same time, it could be argued that length of stay would create a routine, non-stressful environment. In any case, these background variables were included in an analysis of covariance as covariates for the dependent variable with which they were found to be correlated.

TABLE 6 Analysis of covariance for job performance and job-related stress by shift

Job performance and stress	Adjusted shift means				Beta	Sig. of F
	Days	Afternoons	Nights	Rotate		
Job performance	2.94	2.73	2.84	2.67	0.19	0.001
Job-related stress	55.24	57.83	54.20	61.40	0.27	0.000

However, before these relationships were examined, it was necessary to test for interaction between the factor shift, and the covariates as a single effect, so as not to violate the assumption of homogenous slopes for the analysis of covariance. No interaction was found between either job performance ( $P < 0.32$ ) or job-related stress ( $P < 0.88$ ) and the covariates.

Neither of the relationships between shift work, and job performance and job-related stress, were changed by adjusting the means for the covariates (see Table 6). For job performance, the day shift remained highest in their evaluation of job performance, followed by the night, afternoon, and rotating shifts ( $\beta = 0.19$ ,  $P < 0.001$ ). Further, when job-related stress was examined, the rotating shift still reported the most job-related stress, followed by the afternoon, day and night shifts respectively ( $\beta = 0.27$ ,  $P < 0.000$ ). Thus, the findings have not changed by introducing covariates into the analysis. Thus, one can be more certain that it is shift work which is influencing both job performance and job-related stress, and not other factors.

## DISCUSSION

When the five subscales of job performance were examined, only the areas of professional development and leadership were found to be associated with the type of shift worked. For the professional development subscale, rotating and afternoon shift nurses rated themselves lower in their job performance than did the day and night shift nurses. The leadership subscale of job performance showed the same pattern of association with shift work although the leadership subscale was only correlated with shift work at the 0.058 level. This may be because while shift work is correlated with both delegating responsibility for care ( $\eta = 0.169$ ,  $P < 0.007$ ) and accepting responsibility for the level of care provided

for those under your direction ( $\eta = 0.136$ ,  $P < 0.047$ ), it is not correlated with remaining open to suggestions of those under your direction ( $\eta = 0.033$ ,  $P < 0.282$ ). Neither of the correlations for the professional development or leadership subscales was very strong.

However, using the overall job performance scale, a statistically significant correlation was found between shift work and job performance, both in the analysis of variance and the analysis of covariance, although this correlation was not strong ( $\beta = 0.19$ ,  $P < 0.001$ ). Overall job performance was highest for the nurses on the day shift, followed by the night, afternoon and rotating shifts.

The data support the findings of previous research that job performance is lowest on the rotating shift. Previous research indicates that when circadian rhythms are disturbed, the worker's efficiency, productivity, speed, alertness and general job performance are reduced (Colquhoun *et al.* 1968a, 1968b, 1969, Colquhoun 1976, Jamal & Jamal 1982). It is suggested that while shift work has an initial impact on nurses' job performance, over time they become better adjusted to changes in their schedules, if they always work the same hours. Since rotating shift workers are constantly required to change their schedules, they are never able to fully adjust their body's circadian rhythms. This is reflected in lower job performance. This must be considered a significant problem for patient care since more than half of the nurses in the present study were working rotating shifts!

## Leadership

The two subscales that were most highly correlated with job performance were leadership and professional development. The two would seem

to be related to each other in the sense that they are crucial for career mobility. The nurse who is unable to develop or demonstrate her leadership skills or take advantage of professional opportunities, is not as likely to advance his/her career as rapidly as one who can, whatever the rewards may be. The data would seem to indicate that nurses on rotating or afternoon shifts have diminished opportunities for leadership and professional development. Therefore, one would predict, other things being equal, their chances of obtaining career rewards would also be diminished.

These findings suggest a number of implications, interpretations, and lines of further inquiry. Given the conclusions of previous research, it is surprising that even stronger correlations between shifts and job performance were not found. Since most of the previous research on the affects of shift work on job performance has been with males, it may be that circadian rhythms do not have exactly the same effect on women as men. At the same time, the research on men has been with factory workers. It could be that there is a difference between factory work and work in a hospital. For example, the type of work performed in factories may vary little by shift. That is, individuals are doing about the same things on each shift. In the hospital however, the type of work performed by nurses on each shift differs considerably. Day shift, afternoon shift, and night shift nurses are responsible for different tasks. Thus performance by shift may be affected by the social organization of hospital work, as well as by circadian rhythms. Certainly future research using a sufficient sample of both male and female nurses could aid in isolating salient variables.

Also examined was the relationship between shiftwork and job-related stress. A modest correlation was shown between shift work and overall job-related stress ( $\beta = 0.27$ ,  $P < 0.000$ ). Rotating shift nurses experienced the most job-related stress, followed in turn by the afternoon, day and night shifts. Further, each of the five job-related stress subscales was correlated with shift work, with the management of the unit showing the strongest association of all the subscales.

Two different patterns among the shifts were found for the job-related stress subscales. For the areas of inadequate knowledge and technical

skills, and the nature of direct patient care, the rotating shift was highest in job-related stress, followed by the afternoon, night and day shifts. For the areas of interpersonal conflicts, and physical working conditions and management of the unit, the rotating shift nurses were again the highest in job-related stress; however, the day shift nurses were the next highest in job-related stress, followed by the afternoon and night shift nurses. Hence, while the rotating shift was the highest in job-related stress regardless of the working conditions examined, the relationship among the other shifts differed, depending on the particular working condition being examined.

## Stress

The relationship between shift work and job-related stress appears to be stronger than that between shiftwork and job performance. In fact, all of the job-related stress subscales were correlated with shift work. This is important, if for no other reason than that it has been suggested that job-related stress is related to nursing burnout and personnel turnovers (Shubin 1978, Storlie 1979). The present data go beyond previous research by pointing to the types of stress associated with specific shifts. The nurses working on rotating shifts seem to experience the most job-related stress, regardless of type. This is probably due to both the disturbance of circadian rhythms and the fact that rotating shift nurses often work with different groups of coworkers and patients for every different shift they work. It may be more difficult for them to establish working relationships with the other nurses and staff members with whom they associate.

The data indicate that overall it is the nurses on the night shift who experience the least amount of job-related stress, the stress level being even less than that on the conventional day shift. Similar to job performance, the reasons for this situation may be found in the social organization of hospital work. The pace of activities in the hospital is usually much slower at night. In addition to being prepared for emergencies, one of the main functions of the night shift nurse is to make sure that patients receive a good nights rest. There is less contact with patients and other members of the hospital staff and thus less opportunity for interpersonal conflict.

The day shift nurses seem to face the least stress of any shift in the area of inadequate knowledge and technical skills, and the nature of direct patient care. This may be because they get more practice and there is more help available in terms of support and resources. However, they face more stress than the afternoon and night shift nurses in the areas of interpersonal conflicts, physical working conditions, and management of the unit. This of course cannot be accounted for on the basis of circadian rhythm disruption. More likely this stress is due to the greater frequency of patient care activities that occur during the hours of the day shift and the greater frequency of interaction with other hospital functionaries who appear on the unit during that time. It is during the day shift that most examinations, diagnostic testing, and surgery takes place.

From this it would be expected that nurses who are working on rotating shifts, and thus most susceptible to the effects of circadian rhythm disruption, would suffer the highest degree of stress when working on the day shift. Nurses on the afternoon shift seem to assume an intermediate position between the day and night shift nurses. They are subject to less stress than the day nurses in terms of interpersonal conflicts, physical working conditions and management of the unit, but more than the nurses on night shifts. It is the afternoon shift which is responsible for handling most patient visitors. On the other hand, they suffer more stress in the areas of inadequate knowledge and technical skills, and the nature of direct patient care, than day shift nurses.

Similar to the findings concerning shift and job performance, the associations between shift and stress have important implications. It is suggested that there is an essential difference between shift work's effects on employees in settings such as factories, where work tasks are much the same from shift to shift, and settings such as the hospital, where there is a distinct division of labour by shift. Thus sex differences cannot be adequately measured by comparing male factory workers with female hospital nurses. With the former, the stress of work can be assumed to be much the same from shift to shift. Thus stress caused by circadian rhythm disruption may be measured more or less independently of work stress.

In settings such as the hospital, where there is a division of labour by shift, it is much more difficult to separate the stress of work from the effects of stress caused by circadian rhythm disruption. For example, the greater stress experienced by nurses on the day shift in terms of interpersonal conflicts, physical conditions, and management of the unit cannot be attributed to the disturbance of circadian rhythms. Rather, it would seem to be due to the type of work faced by nurses on the day shift, compared to those on the afternoon and night shifts.

We hypothesize that what is occurring is that the division of labour for hospital nurses spreads work stress differentially by type and degree over the three steady shifts. For this reason, the overall stress for any one shift is minimized and the differences among the shifts is less than would be expected if only the effects of circadian rhythm disruption were present.

This idea may be best conceptualized by thinking in terms of the traditional division of the nurse's role into instrumental and expressive components (Skipper 1965) and the relative amounts of activity associated with each shift. The instrumental component consists of those activities that are used as a means towards the medical objective of improving the patient's condition through biophysical intervention. The expressive component consists of those activities that are directed toward the nursing objective of caring for the social and psychological needs of the patient through social intervention. Administration of medication is an instrumental activity performed by nurses, but dictated by medical practice guidelines. Quelling the patient's fear of medication is an expressive activity performed by nurses and directed by nursing practice guidelines (Wooldridge *et al.* 1983).

### **Instrumental and expressive activities**

The work of hospital nurses on each shift can be classified on the basis of the relative emphasis placed on instrumental and expressive activities. Nurses on the day shift must of necessity emphasize instrumental activities. Nurses on the day shift are responsible for supervising patient preparation for the day's diagnostic testing, treatment and therapy which usually takes place during the morning and early afternoon hours.



The pace is rapid and the number of hospital personnel interacting with nurses is at its maximum. The stress of work is probably greatest during this period of time, but the effects of stress from circadian rhythm disruption is at its lowest.

During the night shift, the pace of activities is much slower. Medical treatment is at a minimum. Although emphasis is on expressive activities, which may be as or potentially even more stressful than instrumental activities, they are usually confined to making patients comfortable and ensuring their rest and sleep. As important as this function is, fewer activities take place than on the other two shifts, and much less interaction with patients and other hospital personnel. As one night-shift nurse put it 'A successful shift is one in which nothing happens'. It is during the night shift when stress from circadian rhythm disruption supposedly would be greatest, that work stress is at its lowest ebb.

Nurses on the afternoon shift are caught in the middle. Although they probably do not place as much emphasis on instrumental activities as day shift nurses, or as much emphasis on expressive activities as the night shift nurses, they must be concerned with both, with about equal emphasis. Especially before the evening meal, the medical treatments initiated during the day shift have to be continued or at least monitored. In addition, the social and psychological aftermath of the medical treatment regimen on patients must be faced. This involves expressive activities and continues into the evening hours, when visitors are most likely to be on the ward. Thus, the work stress for the afternoon shift stems from both instrumental and expressive activities. During this time period the stress from the influence of circadian rhythm disruption would be expected to be moderate. On this basis, it may be that nurses on the afternoon shift are the ones who are subject to the greatest overall stress.

Either by chance or design, the division of labour by shift in the hospital provides a measure of worker adaptation to stress, in much the same fashion that other researchers have conceptualized the development of informal organization and status rearrangements as adjustments to the contingencies of the work place environment (Champion 1975). Unfortunately, however, no mechanism has been provided for the majority of hospital nurses working on rotating shifts. That is, those working rotating shifts are most

likely to suffer stress from the effects of circadian rhythms.

## CONCLUSION

Overall, several directions for future research are dictated. First, to ascertain whether circadian rhythm disruption has different effects on the stress of men compared to women, the organization of work will have to be held constant. This might be accomplished by comparing male and female factory workers, policemen, firemen, public transit workers and/or even prison guards who work shifts. Second, to check the effects of circadian rhythm disruption on nurses by shift, work stress might be held constant by selecting nurses on each shift from the intensive care unit, where there is less variation in the work of the three shifts. Third, if the hypothesized relationship between stress and the division of nurses' labour by shift is valid, then it ought to apply to other types of hospital personnel as well, such as aids, practical nurses and perhaps even hospital staff physicians. Finally, rotating shift workers, such as nurses who are employed in institutions where there is a division of labour by shift, should be subject to more overall stress than rotating workers who are employed in institutions where there is no division of labour by shift, since in the former case, not only the time of work changes, but also the organization of work.

While the effects of stress on shift workers are of importance in any work setting, they take on a special meaning in the hospital. Since not just registered nurses, but almost all kind of nursing service personnel work on shifts, the actual effects of shift work on patient care, both process and outcome, are of great significance. Strangely, this area of research is virtually unexplored. Furthermore, preparing individuals to effectively deal with the vicissitudes of the stress they will encounter on the different shifts would seem to be a useful endeavour. Yet, this does not appear to be part of training programmes for registered nurses, let alone other hospital personnel.

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