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ORIGINAL ARTICLE

Attitudes towards rotating shift work in clinical nurses: a Q-methodology study

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Aims and objectives. To identify clinical nurses' attitudes towards rotating shift work.

Background. Many hospitals worldwide employ rotating shift work patterns to staff their facilities. Attitudes of clinical nurses towards rotating shift work vary.

Design. To understand clinical nurses' attitudes towards rotating shift work, Q-methodology, a method for the analysis of subjective viewpoints with the strengths of both qualitative and quantitative methods, was used.

Methods. Forty-six selected Q-statements from each of the 39 participants were classified into a normal distribution using an 11-point bipolar scale. The collected data were analysed using pc-QUANL program.

Results. Three discrete factors emerged as follows: factor I (rotating shift work is frustrating: objectionable perspective), factor II (rotating shift work is satisfactory: constructive perspective) and factor III (rotating shift work is problematic, but necessary: ambivalent perspective).

Conclusions. The subjective viewpoints of the three identified factors can be applied in developing various roster designs for nurses engaging in rotating shift work.

Relevance to clinical practice. The findings provide the baseline for nurse leaders in helping nurses adjust and deal with rotating shift work.

What does this paper contribute to the wider global clinical community?

- Nurses' mental and physical health problems related to RSW not only militate against retention of proficient nurses but also result in career discontinuity.
- Hospital managers and nursing administrators should understand and respect nurses' attitudes towards RSW and reflect their perspectives in evaluation before planning hospital events, conferences or educational programmes.

Key words: Attitude, Nurses, Rotating Shift work, Q-methodology

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Introduction

Many hospitals worldwide employ rotating shift work (RSW) patterns to staff their facilities. To achieve this, nurses regularly rotate their work schedule in three eight-hour or two 12-hour shifts or other diverse work schedules (de Cordova *et al.* 2012, Clendon & Walker 2013, Bae & Fabry 2014). Particularly, a pattern of three eight-hour rotating shifts has been conventionally adopted in various hospitals (Josten *et al.* 2003, Lee *et al.* 2012). While RSW is often required to provide continuous patient care (Shao *et al.* 2010), there are problematic issues including mental and physical stress (Suzuki *et al.* 2004, Willis *et al.* 2008). Encouraging voluntary and active participation of nurses in this work system or adopting a variable and flexible RSW schedule attuned to individual needs of nurses may help alleviate these stresses (Peters *et al.* 2009, Brewer *et al.* 2012, Drake 2014). For this to occur, the attitudes

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of nurses towards RSW need to be understood. The subjective opinions of nurses can negatively or positively affect their attitudes towards job aspects including RSW (Cross 2005).

Background

Mental and physical health consequences in RSW

Several issues have been linked to RSW by nurses. RSW can be a critical risk factor for mental and physical health. Cumulative fatigue of nurses due to repetitive eight-hour pattern of RSW can imperil patient safety (Suzuki *et al.* 2004, Korompeli *et al.* 2009) and lower cognitive performance of nurses (Rouch *et al.* 2005). In addition, their immune system can be harmed as demonstrated by decreased natural killer cell functions and increased lymphocyte subsets (Nagai *et al.* 2011). The night shift, in particular, can interfere with circadian rhythm and sleep homeostasis, such as the sleep–wake cycle (Järvelin-Pasanen *et al.* 2013). Disequilibrium of circadian rhythm has been implicated in cardiovascular disease. Intense sleep disturbance contributes to menstrual irregularity, digestive disease and risk of type 2 diabetes (Inoue *et al.* 2004, Pan *et al.* 2011). Poor sleep has also been associated with carcinogenic potency (Shao *et al.* 2010). However, other studies reported that RSW did not pose significant detriments to emotional exhaustion (Peters *et al.* 2009) or affect the circadian cycle and sleep patterns. Some even reported that RSW could increase job performance (Sveinsdóttir 2006, Chung *et al.* 2012). There is still debate on this issue due to the lack of rigorous evidence.

Personal or family life consequences of RSW

Nurses are often challenged by the lack of time for housework, family affairs and child-raising due to their irregular working hours (Tanaka *et al.* 2011). These problems can negatively affect their personal and social lives and increase tensions in family relationships, which can result in work–family conflict (Willis *et al.* 2008, Saksvik *et al.* 2011). Consequently, the quality of life and job satisfaction of nurses can gradually deteriorate, which can accelerate the turnover rate of nursing staff (Shao *et al.* 2010, Brewer *et al.* 2012, Clendon & Walker 2013). Some claimed the RSW had advantages such as more flexibility for activities including attending school activities, having weekdays off, family care and associated responsibilities (Ruggiero & Pezzino 2006). Financial benefits and efficient use of time can be also the strengths of RSW (Matheson *et al.* 2014).

Diverse attitudes towards RSW can positively or negatively affect nurses' quality of life. Few studies have investigated nurses' attitudes towards RSW. Therefore, the main purpose of this study was to identify the attitudes of clinical nurses towards RSW.

Methods

Q-methodology

Q-methodology was developed by William Stephenson in 1935 (Stephenson 1935). Q-methodology retains the strengths of quantitative and qualitative methods, which enables conversion of subjective human perspectives into an objective outcome (Watts & Stenner 2005). This method can reveal a subject's point of view about a certain phenomenon, interest, opinion or concern (Dziopa & Ahern 2011). Q-methodology, in particular, is applied to the study of a wide range of various topics in health. It is suitable to explore nurses' attitudes towards special issues and opinions related to nursing and other aspects (Cross 2005). Q-methodology is a multistep process, involving: (1) development of the concourse using diverse sources; (2) production of final statements from the concourse (Q-sample or Q-set); (3) selection of a sample of participants (the P-sample or P-set); (4) process of Q-sorting using a bipolar Q-sort table designed as a grid (or data collection table). The participants are asked to provide more information on why they placed the statements at the polar ends of the sorting grid (Akhtar-Danesh *et al.* 2008, Dziopa & Ahern 2011). These comments are an essential part of the Q-methodology for interpreting emergent viewpoints, communicating shared viewpoints and providing a source of further insights (Watts & Stenner 2005); (5) factor analysis using varimax rotation; and (6) factor extraction and interpretation (Figure 1). The definitions of terms used in Q-methodology are summarised in Table 1.

Research procedure

Q-population development (Concourse)

The first box in Fig. 1 displays the practical step for Q-population development. The Q-population consisted of statements generated as follows. Previous studies related to RSW were reviewed. Next, written narratives were obtained from the participants – 98 clinical nurses registered in academic programmes leading to Bachelor's degrees at the School of Continuing Education, C University, and

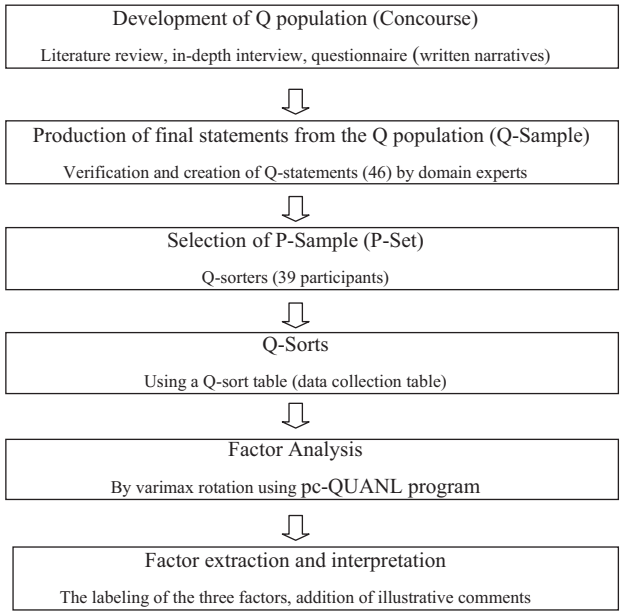

Figure 1 The practical steps in Q-methodology.

120 colleagues in 17 general hospitals. The 218 clinical nurses were asked five questions generated from literature reviews and formulated by a researcher:

1 What do you think about rotating shift work in hospitals?
2 What relationships are there between nurses' intention to leave and rotating shift work in hospitals?
3 What are advantages and disadvantages of rotating shift work in hospitals?
4 What are the alternatives to rotating shift work in hospitals?
5 What is the most effective way of rotating shift work in hospitals?

A total of 188 of the 218 clinical nurses anonymously posted their responses. The third step was in-depth interviews conducted during focus group discussions with 30 clinical nurses who were willing to participate in further extraction of their responses concerning RSW. A total of 215 statements as an initial Q-population were extracted through these processes. After correcting for overlapping and ambiguous statements, 128 of 215 statements were generated as the second Q-population. The procedures for development of the Q-population were accomplished by domain experts including a Q-methodologist, a researcher and a nurse administrator.

Q-sample

The list of 128 statements was reduced to 69 by three professors of nursing, one nursing administrator and one methodologist following identification and elimination of repetitious viewpoints and duplications. After pilot testing the statements with seven participants to identify how the statements performed, the statements were further reduced to 58. This ensured expression of contrasting viewpoints, involved rewording and rewriting of statements, and further elimination of superfluous statements. Ultimately, 46 Q-statements (Q-sample) were created to represent the concourse surrounding RSW (Table 2). The adequate number of statements is usually between 20–100 (Watts & Stenner 2005) or up to 50 (Akhtar-Danesh *et al.* 2008).

Selection of participants (P-sample)

In the Q-methodology, 40–60 participants are reasonable for sorting, although far fewer might be needed for some studies (Akhtar-Danesh *et al.* 2008). To recruit the P-sample for Q-sorting, 39 clinical nurses enrolled at the School of Continuing Education, C University, Seoul, Korea, were asked to participate in Q-sorting. The convenience P-sample

Table 1 The definition of terms used in Q-methodology

Terms	Definition
Q-population (The concourse)	A list of statements developed using various sources such as literature, interviews and expert opinion. The statements are representative of the 'universe point of views' regarding a topic. The number of statements can range from dozens to hundreds
Q-sample (Q-set)	The finalised list of statements from the concourse. This step is to clarify statements by reducing ambiguity of meaning and eliminating repetition. The number of finalised statements can range from 20–100 or can be no more than 50
P-sample (P-set)	The group of participants who sort the Q-sample. Forty to sixty participants are appropriate for most studies, or far fewer may be needed for some studies
Q-sorting	Ranking order Q-sample using a grid called a quasi-normal distributed table (Q-sort table). The Q-sort table is arbitrary and can be altered for the convenience of the P-sample

Table 2 Item descriptions and typical array *Z*-scores

Q-statement	Z-Score (Factor)		
	I	II	III
1. Three shifts must be inevitably done for continuous patient care	**−1·0**	0·8	**1·0**
2. A lack of sleep, accumulation of fatigue, and menstrual irregularity due to RSW create physical and mental difficulties	**2·7**	0·9	**1·0**
3. There is time for activities like banking, shopping, and recreation	−0·6	**1·3**	**1·2**
4. It is very difficult to keep in touch with friends because of the irregular working hours	−0·7	−0·8	0·4
5. I prepared for shiftwork when I entered nursing school, which I considered inevitable	**−2·2**	−0·3	**−1·0**
6. It is very good to have a day off during weekdays, but it is very hard to get a day off during a public holiday or on weekends	−0·5	−0·3	0·1
7. Overtime without extra pay in RSW makes me more upset	0·9	0·6	**1·3**
8. It is good to have extra pay for night shift, but I want to sleep when others do	0·1	0·4	−0·1
9. It is very annoying to participate in hospital events, education programs, ward conferences, and staff dinners during my day off or during the night shift	**1·1**	0·2	**1·4**
10. I want to take a break time for every shift to have proper rest and nutrition	0·5	0·5	0·0
11. There is a need to introduce several types of flexible working, and not insist only on three shifts*	**1·2**	**1·4**	**1·2**
12. I wish there was a special bonus and holiday for RSW*	**2·0**	**1·6**	**1·7**
13. It is stupid of some people think nurses can sleep during night shift	0·2	−0·1	0·8
14. RSW makes me feel skeptical about working as a nurse	−0·4	−0·9	**−1·5**
15. I have to work or cannot go early from work because of no substitute workers even if I get sick	0·8	−0·7	**1·9**
16. It is often ambiguous who is responsible if something happens	−0·5	0·6	−0·3
17. I do not feel working RSW when my work schedule requests are not accepted	−0·3	−0·5	0·5
18. It is a good idea to benchmark the RSW system of other organizations	−0·2	**1·2**	0·9
19. Development of special programs which can reduce job stress of RSW is necessary	−0·3	**1·1**	0·4
20. I feel insecure and fearful of being sexually assaulted when I commute early in the morning or late in the evening	−0·5	−0·1	0·2
21. I am comfortable with RSW work, even though I have a baby, as long as there are 24 hour workplace childcare facilities in hospitals	**−1·4**	**1·4**	−0·9
22. It is burdensome to get pregnant because of RSW	0·3	0·6	−0·1
23. I feel sorry to see pregnant nurses work in RSW, but uncomfortable because I have to help them or work more	−0·4	**−1·0**	−0·2
24. The time for self-development is not enough because keeping regular hours is hard	**1·7**	−0·7	0·6
25. I am always tired because of the irregular schedule, and cannot concentrate on my work	0·8	0·4	−0·6
26. It is burdensome to adjust to new patients when I go back to work from days off or holidays	0·0	−0·2	**−1·2**
27. I always strive not to leave tasks for the next shift personnel, but this job never ends	0·2	−0·9	−0·0
28. I have no time to date or go out with boyfriend. I worry that I won't get married	−0·6	**−2·3**	**−1·1**
29. I feel that my life and mood depend on the monthly roster	0·5	**−2·3**	0·4
30. I am angry about working for someone who does not come to the work on my day off	0·2	−0·6	**1·3**
31. My personality seems to be affected because of the pressure of RSW. I worry that I have a personality disorder	**1·1**	**−2·0**	**−1·4**
32. One nice benefit of RSW is able to avoid rush hours because we have different working hours compared to other jobs	−0·8	0·6	−0·1
33. I am eager to transfer to work from 9–5, even though the salary is lower	0·7	−0·3	**−1·0**
34. Relationships with colleagues, doctors, senior-junior, and patients and their relatives are more difficult than the pressure of RSW	0·6	−0·4	**1·2**
35. I am worried about losing the balance between work and family because it is very difficult to participate in family events with SW	−0·8	−0·3	−0·7
36. I hate to work on the day that others get day off, such as holidays and weekends. I want to rest when others do	0·6	0·7	0·2
37. Nursing is interesting and not boring because each shift has different tasks	**−2·4**	**1·6**	**−2·1**
38. I am going to quit my job because there are no reasonable alternatives to working in RSW	**−1·3**	**−1·9**	−0·9
39. One of the advantages of RSW is that I have developed a habit of completing tasks in the allotted time	−0·5	0·9	**−1·9**
40. The efficiency of work is low when I work in RSW with unfriendly colleagues	0·5	−0·7	0·5

Table 2 (continued)

Q-statement	Z-Score (Factor) I	II	III
41. I like the fact that I have many days off compared to other jobs, and a salary that is higher than women my age	**−1·7**	0·5	0·7
42. I do not understand a unit manager who makes a roster like from night off to day or day to evening	0·8	**1·1**	**−1·3**
43. My heart palpitates and I feel uncomfortable when I get a phone call from the hospital on my day off	−0·2	−0·0	**−1·3**
44. It is tough to work in SW, so I hope nurses help each other regardless of work	0·6	0·3	0·3
45. I feel I have three faces and minds according to the three shifts†	−0·7	**−1·4**	**−1·3**
46. I think that the main culprit of nurse turnover rate is RSW	−0·2	−0·1	−0·5

RSW, rotating shift work; *consensus; bold, types of Z-score above +1·0, or below −1.

consisted of 39 clinical nurses (from the 218 nurses) who had prior experience (> one year) with RSW in general hospitals.

Q-sorting

Thirty-nine participants (P-sample) were informed about instructions for the method of Q-sorting (Appendix 1). These participants ranked and ordered the Q-statements using a grid called a quasi-normal distributed table with a distribution ranging from +5, through 0, to −5 for items (Table 3). After each Q-sort, each participant was requested to write open-ended comments to describe the reasons why they sorted the statements to which they strongly disagreed (−5) or strongly agreed (+5). These descriptions were used to interpret each factor classified.

Data analyses

The pc-QUANL program (Van Tubergen 1975) was used to analyse the Q-sorts. Factor analysis was established to reveal groupings or patterns in the data after each participant's score was entered into the database. Relevant to the analysis of Q-sorts were the following three points: eigenvalues (which are indicative factors for statistical strength and explanatory power) of at least 1·0, varimax rotation to maximise the variance in each factor and *z*-score as a measure of standard deviation for each statement (statements with a *z*-score above +1·0 as positive views and below −1·0 as negative views; Akhtar-Danesh *et al.* 2008).

Ethical considerations

The study was approved by Institutional Review Board at the College of Medicine, Chung-Ang University (13-0002). All participants received information about the purpose and method of the study. All participants were informed that their participation was voluntary that they could refuse to participate and could withdraw during the study without penalty. All information gathered was treated confidentially and anonymously. They would not affect participants' course grades. Written informed consent was obtained in accordance with the Declaration of Helsinki.

Results

Of the 39 participants in this study, 31 were women and eight were men. Their age ranged from 24–52 years. Twenty-six participants were married, of which 25 had

Table 3 Sample of completed Q-Sort Table

					41	18	2				
				19	26	46	45	12			
			4	38	24	14	31	36	32		
		43	27	37	34	25	40	42	30	35	
	21	17	28	23	01	16	22	39	1	29	15
	6	9	8	44	33	3	20	7	5	13	11
Raw Scores	−5	−4	−3	−2	−1	0	1	2	3	4	5
No. of Card	(2)	(3)	(4)	(5)	(6)	(6)	(6)	(5)	(4)	(3)	(2)
Transformed Score	1	2	3	4	5	6	7	8	9	10	11
	(Strongly Disagree)					(Neutral)				(Strongly Agree)	

Table 4 Eigenvalues, variance and characteristics of the 39 participants

Variable	Factor I (n = 18)	Factor II (n = 10)	Factor III (n = 11)
Eigenvalues (variance, %)	7·91 (20·2)	3·80 (9·7)	2·69 (6·9)
Gender			
Male	1	4	3
Female	17	6	8
Age			
in years (range)	27–52	24–28	28–37
Marriage			
Yes	15	3	8
No	3	7	3
Children			
Yes	14	3	8
No	4	7	3
Period of working			
in years (range)	2–25	1–5	5–14
Experience in SW			
Yes	18	10	11
No	0	0	0
Importance of rotating SW			
Yes	18	10	11
Average	0	0	0
No	0	0	0
Type of SW (present)			
Three-SW	17	10	7
Fixed work	1 (D)	0	4 (D)
Preference for rotating SW			
Yes	0	8	3
Average	2	2	3
No	16	0	5

SW, shift work; (D), daytime.

children. Participants' period of work varied from 1–25 years. All participants had experience in RSW and appreciated the importance of this work schedule. The majority (n = 34) of the participants were working in a three-shift RSW. The remaining five had a fixed daytime shift. Eleven of the 39 participants preferred RSW, seven were noncommittal, but 21 did not prefer RSW. This study revealed three factors that occupied 36·8% of all variance, including factor I (20·2%), factor II (9·7%) and factor III (6·9%). Eigenvalue was 7·91, 3·80 and 2·69, respectively (Table 4).

Factor I: RSW is frustrating (objectionable perspective)

Eighteen clinical nurses loaded significantly onto factor I, which was labelled 'RSW is frustrating (objectionable perspective)'. The participants complained about the RSW system and its detrimental impact on their physical and mental health. However, this group did not want to quit their jobs on account of RSW and instead requested extra pay for RSW. This group agreed with Q-statements 2, 9, 11, 12, 24 and 31. The participants did not agree with Q-statements 1, 5, 21, 37, 38 and 41 (Table 2). Participants who loaded on this factor provided illustrative comments about why they placed the statements at the ends of the sorting grid. Examples include:

'I never thought that rotating shift work was my destiny. I would not have specialized in nursing had I known that rotating shift work was so stressful and backbreaking.'

'I regret that I am working as a nurse. It is very hard to make time for myself. I gave up so many things to develop myself. I just sleep all day during my day off.'

'I feel always tired, so I am not in the mood to meet anyone or do anything, especially after a night shift.'

'I think I have a mood disturbance. I am becoming irritable and nervous.'

Factor II: RSW is satisfactory (constructive perspective)

Ten of the 39 participants loaded onto factor II ('RSW is satisfactory: constructive perspective') on the basis of 13 statements. The participants deemed RSW as interesting

and worthwhile. This group agreed with Q-statements 3, 11, 12, 18, 19, 21, 37 and 42. They did not agree with Q-statements 28, 29, 31, 38 and 45 (Table 2). Participants who loaded on this factor provided illustrative comments about why they placed the statements at the ends of the sorting grid. Examples include:

'Everything depends on the way I look at something. I can manage my life in accordance with shift work. I can do many things that others cannot do during weekdays.'

'I love the variety of rotating shift work, even if it causes me some stress. A proper amount of stress can help me stay alert and cope with difficulties.'

'Rotating shift work is very important to continued patient care, but times have changed and so have nurses. Newly developed shift work methods need to be applied.'

Factor III: RSW is problematic, but necessary (ambivalent perspective)

Eleven of the 39 participants loaded on factor III ('RSW is problematic, but necessary: ambivalent perspective') on the basis of 18 Q-statements. Most of these participants acknowledged the need for RSW, but they demanded careful consideration for nurses' difficult working circumstances with regard to RSW. This group agreed with Q-statements 1, 3, 7, 9, 11, 12, 15, 30 and 34, but disagreed with statements 14, 26, 28, 31, 37, 39, 42, 43 and 45 (Table 2). Participants who loaded on this factor provided illustrative comments about why they placed the statements at the ends of the sorting grid. Examples include:

'Rotating shift work is positively necessary, but is not easy. Nevertheless, I have to work because of money.'

'I don't understand why I have to attend sudden hospital events after a night shift, or my day off. I would like to make a complaint about this, but no one listens to us.'

'I should work even if I get sick. There are no substitute workers for me. It is indeed a serious disincentive.'

Consensus statements between the three factors

There were several statements that the participants loading in the three factors equally either agreed or disagreed with (Table 2). The three factors all agreed with statements 11 and 12, but disagreed with statements 45. These responses reflected the views that extra pay and special holiday hours should be given as a reward for RSW and that a flexible work schedule needs to be applied in nursing.

Discussion

Factor I

Factor I participants expressed displeasure with RSW. The major topic of the discussion concerning RSW in this group were serious complications arising from lack of sleep, accumulation of fatigue, irregular menstruation and changed abnormal personality due to unpredictable work schedules. This group opined that RSW unfairly affected attendance at other tasks besides nursing on their day off and on holidays.

Bae and Fabry (2014) and Saksvik *et al.* (2011) reported that the majority of shift-working nurses suffer from acute and chronic fatigue including sleep disorder. Working 12 hours or more was associated with a high risk of depersonalisation or behaviour change caused by emotional and physical exhaustion. Shao *et al.* (2010) reported that 57% of female shift-working nurses have an unfavourable sleep pattern and a change in phases of the menstrual cycle, which adversely affect quality of life.

Mental and physical burnout may result in work-related injuries, sick leave and absenteeism (Suzuki *et al.* 2004, Brewer *et al.* 2012, Daouk-Öyry *et al.* 2014, Lin *et al.* 2014). Constant tiredness, in particular, due to night shift work has been related to patient mortality and increased intensive care unit readmission (de Cordova *et al.* 2012). Lower quality of sleep negatively influences patient safety (Sveinsdóttir 2006, Järvelin-Pasanen *et al.* 2013). Consequently, nurses' job satisfaction and nursing outcomes decline, turnover intention is accelerated, and medical costs for covering medical accidents are increased (Saksvik *et al.* 2011, Brewer *et al.* 2012, Lee *et al.* 2012).

Circadian fluctuation due to RSW can jeopardise nurses' normal biorhythms, which can have a deleterious effect on dietary habits, immune system and level of hormones which has been linked to increased rates of cancer (Shao *et al.* 2010, Nagai *et al.* 2011, Chung *et al.* 2012). Wong *et al.* (2010) surveyed 662 RSW nurses in one hospital. More than 60% had abnormal emotional, external and restraint eating scores. Abnormal eating habits in RSW nurses can lead to poor nutrition or obesity (Clendon & Walker 2013). Inoue *et al.* (2004) investigated 568 three-shift RSW nurses in four hospitals in Japan. A total of 57 nurses (10%) experienced biochemical hypoglycaemia at least once during RSW. This could lead to impaired cognition. Schernhammer *et al.* (2001) reported that perimenopausal women who worked a rotating night shift more than 3 days per month could be at heightened risk of breast cancer. Postmenopausal women who worked a rotating night shift for over 30 years experienced a significantly increased in

cancer incident rate. Korompeli *et al.* (2009) reported increased levels of cortisol and T4 but decreased thyroid-stimulating hormone in RSW personnel compared to fixed morning shift. All these findings support a strong correlation between RSW and nurse health.

Nurses are leading healthcare providers. Their mental and physical health can influence patient outcomes (de Cordova *et al.* 2012, Järvelin-Pasanen *et al.* 2013). Therefore, strategies for factor I individuals and continuous monitoring status of nurse health through regular check-ups are crucial to mitigate health problems of nurses that are associated with RSW. A regular exercise intervention programme is another useful coping strategy in RSW (Shao *et al.* 2010).

Although RSW can manifest undesirable health problems, factor I participants opined that RSW is imperative and wants to continue their job (statements 1 and 38). Flexible schedules reflecting nurses' preferred shift rotations or nurses' preferences for specific work days can be helpful for factor I individuals (Ruggiero & Pezzino 2006, de Cordova *et al.* 2012, Clendon & Walker 2013). Offering high shift differentials to nurses who are always willing to work night shifts can also be a valuable suggestion.

Factor II

Factor II participants believed that RSW is satisfactory and has various advantages. This group proposed development of diverse programmes to alleviate stress related to RSW, and adoption of various work schedules, such as part-time, fixed-hour day, evening and night-time, or flexible working hours.

Clendon and Walker (2013) reported that over 34% of 3273 respondents thought SW suited them, and almost 33% reported coping well with SW. Respondents also willingly acknowledged that SW is part of their job and is necessary. Ruggiero and Pezzino (2006) reported that RSW, especially the night shift, is comfortable because of a less hectic work atmosphere and stress, autonomy in work, more teamwork and more time to focus on patient care. Chung *et al.* (2012) identified no significant differences between regular-shift nurses and RSW nurses regarding sleep patterns and sleep-related cardiac autonomic functions. This finding indicated that two consecutive days off for RSW nurses is needed to recover sleep-related cardiac autonomic functions and that RSW can be acceptable unless nurses use their free time irrelevantly. Therefore, sufficient days off and institution of various working schedule can be helpful in enhancing advantages of RSW.

Factor II participants, in particular, had constructive ideas emphasising the importance of 24-hour childcare facilities in the workplace (statement 21). Raising a child and taking care of family while maintaining RSW is especially difficult for married woman nurses and is crucial in turnover intention, early retirement, work–family conflict and family disorganisation (Saksvik *et al.* 2011, Brewer *et al.* 2012, de Cordova *et al.* 2012). Nursing turnover can create a shortage of nurses, and work–family conflict can develop into a serious social issue (Willis *et al.* 2008, Shao *et al.* 2010, Lee *et al.* 2012). Therefore, childcare is an issue for nurses that hospitals should consider when planning benefits. The installation of 24-hour childcare facilities in the workplace to maintain a work–life balance might be helpful. Enacting certain days off for children and family and revitalisation of paternity leave at the discretion of hospitals can be also prominent strategy for this group.

Factor III

Factor III participants expressed a feeling of both satisfaction and dissatisfaction with the RSW system. This group was upset about the lack of replacement workers for sick nurses, unpaid overtime, being called in to work unexpectedly without notice and superfluous attendance at hospital events. Nevertheless, this group conceded the importance and benefits of RSW.

Zeytinoglu *et al.* (2006) reported that working unpaid for longer than the agreed working hours is a factor for increasing the intention to leave the nursing profession. Bae and Fabry (2014), Järvelin-Pasanen *et al.* (2013) and Scott *et al.* (2007) reported that nursing overtime can result in job-related accidents, including accidents affecting patient safety, with a higher risk of motor vehicle accidents (15·7% in $\leq$8·5; 22·3% in >8·5–<12·5; and 31·3% in $\geq$12·5 hours worked). In addition, Josten *et al.* (2003) supported the idea that working more than 9 hours without replacement can contribute to fatigue, psychophysiological health problems and low work satisfaction. However, Brewer *et al.* (2012) reported that voluntary overtime and pay for work decreases turnover of nursing staff. Fair remuneration for overtime or extra work should be considered. Also, encouraging voluntarily participation in extra work or hospital events with prior consent could be a prudent strategy for this group.

Relevant to clinical nursing

The present findings support the view that RSW is associated with nurse health, job satisfaction and patient out-

comes. Nursing administrators and hospital managers who are typically involved in nurses' welfare should understand the effect of RSW on nurses and consider the perspectives of nurses to RSW. This involves respecting these attitudes and reflecting nurses' perspectives in the work schedule, with the goal of optimising mental, physical and social health. As well, personalised roster design considered individual circumstances and preference needs to be taken into account when scheduling RSW.

Limitations

Limitations in this study should be considered. The findings in this study may not be generalised to other groups with different experiences. An additional limitation is that the time for Q-sorting took 1 or 2 hours per individual, which may have resulted in the participants feeling tired and trying to finish Q-sorting early. These circumstances may have affected the result of this study.

Participants in this study were specialised in nursing at a college nursing not university, most of them were working in a medium-sized hospital, and their pay was lower than at a large hospital. Such circumstances may have contributed to the negative attitudes towards RSW in the study setting.

Conclusions

The study findings highlight the supportive manner of nurse managers, introduction of diverse reward methods and regular check-ups for shift workers. This study also emphasises that nurses' mental and physical health problems related to RSW can adversely affect retention of proficient nurses and can also result in career discontinuity. Based on findings in this study, hospital managers and nursing administrators should understand and respect nurses' attitudes towards RSW and reflect their perspectives in evaluations prior to planning hospital events, conferences or educational programmes. Development of personalised roster design that considers individual circumstances and preferences of nurses are the key suggestions in this study to positively reinforce nurses' attitudes towards RSW.

Disclosure

The author has confirmed that the author meets the ICMJE criteria for authorship credit (www.icmje.org/ethical_1author.html), as follows: (1) substantial contributions to conception and design of, or acquisition of data or analysis and interpretation of data, (2) drafting the article or revising it critically for important intellectual content and (3) final approval of the version to be published.

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Appendix 1: Q-sorting instructions for participants

1 Carefully read the Q-set cards (statements) and understand the meaning of each card.

2 Divide the Q-set cards into three provisional ranking categories with the highest ranking on the right (feel positive/definitely important or agree with), zero (0) in the middle (feel indifferent, unsure) and the lowest ranking on the left (feel negative/most unimportant or definitely disagree with).

3 Rank the 46 Q-set cards according to a range of agreement (from 5 to +1, positive side) to disagreement (from −5 to −1, negative side) using a grid called the Q-sort table that illustrates the ranking values in the distribution.

4 Approach the middle and the remaining neutral 6 items placed under '0' columns.

5 Finally, write comments to describe your reasons for sorting the statements with which you strongly disagreed (−5) and strongly agreed (+5).