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Anya Johnson, Helena Nguyen, Sharon K. Parker, Markus Groth, Steven Coote, Lin Perry, Bruce Way,

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# “That was a good shift”

## Interprofessional collaboration and junior doctors’ learning and development on overtime shifts

Junior doctors’  
learning and  
development

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Anya Johnson and Helena Nguyen

*Work and Organisational Studies,*

*University of Sydney Business School, University of Sydney, Sydney, Australia*

Sharon K. Parker

*Centre for Transformative Work Design, The UWA Business School,*

*University of Western Australia, Perth, Australia*

Markus Groth

*School of Management, UNSW Business School, UNSW, Sydney, Australia*

Steven Coote

*Counter Disaster Unit, Gosford Hospital, Central Coast and Northern Sydney*

*Area Health Services, New South Wales, Australia*

Lin Perry

*Faculty of Health, University of Technology Sydney and South Eastern Sydney*

*Local Health District, Sydney, Australia, and*

Bruce Way

*Prince of Wales Hospital and Community Health Services, Randwick, Australia*

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### Abstract

**Purpose** – The purpose of this paper is to investigate a boundary spanning, interprofessional collaboration between advanced practice nurses (APNs) and junior doctors to support junior doctors’ learning and improve patient management during the overtime shift.

**Design/methodology/approach** – A mixed methods evaluation of an intervention in an adult tertiary referral hospital, to enhance interprofessional collaboration on overtime shifts. Phase 1 compared tasks and ward rounds on 86 intervention shifts with 106 “regular” shifts, and examined the effect on junior doctor patient management testing a model using regression techniques. Phase 2 explored the experience of the intervention for stakeholders. 91 junior doctors participated (89 percent response rate) on 192 overtime shifts. Junior doctors, APNs and senior medical professionals/administrators participated in interviews.

**Findings** – The intervention was associated with an increase in self-initiated ward rounds by junior doctors, partially explained by junior doctors completing fewer tasks skilled nurses could also complete. The intervention significantly reduced doctors’ engagement in tasks carried over from day shifts as well as first year (but not more experienced) junior doctors’ total tasks. Interviews suggested the initiative reduced junior doctors’ work pressure and promoted a safe team climate, situation awareness, skills, confidence, and well-being.

**Originality/value** – Junior doctors overtime shifts (5 p.m. to 11 p.m.) are important, both for hospitals to maintain patient care after hours and for junior doctors to learn and develop independent clinical decision making skills. However, junior doctors frequently report finding overtime shifts challenging and stressful. Redesigning overtime shifts to facilitate interprofessional collaboration can improve patient management and junior doctors’ learning and well-being.

**Keywords** Team working, Boundary spanning, Learning and development, Nurse, Interprofessional collaboration, Junior doctors, Patient management

**Paper type** Research paper



### Introduction

Hospitals need to find new ways to manage patients safely and effectively as they contend with escalating costs and increasingly complex and acute patient needs. This is particularly

pressing for the transitional period (overtime shift)[1] between the day shift, when the hospital is operating at full capacity, and the overnight shift, when the hospital operates in “screensaver mode.” In this paper we examine the effect of an interprofessional[2] collaboration between advanced practice nurses (APNs) and junior doctors[3] to support junior doctors’ learning and improve patient management during the hours of 5 p.m. to 11 p.m. In the first section of this paper, we analyze the effect of the interprofessional collaboration on the task environment and self-initiated ward rounds of junior doctors using quantitative data. In the second section, we draw on interview data to explore the junior doctors’ and the APNs’ experiences of this initiative.

Junior doctors’ overtime shifts are important, both for hospitals to maintain patient care after hours and for junior doctors to learn (Antiel *et al.*, 2013; Bearman *et al.*, 2011; McKee and Black, 1992). However, junior doctors find overtime shifts challenging and stressful (Wrenn *et al.*, 2010). Unlike regular hours where they are supervised and supported by a medical team, junior doctors are required to work independently as temporary members of unfamiliar wards, managing unfamiliar patients, working long hours, and managing competing demands with limited on-site supervision and support (Ahmed-Little, 2007; Barrow *et al.*, 2011; Jackson and Moreton, 2013). In the job design literature the overtime shift would be characterized as high strain, as junior doctors face high demands with high uncertainty and low support (Fiordelli *et al.*, 2014; Theorell and Karasek, 1996). There is also evidence that long hours, limited supervision, and high workload can diminish junior doctors’ patient care and learning (Baldwin *et al.*, 1997; Jagsi and Surender, 2004) and increase errors (Landrigan *et al.*, 2004). With high demands and uncertainty and little support, junior doctors are likely to experience “learned helplessness” (Theorell and Karasek, 1996) and to passively wait for requests for assistance from the ward, rather than proactively manage patients and their own skill development. In a parallel system, most nurses scheduled on overtime shifts work on their regular ward, with familiar co-workers and carry out familiar tasks (Barrow *et al.*, 2011) (i.e. high demand/low uncertainty and high support). In this intervention, an APN spans these systems, creating an interprofessional collaboration, reducing uncertainty and embedding support for junior doctors.

Most studies investigating interventions involving APNs’ focus on patient outcomes in acute and critical care hospital settings (Benatar *et al.*, 2003; Cowan *et al.*, 2006; Hoffman *et al.*, 2005; Kleinpell and Gawlinski, 2005) and in aged care (Koppel, 2003). Generally these studies have found that APN-led patient management reduces costs and improves care outcomes. However, these studies focus on the viability of APN care as a substitute for junior doctors’ care (Hoffman *et al.*, 2005), rather than the APN as a partner collaborating with junior doctors. There is some evidence that when junior doctors collaborate with and learn from APNs, they are more effective and, when they experience less “strain,” are more likely to be proactive, and utilize and develop their skills (Parker *et al.*, 2013; Vazirani *et al.*, 2005). This approach is also more likely to be effective than having senior nurses making decisions behind the scenes, where the opportunity for junior doctors to learn is lost (Fiordelli *et al.*, 2014). We explore whether an interprofessional collaboration increases junior doctors’ proactive patient management during overtime shifts.

Evidence from the UK indicates that APNs can act as knowledge brokers, supporting problem solving and facilitating change (Gerrish *et al.*, 2011). We propose that collaborations between APNs and junior doctors are likely to change the design of junior doctors’ overtime shifts by incorporating important social characteristics (support, feedback, interdependence) into their work design (Bearman *et al.*, 2011; Humphrey *et al.*, 2007) and by enhancing situational knowledge. These changes, we argue, reduce the uncertainty in the environment and create the opportunity for junior doctors to craft their roles and become more proactive. Figure 1 depicts the proposed model which provides the basis for the hypotheses in part 1.

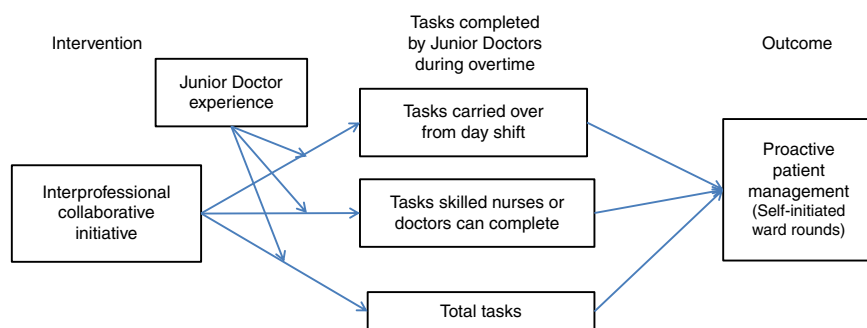


Figure 1. Proposed model

In this intervention the APN has a boundary spanning role on the overtime shift. The APN commenced work three hours before the junior doctors began their overtime shifts, thereby “spanning” the “full capacity” day and “minimally staffed” overtime shift to facilitate information flow and continuity. The APN also “spanned” between the junior doctors and the after-hours ward nurses, where differences in “power, authority and leadership paradigms” can create difficulties in working together (Barrow *et al.*, 2011). Through boundary spanning (Ancona and Caldwell, 1992) the APN transferred knowledge about patients that might otherwise fall between the cracks of different systems (day/overtime) as well as the cracks within systems (across wards and professions).

Boundary spanning is important as it enables more effective coordination of subsystems and teams (Ancona and Caldwell, 1992) and increases access to three types of knowledge: strategic, relational, and normative (Dutton *et al.*, 2001). In the context of this research strategic knowledge is information provided from other shifts and wards (e.g. patients at risk/flow status) enabling junior doctors to anticipate and prioritize patient needs. Relational knowledge is information about other overtime health professionals; this is important as junior doctors generally have sporadic overtime patterns and are less able to build working relationships. Normative knowledge is information about patients (e.g. typical patient status), or resources (e.g. testing protocols). We argue that the boundary-spanning nature of the APN’s role expands the knowledge available to junior doctors that enhances their perceived control, capability, and willingness to perform proactively (Parker and Collins, 2010). This leads to our first hypothesis:

*H1.* An interprofessional collaboration between an APN and junior doctor on the overtime shift will lead to junior doctors’ proactive management of patients.

In addition to determining whether the interprofessional collaboration has the effect we propose, it is also important to investigate the mechanisms or reasons why a collaborative partnership and boundary spanning role might increase proactivity. We propose three pathways through which this collaboration may affect junior doctors’ proactive behavior. First, in their role as boundary spanner between the day and overtime shifts facilitating information flow and continuity, it is likely that the APN prevents or reduces patient-related problems carried over from the day shift into the overtime shift. Having fewer demands and timely information about high risk patients early in the overtime shift provides junior doctors’ greater certainty and increased control enabling them to plan and initiate ward rounds.

Second, we propose that through boundary spanning within the overtime shift, facilitating knowledge transfer between ward nurses and junior doctors, the APN changes the patient care tasks that junior doctors complete. We expect that junior doctors’ complete fewer tasks that both skilled nurses and junior doctors are authorized to undertake. Finally, we propose that these reduced demands will be reflected in junior doctors completing fewer tasks overall when working with an APN, due to the additional resources and greater

efficiencies created through boundary spanning. Through the combination of reduced demands, and increased certainty, control and support from the interprofessional collaboration, we expect junior doctors to be more proactive and initiate more ward rounds. This leads to our second hypothesis:

- H2. The effect of an interprofessional collaboration between an APN and junior doctor on junior doctors proactive behavior is transmitted or explained by (in part) (a) fewer tasks left over from the day shift (b) fewer tasks both skilled nurses and junior doctors complete and (c) fewer total tasks junior doctors complete.

Finally the effects of the interprofessional collaboration are likely to be influenced by junior doctors' experience. While all junior doctors might be classified as novices, those in their first year of hospital practice are least likely to be able to manage the uncertainty and complexity of the overtime shift. We therefore propose that the interprofessional collaboration will have the strongest effect for the least experienced junior doctors by reducing their work tasks and enabling them to learn in a less pressured environment. However for junior doctors who are close to full registration we expect the interprofessional collaboration to lead to increased tasks and self-initiated ward rounds:

- H3. The effect of the interprofessional collaboration between an APN and junior doctor on the tasks junior doctors complete is contingent on the junior doctors' experience, with the greatest change in tasks being experienced by first year junior doctors.

## Method

### *Setting, intervention and study design*

The research took place in a large, metropolitan public teaching hospital in Australia. During normal working hours, a junior doctor is supervised by a specialist medical team on a specific ward or unit. However at 5 p.m., twice a week the junior doctor collects a pager and is responsible for up to eight wards, with which he/she may be unfamiliar, until 11 p.m. Across the hospital, two first year junior doctors cover wards with less acute/complex patients and three experienced junior doctors cover the remaining wards. An on-site medical and surgical registrar oversee all junior doctors, and consultants (specialists) are on-call, but on many overtime shifts junior doctors have no contact with senior doctors.

Recognizing the challenges inherent in this system for junior doctors (such as fatigue, anxiety, lack of support and environmental uncertainty) and for patient management (as junior doctors respond to requests from the wards rather than proactively managing patients) senior medical and nursing staff initiated a new advanced practice nursing role. The objective of this role was twofold: to support, encourage and coach junior doctors; and to facilitate collaboration between junior doctors and ward nurses to improve patient management. The APN commenced work at 2 p.m. and completed initial assessments of at-risk patients, prepared a care plan, providing this information to junior doctors at 5 p.m., thus spanning the boundary between regular and overtime shifts. Between 5 p.m.-11 p.m., the APN worked between the wards and junior doctors to facilitate communication and information sharing, spanning the boundary between junior doctors and ward nurses and worked alongside the junior doctors to provide support and advice.

At the time of the study, there was only sufficient funding for an APN to work with junior doctors on half the overtime shifts. This natural experiment enabled us to compare overtime shifts with and without an APN present. The junior doctors were not aware of the specific hypotheses of the research and were invited to participate in a research project investigating their experiences on overtime shifts as part of a wider project to investigate patient flow. This research was approved by health service and university Human Research Ethics Committees. Participation was voluntary and written consent was obtained.

*Sample*

Three APNs and ninety-one junior doctors participated, resulting in a response rate of 100 and 89 percent, respectively. Data were collected from 192 overtime shifts over six months. An APN was present in 86 shifts. In total, 54 percent of participating junior doctors were female and 35 percent were in their first year. The average hospital experience of junior doctors' was 2.1 years (SD = 1.22).

*Measures*

We collected data using a survey checklist and pager. The checklist was designed by senior doctors and consisted of 20 typical overtime shift tasks, including clinical patient reviews, non-patient reviews (e.g. pathology results or x-rays), procedures (e.g. IV cannulas), prescribing new treatments, and other ward duties (e.g. medication charts, discharges). Junior doctors recorded their tasks and self-initiated ward rounds throughout the overtime shift and also noted the origin of the task, such as whether the task could have been completed during the day. Senior doctors and APNs also classified tasks into those that could be undertaken by junior doctors or skilled nurses (junior doctor/skilled nurse tasks) and tasks that could only be completed by junior doctors. Finally "total tasks" was based on all tasks the junior doctor recorded during overtime.

To control for workload differences between wards, weekdays, and seasons, we included the pages junior doctors received with requests for assistance in the analysis. This information was taken from the pagers junior doctors carry on their overtime shift and recorded at the end of the shift.

*Data analysis*

To test the study hypotheses, we used SPSS 21 and the PROCESS macro (model 7) (Hayes, 2013) to estimate the equations and test the conditional indirect effects of the presence of the APN on self-initiated ward rounds, through "tasks from the day shift," "doctor or nurse tasks" and "total tasks" (see Table II). The PROCESS macro uses bootstrapping, a nonparametric re-sampling procedure that does not impose the assumption of normality on the sampling distribution (Hayes, 2013), to obtain bias-corrected confidence intervals (using 5,000 bootstrap samples).

**Results**

In Table I we present descriptive statistics and patterns of association between study variables. Findings suggest that the presence of the APN was associated with junior doctors completing fewer tasks from the day shift, fewer "junior doctor or nurse" tasks, and fewer tasks overall. Tenure was positively associated with overall tasks and while there was a positive association between the presence of the APN and junior doctor initiated ward rounds, this did not reach significance.

	Mean	SD	1	2	3	4	5	6
1 APN <sup>a</sup>	0.45	0.50						
2 Junior Doc. Experience <sup>b</sup>	2.06	1.13	-0.02					
3 Paged requests for assistance	11.46	5.46	-0.01	-0.07				
4 Tasks from day shift	1.59	1.92	-0.16*	0.11	0.19*			
5 Skilled nurse/doctor tasks	5.68	4.70	-0.26**	0.04	0.27**	0.23**		
6 Total tasks	25.53	13.03	-0.16*	0.17*	0.41**	0.42**	0.73**	
7 Self-initiated ward rounds	1.61	1.37	0.14	0.02	0.15	0.17*	-0.13	0.07

**Notes:** <sup>a</sup>0 = No APN, 1 = APN; <sup>b</sup>Years. \**p* < 0.05; \*\* *p* < 0.01

**Table I.** Descriptive statistics for all variables, from overtime shifts (5 p.m. to 11 p.m.) completed by junior doctors and Pearson product correlations

In Table II we present the results of the moderated mediation analysis. There was no evidence for the direct effect of the presence of the APN on junior doctor initiated ward rounds (*H1*). However, there was evidence of an indirect effect of the presence of the APN on junior doctor initiated ward rounds through “Doctor or Nurse Tasks.” The path coefficient showed that junior doctors completed fewer “tasks skilled nurses or doctors are authorized to complete” when an APN is present, and this reduction in these specific types of tasks helps explain the increase in self-initiated ward rounds, providing partial support for *H2*. Interestingly, there are fewer tasks from the day shift when the APN is present, however this does not mediate or explain the increased self-initiated ward rounds. In addition, there is no direct effect of the presence of an APN on the total tasks junior doctors complete, nor do the total tasks completed have an effect on the junior doctors self-initiated ward rounds. This suggests that the presence of the APN changes the nature of the work rather than simply reduces the tasks the junior doctors complete during overtime. *Post-hoc* analysis showed that junior doctors completed more tasks that only doctors are authorized to complete, when working with the APN.

Perhaps not surprisingly, there is a direct effect of experience on total tasks, with experienced junior doctors completing more tasks during overtime than less experienced junior doctors. In addition, there is an interaction between junior doctors’ experience and the presence of the APN, suggesting that the effect on the total tasks junior doctors complete is contingent or depends on the junior doctors’ experience. We graphed the simple slopes of the interprofessional initiative on junior doctors’ total tasks, for junior doctors with three or more years tenure ( $> 1SD$ ) and one or less years tenure ( $< 1SD$ ), following procedures recommended by Aiken and West (1991). As shown in Figure 2, and in support of *H3*, we found that the least experienced junior doctors completed the fewest tasks when the APN was present, suggesting that the APN reduces work demands for this group. Finally the conditional indirect effects of the presence of the APN on self-initiated ward rounds is significant for less experienced junior doctors, suggesting that the presence of the APN changes less experienced junior doctors’ behaviors but not more experienced junior doctors’ behaviors, who may be more fixed in their routines.

## Discussion

We explored how an interprofessional initiative between an APN and junior doctors can change the way junior doctors work, in what has traditionally been a challenging and difficult environment; overtime shifts in hospitals (Barrow *et al.*, 2011; Fiordelli *et al.*, 2014). While there is evidence of the efficacy of APN care for patients (e.g. Kleinpell and Gawlinski, 2005), this is one of the first studies examining the effects of an APN and junior doctors working together on junior doctors’ work patterns and behaviors during overtime. Our results demonstrate that a boundary spanning interprofessional initiative (where an APN facilitates information flow, improves coordination and communication and embeds learning between systems and groups) can change the work environment, and through this change increase the proactive management of patients. This initiative might also be characterized as knot working or the “rapidly pulsating, distributed and partially improvised orchestration of collaborative performance between otherwise loosely connected actors and activity systems” (Engestrom, 2000, p. 972). Engestrom’s metaphor of the tying and retying of knots, as representing the interactions between nurses and doctors as they care for patients, captures the complexity of this initiative, as it is more than the “mere presence” of an APN, rather the APN creates an environment where teamwork and collaboration between nurses and doctors is enhanced.

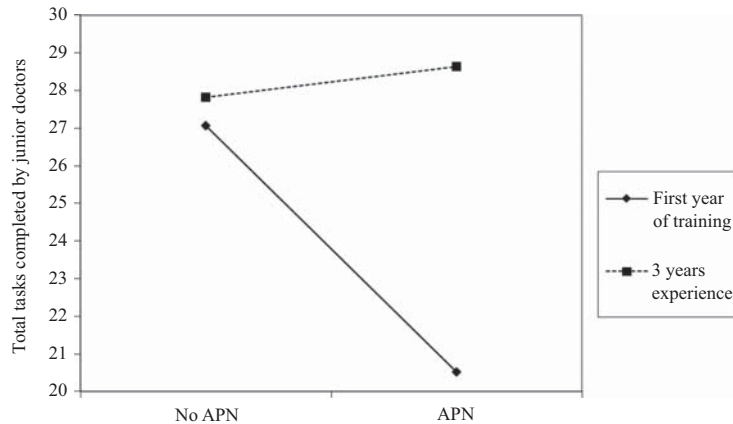
Previous research has found that employees working in complex, uncertain environments are more engaged and motivated by relational job characteristics, such as feedback and support (Barry and Crant, 2000; Gersick *et al.*, 2000). This research adds to this

	Outcome: tasks from day shift (M1)			Outcome: skilled nurse/doctor tasks (M2)			Outcome: total tasks (M3)			Outcome: self-initiated ward rounds (Y)		
	Coeff.	SE	ULCI	Coeff.	SE	ULCI	Coeff.	SE	ULCI	Coeff.	SE	ULCI
Constant	1.63	0.15	1.33	1.92	0.35	5.12	6.49	26.01	27.82	1.36	0.25	0.86
APN <sup>a</sup> (X)	-0.64**	0.30	-1.24	-0.04	-2.20*	0.70	-3.58	-2.87	0.77	0.27	0.22	-0.17
Day tasks (M1)												
APN tasks (M2)												
Total tasks (M3)												
Experience	0.16	0.13	-0.09	0.42	0.20	-0.39	0.79	1.96*	3.51	0.03	0.02	-0.01
APN × Exp	0.05	0.26	-0.47	0.57	1.12	0.60	-0.07	3.27*	6.40	0.11	0.06	-0.01
Pages	0.07*	0.03	0.02	0.13	0.25*	0.06	0.12	1.04**	1.37	-0.09*	0.03	-0.16
R <sup>2</sup>										0.02	0.01	-0.00
												0.05
Conditional indirect effects of APN on self-initiated ward rounds (Y) at values of junior doctors experience												
Experience	Indirect effects	Boot SE	Boot ULCI	Indirect effects	Boot SE	Boot ULCI	Indirect effects	Boot SE	Boot ULCI	Indirect effects	Boot SE	Boot ULCI
		-0.07	0.07	-0.24	0.01	0.32	0.15	0.08	0.70	-0.15	0.11	-0.43
ISD < Mean		0.05	-0.22	0.00	0.20	0.10	0.05	0.45	-0.07	0.06	-0.26	0.01
ISD > Mean		0.07	-0.25	0.03	0.08	0.09	-0.05	0.33	0.02	0.08	-0.09	0.25
Note: <sup>a</sup> 0 = No APN; 1 = APN. Model 7 (PROCESS) Unstandardized regression coefficients are reported. Bootstrap simple size: 5,000. The indirect effect is significant where the confidence interval does not contain zero. LLCI = lower level of the 95% bootstrap percentile confidence interval; SE = standard error; ULCI = upper level of the 95% bootstrap percentile confidence interval. * <i>p</i> < 0.05; ** <i>p</i> < 0.01												

**Table II.** Results of the moderated mediation of APN collaboration on self-initiated ward rounds on overtime shifts



**Figure 2.**  
Moderating effects of  
experience on total  
tasks completed by  
junior doctors



literature by providing evidence that an APN providing coaching, support and encouragement, can change behavior, and create opportunities for junior doctors to be more proactive in ways that benefit both patients and the hospital.

In addition, the APN increased environmental certainty and control for junior doctors through boundary spanning. As the APN commenced ward rounds earlier than junior doctors, they were able to transfer knowledge to ward nurses and junior doctors. As a result, there were significantly fewer unexpected tasks left over from the day shift. We found that the boundary spanning that occurred between ward nurses and junior doctors within the overtime shifts meant that junior doctors completed fewer tasks that skilled ward nurses were able to complete (as ward nurses were also supported and coached by the APN). Having fewer of these types of tasks explained why junior doctors initiated more ward rounds, took control of the overtime shift and engaged proactively in patient management on the wards. Having fewer demands (such as paged requests) and the additional support and knowledge may be a key to enabling junior doctors to take initiative. Without this support and knowledge, and faced with uncertainty about task demands, junior doctors are more likely to be reactive and wait for requests for assistance. This provides support for the proposition that the increased knowledge and support provided through relational job characteristics (such as a boundary spanning support role) increases capability and willingness to perform proactively (Parker and Collins, 2010; Parker *et al.*, 2013).

Interestingly junior doctors did not complete fewer tasks overall when collaborating with an APN, although this depended on their experience. Junior doctors employed for more than one year, completed the same number of tasks whether they worked on the overtime shift with or without an APN. Interestingly junior doctors completed more tasks that only doctors are authorized to complete when they were on overtime with the APN. These “Doctor only” tasks, replaced tasks that could were being completed by a skilled nurse. This is encouraging as it might be argued that having any additional headcount will reduce workload for other staff. However, these results suggest that the APN on overtime changes the way work is managed, enabling junior doctors’ to be proactive in their patient management and to use their skills in a more effective way.

First year junior doctors, however, completed significantly fewer tasks when collaborating with an APN. This suggests that the APN reduced the workload for the group that are at greatest risk for psychological strain during overtime shifts (Sweet and Norman, 1995). Psychological strain is associated with frequent non-urgent interruptions during challenging tasks (Rolfe *et al.*, 1998) and has also been found to increase errors

(Goodell, Cao and Schwaitzberg, 2006), reduce opportunities for learning (Bogg *et al.*, 2001) and affect nurse-doctor relationships (Barrow *et al.*, 2011).

Importantly, *post-hoc* analyses also confirmed that the presence of an APN did not adversely affect junior doctors' engagement with high-end clinical tasks such as patient reviews. Thus, the learning opportunities these tasks provide were not lost. This is positive as it suggests that the overtime shift remains a rich environment for learning and building skills, with the bonus of a safety net. In essence, the APN collaboration is not "dumbing down" the overtime shift but rather providing junior doctors the opportunity to build confidence, and improve patient management.

While there is evidence of change in the tasks and work patterns of junior doctors, and we present reasons why these changes occur, this first phase of the research leaves open questions about how the different stakeholders perceived the collaboration. To address this question, we conducted interviews to explore the experience of the overtime shift for junior doctors and the APNs.

### *Phase 2: the experience of APNs/junior doctors during overtime shifts*

Our aim for this second phase was to extend our understanding of how and why this boundary spanning, collaborative approach to patient care between APNs and junior doctors improved their experience of the overtime shift. By shedding light on how the different stakeholders perceived this initiative, we aim to provide further insight into why it was effective. We used a qualitative research approach, which is useful in complex, uncertain environments such as hospitals, as it provides an opportunity to understand dynamic processes embedded in the context from different perspectives. New workplace initiatives can have unintended consequences, which might not be observed when focusing on anticipated changes alone (Johns, 2010). Thus, the second phase of our research provides an opportunity to investigate these changes and observe unexpected or unplanned outcomes.

### **Method**

Interviews were conducted in the same hospital where data were collected for Phase 1 of this research. We selected interviewees to capture different perspectives on the collaborative initiative; junior doctors (four) APNs (two), and senior doctors/administrators (two). The interviews were semi-structured, using open-ended questions, followed by clarifying probes. Examples include: "Describe your experience of overtime with (without) an APN," "How do you work with the APN?" and "What does an APN do during overtime shifts?" The interviews ranged from 20-60 minutes and were recorded (with consent) and transcribed.

We followed a grounded theory approach to the data (Henwood and Pigeon, 1992) and were guided by recent examples (e.g. Klein *et al.*, 2006). Two researchers initially identified 121 "thought units" (Currall *et al.*, 1999), which were classified into themes, iteratively, moving between the data (thought units) and the emerging themes, until no further insights were added. Themes were compared and a consensus reached on six overarching themes that best captured stakeholders' meaning, and were most likely transferrable to other settings. To check the reliability of the themes, four research assistants independently reclassified the units. The inter-rater reliability was 0.73 (Krippendorffs  $\alpha$ ), which provides reasonable evidence of reliability. The "thought units" were then reviewed to identify exemplars that best illustrated the meaning and were particularly informative to bring each theme alive.

### **Results and discussion**

Below we present the six themes that were identified, with illustrative thought units. The themes suggest that the presence of an APN: changed doctors' work tasks and reduced work pressure; promoted team working and a psychologically safe climate; facilitated

environmental scanning and situation awareness; supported doctors' technical skill development; supported the development of doctors' decision-making and problem-solving skills; and promoted doctors' confidence and well-being.

Illustrative quotes supporting the themes that emerged.

Theme: change in work tasks:

*JD shift with APN on:* "They (APN) do so much behind the scenes that you don't even know about [...]. When you don't have him on you get called for so much more" (JD1).

*JD, shift without APN:* "I know there will be constant interruptions, with lots of little jobs interspersed with the big ones. And you know the pager will go off in 10 minutes if you haven't got to the little jobs, so you feel under pressure to finish and move on" (JD1).

*JD, comparison of shifts:* "There was one night when there was an APN on and other nights when there wasn't and there was a huge difference in my work load between the two" (JD4).

Theme: supportive interdisciplinary teamwork:

*JD, APN on shift:* "Definitely a team with the APN, rather than a hierarchy, we are all working together to look after the patients [...] for example I had a patient with chest pains, and I could ask him (APN) to come and help me and then we can both work on the patient, or either or [...] The APN helps by filling in the nursing staff, saying 'oh she's in ward X, but I can help out this time' – helps reduce tension (with other nurses)" (JD1).

*JD, APN on shift:* "The other advantage for us is that we get to know the APN because he is often on shift, whereas the Registrar (senior supervising doctor) is a different registrar each time. So not as easy to call them. Don't necessarily have a working relationship with the registrar" (JD2).

*APN describing climate generally: Junior doctors* "Can't admit mistakes to senior doctors, Junior doctors tend to shut up and don't say anything, if you want to stay or progress [...] consultants have a lot of power in terms of a career. If you have been seen as a non performer, may have ramifications later on" (APN1).

*JD describing relationship with ward nurses* "there are lots of misconceptions. We could be up relaxing in the (junior doctor) common room, or we could be flat out on another ward – and they (nurses) don't know, so it is hard for them to judge whether to contact us about minor issues or whether to wait (for) a ward round. On the other side if I am working with a very sick patient it is really irritating to keep getting paged about minor things when I was on their ward earlier and could have done them then, or can do them later on a round. So we have to learn to say "no", which is hard when they are often older and had a lot more experience than you have" (JD1).

*JD describing lack of teamwork on overtime* "It's quite hard to help each other out. As a group we are pretty keen to sort things out ourselves and maybe that's our background, [...] People who did well at school, did well at Uni and didn't have to ask a lot from others. Fairly self-contained and see challenges as something we need to overcome on our own" (JD3).

Theme: environmental scanning and situation awareness:

Every ward is set up differently, so if you want to find equipment or supplies, it is always in a different place, which makes it difficult to work efficiently (APN2).

They (APNs) know the system and the nurses and who to contact, what forms to fill in. They can also ask favours. When you are covering 10 wards it's really hard to deal with the politics as well. For example getting a sick patient transferred off the psychiatric ward into a medical ward, because they became very ill and needed monitoring, was very difficult (JD1).

(APN) tells you what is going on, on your wards, if you haven't had a chance to visit a ward for a couple of hours and you are wondering whether there are any nasty surprises up there (JD2).

Often (APN) has been on and he will know about the patient and will say oh she has been in a while and she is often like this (JD3).

You can relax and concentrate on what you are doing because you can assess and anticipate what is going on, and set priorities on other wards. The APN will let you know, so you can focus on the issues coming up (JD2).

Theme: opportunity to develop technical skills:

*APN, shift with APN:* "I assist with basic skills that the (*junior doctors*) have not fully mastered – difficult bloods, cannulas, nasogastric tubes" (APN1).

*JD, shift with APN:* "He is able to help with a difficult task and news travels – (*junior doctors*) talk about what he can do – and we have a discussion – oh! I didn't know he can do that – and then when they are confronted with that situation, they call the APN" (JD2).

*JD, shift with APN:* "He will coach us through things, asking us "what equipment will you need in this situation [...]. Learnt some great tricks and practical things [...] and also in emergencies" (JD1).

*JD, shift with APN:* "As a doctor you are only asked to do them (*catheters*) if they are a male with prostrate problems or something, or they (*nurses*) can't get them down and so you never do normal, easy ones and then its only when they are really hard but you know you get asked to (do) things you haven't had much practice in doing. So it is handy having the APN there" (JD4).

*SD commenting on JDs on overtime:* "they are expected by non doctors to have knowledge that they don't necessarily have. The nursing staff require them to do a lot of stuff that they are not necessarily competent at doing. So if the nurse can't get a catheter in, she has probably had 20 years more experience at putting catheters in than the intern (*first year junior doctor*), but she calls the intern to do it when the intern may have put one catheter in when they were a student." (SD/A1).

Theme: opportunity to develop cognitive skills:

*APN, shift with APN:* "This happened 3 times one evening (*medical emergency*) and my role is to keep them (*junior doctors*) focused on the process and not get distracted by less essential issues" (APN1).

*JD, shift with APN:* "You can't always get onto a (*senior doctor*) straight away, so when you have a very sick patient, not always sure what I have approval for, so the APN has supported me in making decisions" (JD1).

*JD, shift with APN:* "He (*APN*) can help you structure your thinking" (JD1).

*SD commenting on JDs generally* "Interns (*first year junior doctors*) don't make clinical decisions. Most of the work they do is ordering tests, consults, writing discharges, writing medication charts. Its clerical work really. I mean it requires some medical background but it is not making decisions. They don't decide what medications the patient is going to be on, they just write the chart after someone else has told them. [...]. But it's really on the overtime shift that the Intern gets to make any decisions because they are relatively less supervised, so that's the environment where they feel they can do clinical work and make decisions" (SD/A1).

Theme: change in psychological well-being and confidence:

*APN, shift with APN:* "Particularly the interns (*first year junior doctors*), [...] and overseas Doctors tell me they feel a lot less anxiety" (APN1).

*JD, comparison of shifts:* "Definitely realize it when they are not on – because it is frantic and you feel quite stressed. When they are on it feels a lot smoother and calmer" (JD1).

*JD, shift with APN:* "When you get a page that the APN is on (shift), it makes you feel really good. That this will be a good shift" (JD2).

*JD, shift with APN:* "I trust [...] (*APN*) so if he feels the same way about the patient we are reviewing gives me extra confidence [...]. I wouldn't automatically assume that if [...] (*APN*) has

reviewed a patient that I don't need to see them – also need to be legally safe, but it is a little bit of reassurance” (JD3).

Note: JD = comment from junior doctor. APN = comment from APN. SD/A = comment from senior doctor/Administrator. The number is an identifying number for the interviewee.

Consistent with Study 1, the themes that emerged from the interviews suggests that the APN presence changed what doctors did during overtime shifts and how they felt about their work. Theme 1 highlighted that junior doctors were aware of the changes to their tasks, and these changes are also reflected in reduced performance pressure and stress.

Theme 2 captures the relational aspect of the intervention. The presence of an APN improved teamwork by facilitating communication with and between junior doctors and nurses. Without an APN, the nurse–junior doctor relationship is challenging because they have infrequent contact. Nurses are based on one ward whereas junior doctors may only visit the ward once/twice each month. Infrequent contact combined with the lack of transparency of junior doctors' role (e.g. the ward nurse does not know if the junior doctor is dealing with an emergency on another ward, or resting in the junior doctors' lounge) can lead to misunderstandings.

Working alongside an APN may also begin to break down the norms of doctors as “rugged individualists” or “lone rangers,” expected to “work, act, and learn as an individual” (Smith and Schmitz, 2004, p. 9). Junior doctors may feel less isolated as they can share their experiences, seek feedback and show weakness with a colleague who does not influence their career progression or appraise their performance. The supportive environment is also created by the coaching provided by the APNs, which differs from the hierarchical approach entrenched in hospital settings (Sexton *et al.*, 2000). When there is no APN, junior doctors are more likely to be silent and less likely to seek feedback, voice ideas or ask questions. The APN also facilitates opportunities for junior doctors and nurses to share experiences and learn from each other. This fosters trust and respect for other professions and encourages information sharing, which is important for proactive behavior. While this does not change the nature of the medical hierarchy, it does open up other opportunities for junior doctors to reach out for assistance and support which did not exist previously.

Today practicing medicine is a “team sport” and the early socialization of junior doctors as part of a team and not the “oracle,” can help change culture. Practicing the skills of collaborative team working and developing trust and respect for other professions may be one of the important benefits of overtime shifts with an APN.

Theme 3, environmental scanning, captures how the APNs boundary spanning role provides essential knowledge for junior doctors to effectively navigate hospital systems, procedures, politics and provide proactive patient care. This knowledge is important both because junior doctors bear considerable responsibility but are relative novices and they come from different medical training programs. Without an APN, junior doctors are less able to navigate these systems and have limited normative knowledge about patients. This knowledge transfer creates continuity of patient care, opportunities for proactivity and could potentially improve patient safety all of which are not possible using the traditional model of overtime.

APNs transfer information about patients from previous overtime shifts and collect information about “at-risk” patients. They are regularly on overtime and are more likely to know the patients well, whereas junior doctors have irregular overtime shifts and are less able to develop this knowledge. APNs also pass on patient information from different wards. This environmental scanning and knowledge transfer enables junior doctors to focus on the most important patient issues and consider longer term implications and not merely react. The “situation awareness” (Quinn, 2005), creates possibilities for proactive behavior.

Themes 4 and 5 capture the opportunity the APN provides to junior doctors to learn and develop skills. The APN models or coaches difficult or complex technical tasks and reduces the performance pressure junior doctors' experience. Without an APN, junior doctors are left to struggle with these difficult technical procedures. With the APNs' presence and support, junior doctors may have the confidence to practice these skills.

The fifth theme highlights how the APN provides junior doctors the opportunity to manage information and develop decision-making skills. For example, the APN assists junior doctors to stay focused on key tasks, so information is processed, patient care needs are anticipated, goals and action plans are set, and time is given to critical priorities. The overtime shift is one of the few opportunities to develop these skills.

Finally, Theme 6 focuses on psychological well-being. Junior doctors report feeling less psychological strain and anxiety when working with an APN. This has implications for enabling more proactive behavior. Feeling less strain and greater confidence in their ability will increase the likelihood that a junior doctor will approach a situation or patient with positive self-belief, which is likely to percolate through to higher performance (Bandura, 1997).

In summary, the six themes capture changes in junior doctors' experience and, in combination with Phase 1, suggest that having an APN on an overtime shift changes the work design and climate. There appears to be a reduction in work pressure, a more supportive work climate and increased information flow about the environment and patients. These changes also help explain why junior doctors are more proactive and initiate more ward rounds. The interviews provide a rich description as well as valuable insight into the mechanisms through which this APN initiative has its effects.

Our studies have some limitations. We collected data over a period of six months so we do not know the longer-term effects. However the hospital now employs sufficient APNs to cover all overtime shifts which is evidence for positive longer term benefits. Qualitative accounts are also vulnerable to biases (e.g. participants may tell us what they think we want to hear). Finally, we focused on effects for junior doctors, and did not systematically document the effects of the APN role on nurses, patients, or other stakeholders.

## Conclusion

This research suggests that an interprofessional collaboration between APNs and junior doctors can have a powerful and positive effect on the work junior doctors undertake, their overall learning, and relationships with nurses. Previous studies have focused on APNs replacing doctors, whereas our research highlights how APNs are more than a replacement. The APNs' superior experience in some tasks, their access to different types of knowledge, and their connection to other stakeholders meant they were able to support junior doctors learning and improve the overall functioning of the wards. Had the hospital simply increased the junior doctor headcount many of the positive outcomes would not have materialized.

The results suggest that the APN support had stronger positive effects on less experienced doctors and early experiences of collaboration may set the pattern of interactions and behaviors during overtime. Overall, this research demonstrates that small-scale initiatives can have a significant impact on junior doctors' behaviors and experience during overtime. With junior doctors spending more time outside the traditional clinical environment, we provide evidence for an alternative model of managing an overtime shift, providing a balanced approach to ensuring patient safety and creating opportunities for learning and development.

**Notes**

1. Shift work after regular working hours (5 p.m.-11 p.m. Monday to Friday or 8 a.m. to 11 p.m. Saturday/Sunday, typically scheduled twice a week).
2. We use the term interprofessional rather than interdisciplinary, as the collaboration is between two professions (nurses and doctors), whereas interdisciplinary can refer to collaborations between disciplines within the same profession (eg surgery and oncology).
3. Junior doctors are postgraduate trainees (also known as Residents, Interns, Foundation Doctors, Fellows) who, in their first six years of internship, are supervised by a Consultant (or Attending Physician) and a team of Registrars employed by the hospital.

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**Corresponding author**

Anya Johnson can be contacted at: [anya.johnson@sydney.edu.au](mailto:anya.johnson@sydney.edu.au)

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