ORIGINAL RESEARCH

Asia-Pacific initiative for rheumatology nurse education: An impact survey in China

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ABSTRACT

Background/Objective: Asia-Pacific Initiative for Rheumatology nurse Education (ASPIRE) is a faculty-led initiative established to meet the educational needs of rheumatology nurses in Asia Pacific in recognition of the expanding role of nurses in daily rheumatology clinical practice. The objective of this study is to measure the impact of ASPIRE workshop training on nurses' levels of knowledge, confidence, attitudes and beliefs using a Before-after-control-impact (BACI) survey.
Methods: A total of 210 nurses who completed both pre- and post-surveys were included in the BACI analysis. The intervention group (n = 111) refers to nurses who attended the ASPIRE workshop training held during the China Chronic Disease Management Forum in Baotou, Inner Mongolia in September 2019 whereas the control group (n = 99) refers to Chinese nurses that have never attended the ASPIRE training.
Results: Overall level of knowledge significantly increased by 30% (5.63 pre- vs. 8.34 post-survey; $p < .001$), and overall level of confidence significantly increased by 29% among nurses who attended ASPIRE training (5.83 pre- vs. 8.39 post-survey; $p < .001$). Nurses in the control group demonstrated no significant increase in knowledge (6.18 pre- vs. 6.50 post-survey; $p = .097$) or confidence (6.46 pre- vs. 6.71 post-survey; $p = .169$) over the same period.
Conclusions: Nurses who attended the ASPIRE training workshop reported a significant increase in their levels of knowledge and confidence compared with a control group of nurses who have never undergone ASPIRE training. Training rheumatology nurses to acquire more in-depth knowledge and skills can help optimize their role in clinical practice to meet the greater demands of disease monitoring and long-term management of rheumatology patients.

Key Words: Asia, Inflammatory joint disease, Nurse practitioners, Patient-centered care, Rheumatology, Spondylarthritis

1. INTRODUCTION

Diagnostic advances and better understanding of disease progression and therapeutic strategies have significantly evolved in the management of rheumatic diseases.[1, 2] The additional demands in the screening, assessment and management of patients receiving biologic therapies have contributed to the expanding role of the rheumatology nurse in daily clinical practice.[3–6]

The World Health Organization (WHO) has highlighted the importance of developing nurses and midwives to ensure

accessible and acceptable quality of care internationally.[7] The WHO is working alongside 'Nursing Now', an initiative launched in 2018, to improve global health by advancing the role of the nurse with the aim of improving access to care with cost-effective interventions for non-communicable diseases.[8, 9] This highly pertinent initiative acknowledges the demographic challenges for healthcare systems worldwide and will require sufficient resources to ensure nurses are well-trained to acquire the knowledge and competencies needed to enhance their roles and improve patient care.[10]

At present, the most common responsibilities of rheumatology nurses in Asia Pacific practices are: performing patient education, adjusting medication doses and conducting physical examinations.[4, 11] In order to enhance a stronger patient-centered approach and empower patients with rheumatic conditions, nurses must play a greater role in educating, assessing and monitoring patients with inflammatory joint diseases (IJD).[12, 13] Nurses in Asia Pacific report that they carry out some of these tasks as an integral aspect of their ward work. However, there are limitations to this 'add on' approach as competing ward demands can compromise the scope and depth of the education offered.

Patients with chronic IJD should have access to a team that includes specialist nursing support. Specialist nurses focus on providing a tailored educational approach that enables the patient to better understand their disease and make informed decisions about their treatment choices. Initially, if these aims are to be achieved, more nurses within Asia Pacific need to have access to adequate training and frameworks for practice that will advance their training towards specialist training.

Recommendations for the roles of rheumatology nurses have been developed and updated by the European League Against Rheumatism (EULAR)[14, 15] and highlight the need for adequately trained nurses to deliver patient education and continuity of care. These recommendations have also been supported by recommendations for core competencies for health professionals.[16]

Nurse-led care (NLC) was shown to be efficacious and cost-effective compared with general practitioner (GP)-led usual care in gout[17] and was comparable to rheumatologist-led care (RLC) in rheumatoid arthritis (RA).[3] In chronic inflammatory arthritis (CIA), NLC was shown to incur less cost and resources with no difference in clinical outcome compared to RLC.[18] Similarly, osteoarthritis patients who were allocated to clinical nurse specialist care were better informed, more satisfied with their care and importantly had similar clinical outcomes compared to that of junior hospital doctor clinics.[19]

Several exploratory studies highlighted the wide variation in the training and education of rheumatology nurses[21, 22] with one study reporting that nurses relied heavily on informal knowledge sources such as interactions with physicians and experiential knowledge.[20] Improved training standards, access to educational resources and formal education have been suggested to improve levels of knowledge and confidence in the areas of patient education on therapeutic options and also to optimize the role of rheumatology nurses in clinical practice.[20–24] Academic/professional conferences and events were reportedly the most preferred method for nurse practitioners to receive and share educational information.[23]

Nurses are a key healthcare resource and constitute a large proportion of the workforce, yet demonstrating the value of advanced nursing roles is complex and may be a barrier to many authorities' reticence in investing in specialist nurse developments in chronic disease management.[25] It was with this in mind that the ASia-Pacific Initiative Rheumatology nurse Education (ASPIRE) was seen as a first step in developing structured education for rheumatology nurses and was established as a response to the expanding role of nurses in daily rheumatology clinical practice. Therefore, it is hoped that ultimately professional regulatory bodies work with hospital authorities within Asia Pacific to create a rheumatology nursing curriculum to assist nurses in acquiring a foundation of knowledge and skill set that extend beyond that of their initial education and training. The goal is to drive change and generate enthusiasm, while also supporting education initiatives organized by the hospital authorities which may lag behind new training needs or lack resources to offer sufficient training.

The ASPIRE initiative was spearheaded by the founding working group comprised of leading rheumatologists (Professor Kazuhiko Yamamoto from Japan, Professor Lai-Shan Tam from Hong Kong) and rheumatology nurse specialists (Susan Oliver from United Kingdom, Mie Fusama, from Japan, Chunyang Zhang from China, Gladys Kwok from Hong Kong) across the Asia Pacific region. To explore issues and service needs, an informal small-scale educational needs survey was deployed among nurses across several countries in Asia Pacific to inform and prioritize topics to be included in the core training modules.[26] Following the review of findings and reconvening of the working group, three core training modules were developed. These modules focused on RA disease management, specifically: (1) patient assessment, (2) treatment and self-management education, (3) disease monitoring and follow-up care. The modules were reviewed and endorsed by Asia Pacific League Against Rheumatism (APLAR) and can be tailored to meet specific educational needs of nurses with different levels of

rheumatology nursing experience. The modules are available on the APLAR website as an open access resource (`http://www.aplar.org/education_page/aspire/`).

Following the success of the initial modules, the Original Working Group members reconvened in 2019 with an expanded team of three rheumatologists (Professor Matthew Brown from Australia, Professor Yi Liu from China, Professor Hideko Nakahara from Japan) and two experienced rheumatology nurses (Linda Bradbury from Australia, Ying Wang from China). The working group reviewed the feedback and evaluation, then went on to identify the need for two further modules for the ASPIRE program: (1) Axial Spondyloarthritis (axSpA) including Ankylosing Spondylitis (AS) and (2) A framework for patient-centered nursing consultations. These were developed by the members of the working group and have been reviewed and endorsed by APLAR at the education committee meeting in November 2019.

Survey data collected following ASPIRE training workshops in the past have shown very positive levels of satisfaction and self-reported level of improvement from nurses who have attended the training. However, the impact of ASPIRE has not been previously measured. Therefore, a Before-after-control-impact (BACI) survey was conducted in conjunction with an ASPIRE training workshop. Participants had the opportunity to learn from accomplished rheumatology nurses on axSpA and the framework for patient-centered nursing consultations. Workshops involved presentations by experienced rheumatologists and rheumatology nurses and were supplemented with patient case study, interactive small-group discussions and a hands-on assessment and evaluation session with patient volunteers. The impact survey explored improvements in knowledge and confidence of ASPIRE-trained nurses compared with a control group of nurses who have never undergone ASPIRE training.

2. METHODS

The outcome survey was undertaken as a market research activity and adhered to all applicable standards. All participants gave consent to participate and privacy was guaranteed. Consent forms were reviewed and approved by the sponsor's regional and local legal and privacy teams in Singapore and China, respectively (Supplementary Materials 1-4). An Australian-based company (Blue Planet Research and Consulting) together with a local panel partner in China (Rakuten Insight), both specializing in market research, conducted the pre- and post-surveys abiding fully by the Australian Market & Social Research Society (AMSRS) Code of Conduct and Principles and the ICC/ESOMAR International Code on Market, Opinion and Social Research and Data Analytics.

A dedicated ASPIRE China Steering Committee met in May 2019 at the Chinese Rheumatology Association (CRA) annual meeting in Qingdao to review and advise on the survey questionnaire. The survey was designed to measure the impact of the program on nurses' knowledge, confidence, and attitude and beliefs. Eleven individual dimensions of knowledge of the axSpA module in particular were measured:
1) Disease in general
2a) Pharmacological treatment options
2b) Non-pharmacological treatment options
3a) Comorbidities
3b) Extra-articular manifestations
4) Practical disease assessment
5a) Risks, benefits and outcomes of disease
5b) Pharmacological therapeutic information
5c) Self-management techniques (behavioral, motivational, social)
5d) About extra-articular manifestations
5e) About exercise and physical therapy.

Similarly, 11 individual dimensions of confidence were measured:
6) Disease assessment
7a) Recognizing and managing comorbidities
7b) Recognizing and managing extra-articular manifestations
8a) Educating patients about risks, benefits, and outcomes of disease
8b) Educating patients about therapeutic information
8c) Educating patients about self-management techniques
8d) Educating patients about extra-articular manifestations
8e) Educating patients about comorbidities
8f) Educating patients about exercise and physical therapy
9a) Educating patients about pharmacological treatments
9b) Educating patients about non-pharmacological treatments.

Nurses rated their level of knowledge and confidence using a visual analog scale (VAS) ranging from 1 (extremely low) to 10 (extremely high).

Attitude is defined as a settled way of thinking and beliefs are things that a person holds personally to be true.[27] To measure nurses' attitude and beliefs, they were asked to rate how strongly they agree or disagree with eight statements on the nurse consultation framework module on a scale from 1 to 5 with 1 being 'strongly disagree' and 5 being 'strongly agree'.

1) I aspire to implement the nurse consultation framework.
2) Rheumatology nurse training has the potential to add value to clinical practice.

3) I believe it is important to involve patients in management of their rheumatological conditions.

4) I believe it is important to involve carers in the treatment journey for the management of rheumatological conditions.

5) I believe it is important to educate patients with rheumatological conditions about their disease in general.

6) I believe it is important that nurses should have a role in educating patients with rheumatological conditions about pharmacological treatment.

7) I believe it is important that nurses should have a role in educating patients with rheumatological conditions about non-pharmacological treatments.

8) I believe that I am equipped with knowledge to perform my role as a nurse caring for patients with rheumatological conditions.

The final version of the survey questionnaire was reviewed and approved by the Steering Committee before deployment (Supplementary Materials 5 & 6). The ASPIRE workshop was held during the Chinese Chronic Disease Management Forum in September 2019 in Baotou, Inner Mongolia. Nurses treating patients with chronic inflammatory disease, (RA) and/or (AS) were invited to participate. All nurses who wanted to attend the ASPIRE workshop in Baotou were asked to complete a pre-meeting survey as part of their registration process. The quantitative baseline survey was deployed digitally in simplified Chinese. During the registration period, a random group of rheumatology nurses across China were also recruited to complete the same quantitative baseline survey. The control group had never attended an ASPIRE training and were not attending the ASPIRE training workshop at the Baotou meeting.

At the time of research design, 100 nurses were expected to attend the training and included in the initial intervention group. A control group consisting of 120 nurses was recommended for pre-survey, with up to 30% of control group nurses predicted to not go on to complete the post-survey. Two weeks after the ASPIRE workshop in Baotou, participants in both the intervention and control groups were asked to complete a post-meeting quantitative impact evaluation survey (Supplementary Materials 5 & 6), which was also deployed digitally in simplified Chinese.

Only nurses who completed both the pre- and post-meeting surveys (samples were matched by name, phone number and/or unique QR survey link) were included in the final sample for data analysis (n = 111 intervention group and n = 99 control group). Interaction effect for the entire dataset was tested and accounted for to ensure measurement and significance of impact reflected true comparison pre- and post-ASPIRE training between control and intervention group nurses. Significance was assessed by paired t-test controlling for years of experience, working in in-patient or out-patient clinics, place of work (public vs. private hospital) and frequency allowed to care for rheumatology patients (often, occasionally, not at all). Changes in overall levels of knowledge and confidence were respectively analyzed using mixed model repeated measures analysis of variance (ANOVA) with adjustment for group sample differences. All analysis was performed using the lme4 R package and InnerTest R package.[28, 29]

3. RESULTS

The ASPIRE training was attended by 134 nurses from 22 different provinces and 75 different hospitals across China. One hundred eleven of these nurses completed both the pre- and post-meeting surveys and formed the intervention group. One hundred twenty nurses from across China who had never attended an ASPIRE training were recruited for the control group. Ninety-nine of these nurses completed both the pre- and post-meeting surveys.

3.1 Nurse characteristics

Characteristics of the nurses participating in this study are reported in Table 1. About half of the nurses in both the control and intervention groups had 5-10 years of experience caring for patients with rheumatological conditions. However, 33% of intervention group nurses had 10+ years of experience compared to only 10% of control group nurses.

3.2 Current role of nurses

On a typical workday, more than 80% of nurses in both groups assess patient information needs, administer medication and perform routine assessments. Nurses in the intervention group care for rheumatology patients more often than nurses in the control group (94% versus 72%, respectively). Similarly, more nurses in the intervention group provide patient education compared to nurses in the control group (95% versus 73%, respectively). However, only 40% of nurses in the intervention group offer information to the patients on the risks and benefits of treatment, extra-articular manifestations, comorbidities, and outcomes of AS disease to patients 70% or more of the time (vs. 60% of control group nurses).

3.3 Impact measurement: Knowledge

Figure 1 demonstrates the overall level of knowledge about ankylosing spondylitis in nurses in the control group and intervention group. There was a significant 30% increase in overall level of knowledge among nurses who attended the ASPIRE training in September 2019 (average VAS: 5.63 pre- vs. 8.34 post-survey; $p < .001$). Control group nurses who did not attend ASPIRE training demonstrated no significant increase in overall knowledge over the same period (average VAS: 6.18 pre- vs. 6.50 post-survey; $p = .097$).

Table 1. Characteristics of the nurses participating in the impact survey

| Total (n = 210)		Control	Intervention
		(n = 99)	(n = 111)
Years caring for patients with rheumatological conditions (B1)	0 to 2 years	17%	5%
	2+ to 5 years	25%	13%
	5+ to 10 years	47%	50%
	10+ to 15 years	9%	23%
	15+ years	1%	10%
Highest level of formal education (B2)	Nurse diploma	22%	5%
	Nurse degree	73%	82%
	Post graduate degree	2%	11%
	Other	3%	2%
In v.s. out-patient clinics (B3)	Rheumatology in-patient ward	40%	84%
	Rheumatology out-patient clinic	2%	5%
	Rheumatology in-patient and out-patient clinic	39%	10%
	Other	18%	1%
Public v.s. private practices (B4)	Public clinic	16%	3%
	Public community hospital	24%	5%
	Public teaching hospital (associated with a University)	49%	87%
	Private clinic	1%	0%
	Private community centre	0%	0%
	Private teaching hospital (associated with a University)	3%	1%
	Mix of public and private practices	4%	0%
	Other	2%	5%
How many rheumatology trainings attended (B8)	None	19%	8%
	1 to 3	44%	40%
	4 to 7	29%	22%
	8+	7%	31%
How many ankylosing spondylitis trainings attended (B9)	None	32%	29%
	1 to 3	49%	45%
	4 to 7	15%	17%
	8+	3%	9%
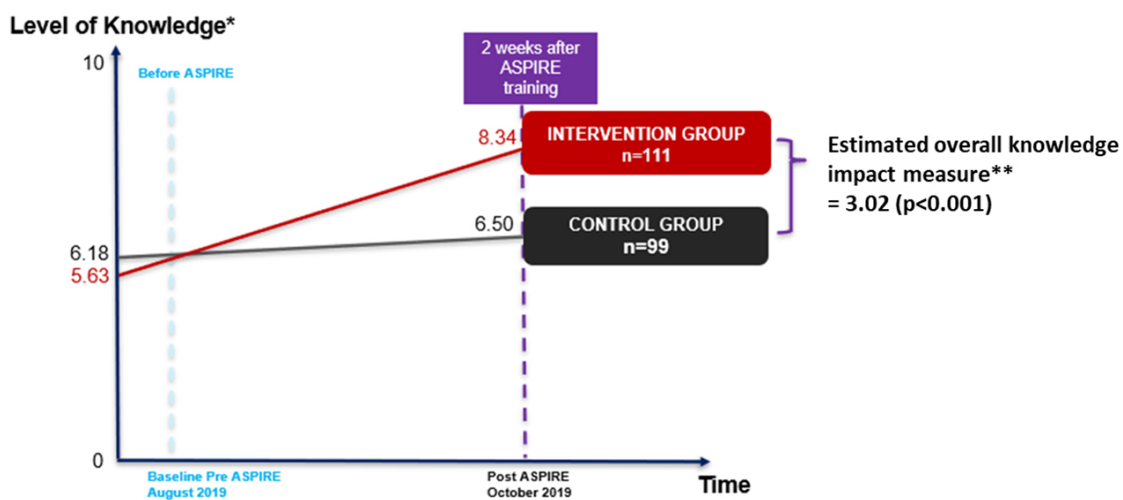
Figure 1. Estimated overall knowledge impact measure between control and intervention group pre- and post-ASPIRE training. *Changes in overall level of knowledge (based on 11 individual knowledge domains) in the control and intervention groups respectively before and after ASPIRE training workshop was conducted. *Self-rated on a 10-point scale, **Analyzed using mixed model repeated measures ANOVA with adjustment for group sample differences*

The changes in pre- and post-ASPIRE training scores are reported in Table 2. Significant improvements were observed across all 11 individual knowledge dimensions measured from pre- to post-ASPIRE training in the intervention group. Control group nurses showed no significant change in 10 out of the 11 knowledge dimensions measured, with the excep-tion being practical AS disease assessment, where control group nurses showed significant improvement between pre- and post-survey. However, the increase in this measure in the intervention group was still significantly greater than the increase in the control group.

Table 2. Level of knowledge and confidence dimensions assessed in the impact survey

Areas assessed pre- & post-ASPIRE training	Control group			Intervention group			Estimate of impact from mixed model repeated measures ANOVA** (The increase in each measure in the intervention group compared to the control group)		
	Pre	Post	*P*	Pre	Post	*P*	Impact estimate	*P*	95% CI
LEVEL OF KNOWLEDGE	6.18	6.50	.097	5.63	8.34	< .001*	3.02*	< .001	2.43-3.61
1. Disease in general	6.32	6.41	.689	5.68	8.16	< .001*	2.68*	< .001	2.04-3.31
2a. Pharmacological treatment options	6.05	6.34	.237	5.80	8.25	< .001*	2.48*	< .001	1.84-3.12
2b. Non-pharmacological treatment options	6.06	6.41	.123	6.02	8.45	< .001*	2.40*	< .001	1.78-3.01
3a. Comorbidities	5.99	6.39	.086	5.05	8.00	< .001*	2.85*	< .001	2.20-3.50
3b. Extra-articular manifestations	6.25	6.56	.154	5.25	8.44	< .001*	3.37*	< .001	2.67-4.07
4. Practical disease assessment	6.05	6.52	.043*	5.37	8.61	< .001*	3.34*	< .001	2.55-4.12
5a. Risks, benefits and outcomes of disease	6.22	6.56	.102	5.59	8.16	< .001*	2.82*	< .001	2.16-3.47
5b Pharmacological therapeutic information	5.94	6.35	.058	5.88	8.36	< .001*	2.55*	< .001	1.89-3.22
5c. Self-management techniques (behavioral, motivational, social)	6.43	6.56	.606	5.84	8.43	< .001*	2.47*	< .001	1.86-3.08
5d. About extra-articular manifestations	6.23	6.62	.113	5.38	8.38	<0.001*	3.29*	< .001	2.56-4.02
5e. About exercise and physical therapy	6.44	6.83	.082	6.02	8.53	< .001*	2.83*	< .001	2.19-3.48
LEVEL OF CONFIDENCE	6.46	6.71	.169	5.83	8.39	< .001*	2.90*	< .001	2.32-3.48
6. Disease assessment	6.42	6.59	.489	5.44	8.51	< .001*	3.36*	< .001	2.63-4.08
7a. Recognizing and managing comorbidities	6.20	6.6	.065	5.48	8.19	< .001*	2.75*	< .001	2.07-3.42
7b. Recognizing and managing extra-articular manifestations	6.30	6.36	.796	5.34	8.37	< .001*	3.59*	< .001	2.85-4.32
8a. Educating patients about risks, benefits, and outcomes of disease	6.41	6.76	.090	5.95	8.36	< .001*	2.84*,†	< .001	2.19-3.49
8b. Educating patients about therapeutic information	6.49	6.85	.105	6.00	8.41	< .001*	2.63*,§	< .001	1.96-3.30
8c. Educating patients about self-management techniques	6.73	6.87	.517	6.00	8.44	< .001*	2.89*	< .001	2.23-3.56
8d. Educating patients about extra-articular manifestations	6.39	6.61	.334	5.42	8.27	< .001*	3.15*	< .001	2.43-3.87
8e. Educating patients about comorbidities	6.19	6.65	.026*	5.52	8.21	< .001*	2.23*	< .001	1.63-2.83
8f. Educating patients about exercise and physical therapy	6.71	7.00	.198	6.40	8.50	< .001*	2.28*	< .001	1.63-2.94
9a. Educating patients about pharmacological treatments	6.61	6.71	.689	6.28	8.50	< .001*	2.12*	< .001	1.49-2.74
9b. Educating patients about non-pharmacological treatments	6.62	6.86	.274	6.24	8.51	< .001*	2.03*	< .001	1.43-2.63

P < .05, significant results; **Assessed using the lme4 R package and Inner Test R package controlling for years of experience, working in-patient or out-patient clinics, where worked (public vs. private hospital), and allowed to care for rheumatology patients (often, occasionally, not at all); †Significant interaction of effect with patient care and in-patient/out-patient experience; §Significant interaction effect with experience and in-patient/out-patient experience.

3.4 Impact measurement: Confidence

Figure 2 reflects the overall level of confidence about anky-losing spondylitis among nurses in the control group and intervention group respectively. Overall level of confidence significantly increased by 29% among nurses who attended the ASPIRE training in September 2019 (average VAS: 5.83

pre- vs. 8.39 post-survey; $p < .001$). Control groups nurses who did not attend ASPIRE demonstrated no significant increase in overall confidence over the same period (average VAS: 6.46 pre- vs. 6.71 post-survey; $p = .169$).
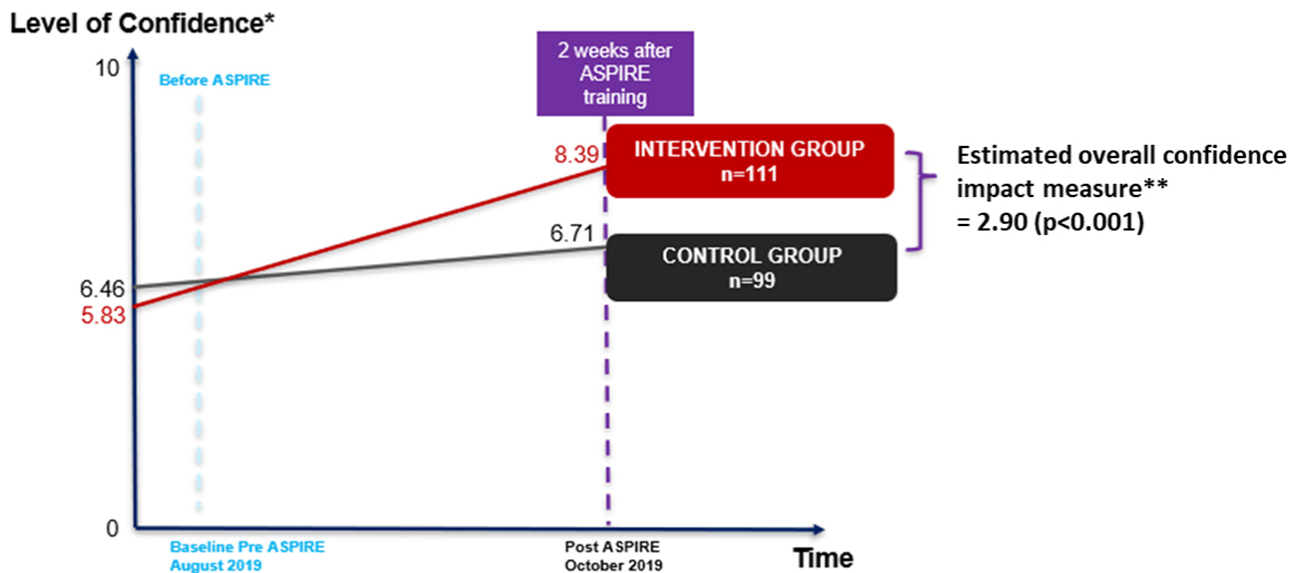

Figure 2. Estimated overall confidence impact measure between control and intervention group pre- and post-ASPIRE training. *Changes in overall level of confidence (based on 11 individual confidence domains) in the control and intervention groups respectively before and after ASPIRE training workshop was conducted. *Self-rated on a 10-point scale, **Analyzed using mixed model repeated measures ANOVA with adjustment for group sample differences*

Pre- and post-ASPIRE scores for level of confidence are reported in Table 2. Significant improvements were observed across all 11 individual confidence dimensions measured from pre- to post-ASPIRE training in the intervention group. Control group nurses showed no significant change in 10 out of the 11 confidence dimensions measured, with the exception being educating AS patients about AS comorbidities, where control group nurses showed significant improvement between pre- and post-survey. However, the increase in this measure in the intervention group was still significantly greater than the increase in the control group.

3.5 Impact measurement: Nurses' attitudes and beliefs

The proportion of nurses that strongly agree they are equipped with knowledge to perform their role as a nurse caring for patients with rheumatological conditions increased from 70% pre-ASPIRE to 82% post-ASPIRE among intervention group nurses (Supplementary Materials 5 & 6; Question 10). By comparison fewer control group nurses strongly agreed and their belief decreased from 53% to 49% over the same period.

As confidence and knowledge increased in nurses who attended the ASPIRE training, so did their belief that they should have a role in educating patients. The proportion of nurses that strongly agreed that they should have a role in educating patients with rheumatological conditions about pharmacological treatment increased from 76% pre-ASPIRE to 87% post-ASPIRE among the intervention group nurses (Supplementary Materials 5 & 6; Question 10). By comparison, fewer control group nurses strongly agreed, and their belief decreased from 59% to 53% over the same period.

The perception of nurses' opportunity to spend time to educate rheumatological patients increased significantly for the intervention group nurses pre- and post-ASPIRE but did not change significantly for control group nurses over the same time period, as represented in Figure 3.

3.6 Subgroup analysis: Years of experience

Overall, the nurses who attended the ASPIRE training were more experienced than the nurses in the control group. Eighty-three percent of nurses in the intervention group had > 5 years of experience compared to 57% of nurses in the control group. However, the benefits of the ASPIRE program were significant regardless of how many years of experience the nurses had. Subgroup analysis showed that the impact of the ASPIRE training on levels of knowledge and confidence was only slightly higher for those nurses with < 5 years of experience compared to those with > 5 years of experience.
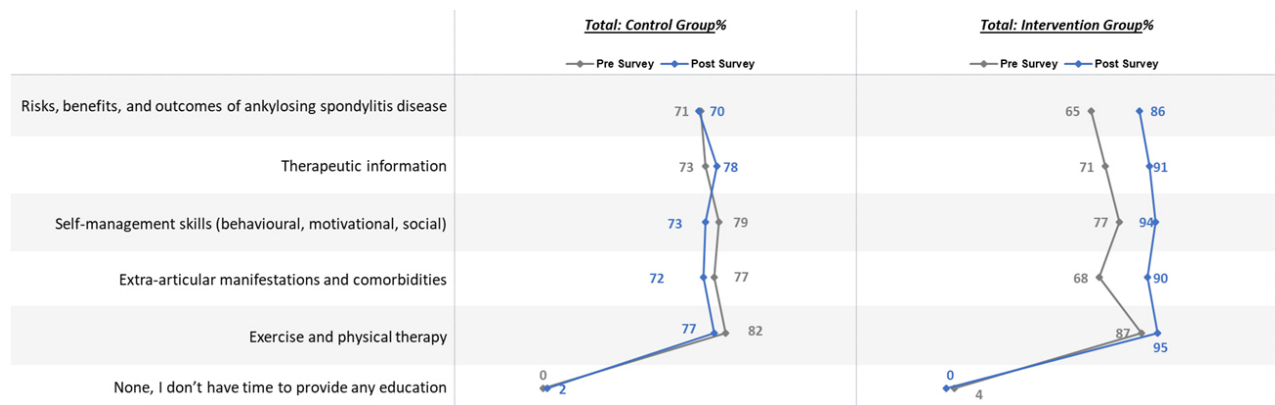
Figure 3. Perception of nurses' opportunity to spend time educating rheumatological patients pre- and post-ASPIRE training

4. DISCUSSION

Nurses who attended an ASPIRE training workshop reported a significant increase in their levels of knowledge and confidence compared with a control group of nurses who have never undergone any ASPIRE training. Nurses at the Baotou ASPIRE training were generally well-educated, worked in teaching hospitals, and attended more rheumatology trainings compared with a control group of nurses who have never undergone ASPIRE training. The impact of the program was only slightly higher in those with < 5 years of experience than those with > 5 years of experience. It is likely that those with > 5 years of experience were the group most likely to be expected to extend their practice and the combined benefit of the axSpA module and the nurse consultation framework had more significance for the more experienced nurses. Nurses who participated in the ASPIRE training may have been highly motivated to develop their expertise. In addition, approximately 30% of these nurses had previously attended other ASPIRE programs. It was also noted that there was endorsement for nurse development by the hospital authority and the consultants at the Baotou hospital which may have influenced the motivation of the nurses. In addition, not all nurses who attended ASPIRE have necessarily received specialized rheumatology trainings previously or worked in Chinese rheumatology clinics or rheumatology hospital departments.

ASPIRE fills a gap regarding specialized, rheumatology nurse education with international experts that otherwise has been limited in China to date. The need to provide nurses with access to best-practice knowledge and training in rheumatology has been recognized globally. The Executive Committee of the Association of Rheumatology Health Professionals (ARHP), a division of the American College of Rheumatology (ACR), recognized the need for innovative solutions to meet the needs of patients with rheumatic diseases.[30] They identified nurse practitioners (NPs) and physician assistants (PAs) as groups of health professionals who could help address the workforce shortage. Informed by needs assessment data and stakeholders, they developed a curriculum outline endorsed by the ACR Board of Directors for use by community-based and academic rheumatology practices who desire to add NPs and PAs to their practice setting. The ACR/ARHP rheumatology curriculum outline can be utilized to train NPs and PAs and create more efficient integration of NPs and PAs into rheumatology practice. Equally, EULAR had also identified educational and training initiatives for all health professionals together with recommendations for core competencies and for the role of nurses managing Chronic IJD.[13, 17] In addition to these initiatives, the Royal College of Nursing in the UK has recently prepared a competency and role development framework specifically directed at rheumatology nurse specialists.[31]

Confidence comes with experience, knowledge, and training, and may take many months to develop.[20] Nurse specialists already have a wide remit and play an invaluable part in the delivery of modern rheumatology services. Advancing nursing practice could improve patient care and enhance nursing career pathways in rheumatology.[32] Career progression and job satisfaction will be an increasingly important recruitment factor for the future of nursing workforces. So, if nurses are to sustain their newly acquired knowledge and skills, they must have opportunities to reinforce their roles in clinical practice. This is a challenge and has to be recognized as a transition from novice to expert and is a continuum that may initially require some time to consolidate learning and develop confidence further before practicing independently.[33, 34] Nurses have a professional responsibility to continue their education and training, whilst also ensuring that the care they deliver is adequately measured using outcome measures appropriate to the evidence base in their

specialty and the nursing model of care.[24]

Training packages, such as the ASPIRE program, may be helpful by filling a critical gap enabling greater management of patients by optimizing the role of the nurse. The hope is that ASPIRE nurses will not only educate patients, but also cascade their expertise to other nurses as ASPIRE train-the-trainers. This will also serve as additional motivation for these nurses to learn and increase their knowledge and confidence. Although ASPIRE provides a first step in influencing nurses within the field of rheumatology, sustained value can only be achieved if the nurses return to clinical practice and are supported by the management team and consultant colleagues to build upon their knowledge and can demonstrate their competencies in routine clinical practice.

Assessing long-term knowledge gain is key for determining whether education knowledge transfer is sustainable. Hands-on learning techniques have shown to be important to long-term knowledge retention.[35] Simulation-based education of general medicine nursing staff that included a didactic lecture followed by simulation scenarios demonstrated statistically significant improvements in nursing confidence and knowledge and were sustained over the three-month follow-up period.[36] ASPIRE training workshops use a mixture of didactic lectures and hands-on workshops.

The limitation of this work is that the results outlined in this study are based upon a single event intervention in China and were measured over a short period. The questionnaire was developed specifically for ASPIRE and has not been validated. Therefore, there is no test-retest reliability for the questionnaire. Some questions in the survey related specifically to patients with axSpA/ankylosing spondylitis while others were more broadly related to rheumatology patients. Rheumatological patients were not defined in the survey, and therefore may have been interpreted differently by different nurses. A confounding factor is that the control group, may have perceived beliefs of knowledge/expertise which remained unchallenged (Supplementary Materials 5 & 6; Question 10). If they had attended the training event as part of the intervention group, they may have been subject to further scrutiny of their baseline perceived knowledge. The control group achieved small benefits without attending ASPIRE training. It is unclear whether their perceived beliefs in their pre- and post-survey match actual competencies or whether their awareness encouraged them to review their knowledge independently. Further studies are needed to explore the long-term benefits of attending the ASPIRE program in the intervention group, and also the perceived knowledge, attitudes and beliefs in the context of patient care for Chronic IJD.

There are many drivers that highlight the need to enhance high-quality, cost-effective health care for those with chronic diseases. An essential component of improving care can be achieved by building a strong nursing workforce. Yet, if recruitment and retention are to be improved, it is vital that a greater focus be given to driving changes that will build clinical career pathways for nurses. Specialist services for people with rheumatological conditions is an exciting and developing field of practice with advances in treatment options in both drugs and management approaches that demonstrate greatly improved outcomes for patients. Training rheumatology nurses to acquire more in-depth knowledge and skills can help optimize their role in clinical practice to meet the greater demands of disease monitoring and long-term management of rheumatology patients. Basic education about rheumatic diseases should begin in undergraduate nursing school and be built upon through continuing education courses.

Nurses who attended the ASPIRE training workshop reported significant increases in levels of knowledge and confidence compared to the control group. Training was delivered by advanced nurse specialists who not only presented but acted as role models and encouraged interactive discussions. The theoretical basis of advanced roles in nursing was supported by interactive practical discussions and reinforced by hands-on sessions, demonstrated by the nurse specialists with patients. The long-term value of such training program relies upon not only inspiring the nurses, but also their consultant and managerial colleagues to build the next steps and achieve organizational changes that may benefit patient care. However, the extent to which nurses can develop also relies upon professional regulation within the Asia Pacific region that will allow nurses to advance their roles in line with nurses in Europe and the United States. It is hoped that such training programs will be a catalyst for change while also enabling units to implement greater involvement of their nurses. Pilot studies should be developed to explore the value of advanced roles in rheumatology within the Asia Pacific region. We hope that this initial preliminary study encourages further, and more in-depth studies, to explore in detail the issues of enhancing nursing expertise within the field of rheumatology nursing in Asia Pacific.

ACKNOWLEDGEMENTS

proofreading and editing services.

CONFLICTS OF INTEREST DISCLOSURE

Susan Oliver has received consultancy fees from Janssen and expenses related to travel while delivering these modules. Daniel Furtner is an employee of Johnson & Johnson Pte. Ltd. and may own stock/options.

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