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The Status of Core Competencies of Wound, Ostomy, and Continence Nurses and their Influence on Career Success: a cross-sectional study

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Abstract

Objectives The wound, ostomy, and continence nursing practice has its own scope and standards, and each standard requires relevant competency. However, the core competencies of wound, ostomy, and continence nurses that contribute to the career success are poorly known. To identify associations between career success and core competencies of wound, ostomy, and continence nurses in China.

Design A cross-sectional survey with a convenience sample.

Setting Participants were recruited from 108 hospitals in 28 provinces.

Participants A total of 123 wound, ostomy, and continence nurses were surveyed.

Measures Demographic characteristics; core competencies of wound, ostomy, and continence nurses; and career success were used in this study.

Methods A survey was distributed to 123 wound, ostomy, and continence nurses were recruited from 108 hospitals in 28 provinces. Multivariate logistic regression was undertaken to explore associations between career success outcomes and core competency scores of wound ostomy and continence nurses, and their demographic characteristics.

Results The career success and core competency of wound, ostomy, and continence nurses were both above average. Nurses who had higher total scores of core competency were more likely to have higher career success, including total score (OR=4.90), career satisfaction (OR=5.58), and perceived internal (OR=4.55)/external (OR=3.42) organization competitiveness. Higher competency in interpersonal communication (OR=7.70), and more time for wound care per month (OR=8.80) predicted higher career satisfaction or career success. Additionally, nurses with higher professional development were more likely to score higher in perceived internal organization competitiveness of career success (OR=4.36).

Conclusions The career success and competency of the wound, ostomy, and continence nurses in China were at an above average level. The nurses had weak perceived external organization competitiveness and professional development competency. The associations between career success and competency of the wound, ostomy, and continence nurses were positive, suggesting that competency training might improve nurses' career success.

Key words: Career success, Core competencies, Ostomy, Professional nurse, Wound.

Strengths and limitations of this study

► It was a nationwide survey, which included participants from 28 provinces in China.

► The outcomes in this study were interesting. The Chinese wound, ostomy, and continence nurses spent more time on practice, but very limited time on research.

► Selection bias existed as most participants came from tertiary hospitals, the top-grade hospitals in China.

► The implications of this study may not be applicable to the WOCN in western countries, but to the developing countries, as WOC nursing practice in China has its own unique features.

INTRODUCTION

As specialist nurses, wound, ostomy, and continence nurses (WOCN) resolve specialized and specific clinical problems in wound, stoma, and incontinence. WOCN play an important role in reducing the occurrence of various complications, reducing the economic burden of patients and the healthcare system, and improving medical care quality[1,2]. Meanwhile, they also play a positive role in saving manpower and hours for the general surgical or medical nurses and in enhancing the quality of life of patients with incontinence and stoma problems[3,4]. In 2009, the Wound, Ostomy and Continence Nurses Society (WOCNS) defined the role of a continence nurse and advanced practices of continence nurses, which was updated in 2018[2,5,6]. The WOCNS believes that the tri-specialty certified WOCN possesses unique knowledge, expertise for assessment, and first-line management of incontinence as well as for prevention of incontinence. According to WOCNS, WOCN provides care to patients with urinary and/or fecal incontinence by conducting a focused assessment, performing physical examinations, synthesizing data, developing a plan of care, and evaluating interventions. The role includes, but is not limited to, serving as a clinician, consultant, educator, and/or administrator/manager in various health care settings[5,6].

Though initiated in developed countries originally, the number of WOCN in developing countries like China has grown rapidly since the last decade due to the ever-increasing number of patients suffering from complex and changeable acute and chronic wounds. The role of WOCN in China comprises the core elements of what was defined by the WOCNS and was modified according to culture and practice. For example, though specialized in wound care, there is no clear classification of WOCN in mainland China. Different hospitals have various models, such as certified wound specialists and enterostomal therapists, who are

divided into different subspecialties (pressure ulcer and refractory wound, surgical wound, and lower limb ulcer and diabetic foot ulcer)[2]. However, their role is specific and quite different from the general nurses, which determines their distinct competency[2]. The concept of competencies dates back to David McClelland in 1973 who believed that testing one's competencies was a more effective predictor of job success than testing one's intelligence[7]. Since then, the concept of competency has been explored in a number of fields including businesses, organizations, industries as well as among health professionals like nurses. Shortly after its foundation, the National Association of Clinical Nurse Specialist (NACNS) began to explicate core competencies for clinical nurse specialist practice[4]. For WOCN, core competencies are essential for the quality of care provided; therefore, the indices that should be included in the system when assessing the core competencies for WOCN have been put on the agenda[3,8]. Base on the role defined by WOCNS and the practice of WOCN in China, Yin et al have developed a six-dimension system of core competencies for WOCN, namely: specialized clinical practice, critical thinking, health education, professional development, interpersonal communication, and nursing management[9]. This competency system was according to the role and was found present in WOCN specialists. Therefore, WOCN got wide acceptance and employment in China[10,11].

As a crucial concept in nursing, career success combines the achievements and positive mental feelings pertaining to work that one accumulates and obtains gradually during their work experience. When analyzing career success, both objective and subjective perspectives should be considered[12]. While objective career success is the achievement that an individual gains during the career that can be observed and measured,[13] subjective career success is the inner understanding and assessment of success on dimensions that an individual considers important, such as meaning of the job, job satisfaction and contributions to the organization[13]. Though job satisfaction and career satisfaction are the most commonly measured indices for subjective career success, job mobility in different organizations, different regions and different countries has also been focused upon[14]. In this boundary-less career era, successful individuals are those who can create value for the current organization and who can be considered competitive by external organizations. Therefore, the three-dimensional theory of career success espoused by Eby, Butts and Lockwood is widely accepted[15]. A number of studies have investigated the influencing factors of career success and demonstrated that both external factors like work environment[16], organizational support[17], and internal factors like emotional intelligence and gender could influence career success[18,19]. Recently, the association between ability, which is quite similar to competency, and career success has

been focused on and explored in psychology[20]. However, to date, no research has correlated core competency with career success among WOCN, though theoretically it is reasonable to correlate the two variables together by suggesting that better core competency will benefit, advance, or improve career success.

Therefore, the present investigation aims to examine the status of core competency and career success among the highly specialized nursing population of WOCN in China, and compare the difference between competency and career success among WOCN bearing different characteristics, testing whether core competency and occupational character could exert influence on career success.

METHODS

Design

A cross-sectional survey was conducted with a convenience sample of nurses from 28 provinces, autonomous regions, and municipalities directly under the Central Government (total 31 in mainland China), except the provinces of Hainan, Tibet, and Ningxia.

Participants

We included 108 hospitals in this study from March to May 2020. All the participants were required to be a certified WOC nurse for inclusion. A total of 126 questionnaires were distributed, and 123 were eventually completed, with a response rate of 97.62%.

Measures

Demographic characteristics

We developed a self-designed questionnaire to acquire general information including age, gender, hospital, educational level, and form of employment.

Core competencies of WOCN

The Chinese version of the core competency framework for WOCN was developed by a three-round Delphi method with the authority coefficient of experts at 0.90, a familiar coefficient of 0.85, and a determination coefficient of 0.95[9]. This questionnaire includes 6 primary indicators, 19 secondary indicators, and 69 tertiary indicators (see table 2), and the coordination coefficients among the 3 level indicators were 0.495, 0.472, 0.282, respectively. The Chinese version uses a Likert-type 5-point rating scale (1 for strongly disagree, 5 for strongly agree), with higher scores indicating a higher level of competencies.

Career success

The scale of career success was developed in 2003 and has been translated into Mandarin[15,21]. This scale covers 3 dimensions through 11 items using a 5-point rating (1 for strongly disagree; 5 for strongly agree). High scores indicate high competency. Cronbach's alpha for the total scale and subscales is 0.91 and 0.87-0.90, respectively and the test-retest reliability is 0.93. The content validity is over 0.83.

Procedure

This study was an on-line survey. And all procedures were reviewed and approved by the Human Ethics Committee of CNA. Two members of our research group issued an invitation to graduates from the school of World Council of Enterostomal Therapists (WCET) to explain the purpose and importance of this survey through WeChat. It was clearly declared that participation was voluntary, and any information revealed by participants would be kept confidential. Respondents could answer questions online through computers or mobile phones. Each participant could complete the questionnaire only once. The survey was done anonymously. To ensure the total completion of the questionnaire, all answers were required before submission, which means that all questionnaires collected were completely filled out. After the questionnaires were collected, the invalid responses were eliminated, and the data was analyzed. The invalid responses were defined as responses from those participants who were no longer engaged in colostomy and wound and incontinence related jobs.

Statistical analysis

Analyses were performed with the SAS software, version 9.4 (SAS Institute). Descriptive statistics were used to present participants' demographic characteristics, core competencies, and career success. For univariate analysis, categorical variables were compared by the chi-square test or Fisher's exact test, and quantitative variables by the Kruskal–Wallis test or Wilcoxon rank test. Clinically relevant factors or variables with p values of less than 0.05 in the univariate analysis were explored further in a multivariate analysis with the use of ascending or descending selection techniques. Exploratory analyses to identify the association between the demographic data and the core competencies score were performed with the use of a logistic-regression model, where we divided the core competency score into high and low based on a median score. Associations between the demographic data and single dimension of the core competence scale were also estimated by a binary logistic

regression model. Results of logistic regression models were reported as odds ratios (OR) with 95% confidence intervals and p values <0.05. We also calculated odds ratios and used binary logistic regression to evaluate a total core competence score as well as other potentially influential covariates (i.e., the demographic data) as predictors of career success. In addition, the relationship between core competencies and each dimension of the career success scale was also analyzed with multivariate logistic regression by adjusting the relevant demographic factors. All tests were two-tailed, and a p value of less than 0.05 was considered to indicate statistical significance.

Patient and Public Involvement

Participant were involved in the design, conduct, or dissemination plans of this study.

RESULTS

Demographic information

A total of 126 WOCN responded to the investigation and returned the questionnaire. Among them, 123 nurses fitting the current criteria completed the questionnaires and were included in the final analysis. The demographic characteristics of the participants are shown in Table 1. The average age for the sample was 39.37 years of age (SD=6.38), ranging from 27 to 57 years. On an average, participants had more than ten years of work experience (M=18.20, SD=7.59) and had several years of practice as WOCN (M=5.43, SD=4.00). Most participants were women, who worked in top grade hospitals and held a bachelor's degree. As WOCN, most of them were certificated by the school of WCET and provide specialized care for patients. More than three quarters of them (77.24%) practiced in stoma clinics. Less than half of the participants were found to have published papers and undertaken or participated in research programs.

Descriptive statistics of variables

Table 2 presents the descriptive statistics of the main variables of the total and dimension score of career success and core competencies of WOCN. Overall, both career success (M=39.07 SD=8.36) and core competencies (M=290.69, SD=47.35) of WOCN was rated above the average by the nurses.

Univariate analyses among the study variables are presented in Table 3. As for career success, participants undertaking different roles in WOCN professional conferences, WOCN training, WOCN continuing education, and days of wound care per month held different

levels of career success. For core competency, the significant factors included years of practice as WOCN, the level at which they worked at a hospital, the number of years of practice in stoma clinics, being in charge of WOCN training, attending WOCN professional conferences, participation in WOCN continuing education, days of stoma per month, published papers, and research studies.

Logistic regression for career success

To analyze the influence of core competency on career success, two steps of regression were employed. Logistic regression was undertaken with career success as the dependent variable (see table 4). The independent variables were the significant factors identified through univariate analysis and the sum scores of core competencies. As it shown in Table 4, in the first step, the total score of core competencies and significant demographic factors were put into analysis and found that total score of core competencies impacted the total score of career success with an OR of 4.90, career satisfaction with an OR of 5.58, perceived in organization competitiveness (PWOC) with an OR of 4.55, and perceived external organization competitiveness (PEOC) with an OR of 3.42 (all $P<0.05$).

The second step revealed the dimensions of the impact of the core competencies on career success. The dependent variables were total scores and the dimensions of career success, and the independent variables were the six dimensions of core competencies and significant demographic factors. Among these results, competency in interpersonal communication of core competencies ($P<0.05$, OR=7.70, 95% CI: (1.453, 40.830)) and days for wound care per month ($P<0.05$, OR=8.80, 95% CI: (1.975, 39.237)) were found to be factors impacting career satisfaction of Chinese Career Success Scale. Professional development ($P<0.05$, OR=4.36, 95%CI: (1.017, 18.672)) was identified to be impacting perceived internal organization of career success.

DISCUSSION

The results showed that career success and core competencies in Chinese WOCN are at the above average level, and core competencies are a positive predictive factor of career success. Our findings concluded that higher competencies contributed to higher career success. Moreover, we explored the effect of subscales of competencies on career success and the results showed that two subscales of competencies influenced WOCNs' career success. We found that the core competencies and career success of the WOC nurses in China are positively associated with their self-development characteristics. There is no clear differences

between WOC advanced practice, WOC specialty nurses, and wound treatment associates in China; additionally, different hospitals currently have different models[2]. In addition, most specialist nurses are on unclear duties, without satisfying promotion opportunities, salaries, and welfare programs; get limited retraining after graduation; and lack a defined role or position. Specialist nurses spend most of their time on clinical practice and the participation in education, management and research is relatively limited[22].

Professional development capability covered research, personal competency development and nursing curriculum development skills in our scale, which required the nurses to provide high quality of care to patients and promote personal development through changeable and creative jobs. These were consistent with international standards. High professional development capability among WOCN predicted a 4.358 times higher organization competitiveness and 5.955 times better career success in China. As per WOC practice, the WOC registered nurse (RN), WOC graduate-level prepared RN, and the WOC advanced practice RN have a role in translating evidence into practice[23]. In our studies, there were only 13.01% of nurses with master's and doctoral degrees, 60.98% with papers published in journals and 47.97% participating in research programs in the last five years. A low education level could limit the WOCNs' ability to undertake research and promote WOC care, because a master's degree or higher is particularly helpful for professional development[24,25]. A Chinese survey with 53 316 specialist nurses reported that 96.5% nurses engaged in clinical practice and 62.4% in nursing research.[22] The specialist nurses spent almost all their time on clinical practice and had very limited time to do research. Another study in China covering 31 provincial capitals and autonomous regions showed 62.7% nurses did not undertake re-certification[26]. Furthermore, there are currently no unified training materials, uniform access standards for specialist nurses and standardized training systems and recertification regulations in China[2]. Thus, the nurse administrators should provide more opportunities for further, high-level training, elucidate responsibilities and hierarchical employment of nurses and develop incentive policies for WOCN.

The interpersonal capability in our study included communication, self-adaptation, and teamwork/cooperation skills. WOCN with higher interpersonal capability had 7.703 times greater career success in this study. This is consistent with the findings of a previous study, reporting that these skills were necessary for conducting professional duties[27]. Interpersonal capability was developed through effective interactions in the organization, which was beneficial for the development of professional competence and transfer experience. Among advanced nurse practitioners, improving intra-practice collegiality, professional and social

interaction are the notable areas to work upon which may give them the opportunity to negotiate resources, administrative support and receive better compensation, which in turn may enhance their job satisfaction[28]. Many Chinese WOCN work in inpatient settings and play a crucial role in the multi-disciplinary team involved in patients' management[2]. Thus, interpersonal capability is the foundation skill needed by WOCN, which leads to acquisition of positive attitudes and skills for improving engagement, increasing quality of care and intent to stay, achieving better job performance, and improving job satisfaction[29,30]. Thus, nurses' managers should give more attention to WOCNs' interpersonal capability and conduct effective training sessions for WOCN.

Our study showed more time spent on wound care could lead to higher job satisfaction. In China, wound care mainly includes preventing and treatment of pressure injuries and diabetic foot, delivering care for postoperative wound infection, and other wound-related complications. A study in China reported that many WOCN often felt overwhelmed by a lack of practical experience and coping strategies when dealing with complex wound care, because the clinical practice training was only half of that in the USA[2]. Moreover, wound care needs a multi-disciplinary approach to provide continuous wound management and is a challenging job for nurses. A review has shown that general nurses and graduating students have limited ability in wound care[31]. Thus, further wound care clinical practice could result in respect and recognition for WOCN from doctors as well as patients, which is an important factor in improving job satisfaction[13]. Therefore, training should also focus on knowledge and skills in wound care.

CONCLUSIONS

Career success and core competencies among WOCN in China are at an above average level and core competencies have a positive impact on career success. These findings were in accordance with the characteristics of self-development of WOCN in China. For better competencies to contribute to higher career success, the education and training of WOCN should be competency-centered, goal-targeted, and specialty-focused. The development of WOCN in China has been guided by the experience of other developed countries and was adapted to Chinese culture and practice, which may provide a reference for other developing countries.

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Ethics approval Study procedures were reviewed and approved by the Peking University First Hospital Human Ethics Committee (Number:2020-380).

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Table 1 General Information of the Participants (N=123)

Variable	Category	N(%)/M(SD)
Age（years）		39.37(6.38)
Years of practice		18.20(7.59)
Years of practice as WOCN		5.43(4.81)
Years of practice as WOCN (ranked)	<5	68(55.28%)
	5-10	39(31.71%)
	>10	16(13.01%)
Sex	Male	7(5.69%)
	Female	116(94.31%)
Level of worked hospital	Top grade hospital	104(84.55%)
	Secondary hospital and below	19(15.45%)
Type of worked hospital	General	111(30.24%)
	Specialized	12(9.76%)
Certificated as WOCN from	school of WCET	106(86.18%)
	National/Provincial Nursing Association	17(13.82%)
Work form as WOCN	Full-time WOCN	13(10.57%)
	Part-time WOCN and nursing manager	52(42.28%)
	Part-time WOCN and clinical nursing/teaching	58(47.15%)
Scope of service	Across the hospital	72(58.54%)
	Parts of department in hospital	21(17.07%)
	In the department and other	30(24.39%)
Practice in stoma clinic	Yes	95(77.24%)
	No	28(22.76%)
Highest level of nursing education	Associate degree	4(3.25%)
	Bachelor degree	103(83.74%)
	Master and above	16(113.01%)
Professional title	Nurse	14(11.38%)
	Senior nurse	75(60.98%)
	Nurse supervisor or above	34(27.64%)
Working position	Nurse	61(49.59%)
	Head nurse	62(50.41%)

Variable	Category	N(%)/M(SD)
In charge of WOCN training	Yes	110(89.43%)
	No	13(10.57%)
Joined in WOCN professional conference	Yes	100(81.30%)
	No	23(18.70%)
Participated in WOCN continuing education	Yes	108(87.80%)
	No	15(12.20%)
Days of stoma care per month	<=7 days	67(54.47%)
	7-14 days	23(18.70%)
	14-21 days	23(18.70%)
	>21 days	10(8.13%)
Days of wound care per month	<=7 days	59(47.97%)
	7-14 days	21(17.07%)
	14-21 days	25(20.33%)
	>21 days	18(14.63%)
Days of incontinence care per month	<=7 days	96(78.05%)
	7-14 days	14(11.38%)
	14-21 days	8(6.50%)
	>21 days	5(4.07%)
Published paper in journals	Yes	75 (60.98%)
	No	48 (39.02%)
Research programs	Yes	59(47.97%)
	No	64(52.03%)

Table 2. Descriptive Statistics of Study Variables（N=123）

Category	Number of Items	Range	Sum Score (SD)
Career Success (CCSS)	11	15~55	39.07(8.36)
Career Satisfaction (CS)	5	9~25	18.72(4.30)
Perceived in Organization Competitiveness (PWOC)	3	3~15	10.64(2.61)
Perceived External Organization Competitiveness (PEOC)	3	3~15	9.71(2.80)
Core Competencies of WOCN (CCS-WOCN)	69	99~345	290.69(47.35)
Competency in specialized clinical practice (CSCP)	21	36~105	89.76(13.63)
Competency in critical thinking (CCT)	10	13~45	38.27(6.73)
Competency in health education (CHE)	11	11~55	47.18(8.14)
Competency in professional development (CPD)	12	22~65	51.23(10.79)
Competency in interpersonal communication (CIC)	7	7~35	30.07(5.23)
Competency in nursing management (CNM)	8	10~40	34.19(6.08)

Abbreviation: CCSS, Chinese Career Success Scale; CCS-WOCN, Core Competency Scale for Wound Ostomy Continence Nurses.

Table 3. Univariate Analyses of the Factors Associated with Career Success and Core Competency (N=123)

Category	CCS-WOCN Sum Score Mean(SD)	t/Z	p	CCSS Sum Score Mean(SD)	t/Z	p
Years of practice as WOCN		6.670	0.036*		1.944	0.378
<5	282.49(47.95)			38.47(9.02)		
5-10	295.77(47.75)			39.21(7.86)		
>10	313.19(35.76)			41.25(6.48)		
Sex		-0.524	0.600		0.464	0.658
Female	291.19(47.67)			38.92(7.96)		
Male	282.43(44.11)			41.43(14.14)		
Level of worked hospital		-2.814	0.005*		-1.766	0.077
Top grade hospital	295.22(46.97)			39.54(8.56)		
Other hospital	265.89(42.47)			36.47(6.79)		
Type of worked hospital		-0.601	0.548		-1.251	0.211
General	292.14(44.46)			39.39(8.47)		
Specialized	277.33(69.87)			36.08(6.88)		
Certificated as WOCN from		-1.814	0.070		-0.183	0.854
school of WCET	293.16(48.03)			39.12(8.66)		
National/Provincial Nursing Association	275.29(40.80)			38.71(6.44)		
Work form of WOCN		1.516	0.469		2.182	0.336
Full-time WOCN	308.54(33.77)			41.62(5.59)		
Part-time WOCN and nursing manager	287.10(54.69)			39.00(7.84)		
Part-time WOCN and clinical nursing/teaching	289.91(42.39)			38.55(9.29)		
Scope of service		3.941	0.139		1.303	0.521
Across the hospital	298.06(43.29)			39.44(7.44)		
Parts of department in hospital	285.14(48.74)			39.95(9.65)		
In the department and other	276.90(53.40)			37.53(9.54)		
Practice in stoma clinic		-2.060	0.039*		-0.864	0.388
Yes	294.57(48.19)			39.38(8.70)		
No	277.54(42.57)			38.00(7.14)		
Highest level of nursing education		2.109	0.348		2.492	0.288
Associate degree	296.25(29.28)			41.25(2.50)		
Bachelor degree	288.09(48.61)			38.51(8.47)		
Master and above	306.06(41.08)			42.06(8.19)		
Professional title		2.782	0.249		1.258	0.533
Nurse	272.43(50.05)			38.36(10.25)		
Senior nurse	290.84(47.62)			38.77(8.68)		

Nurse supervisor or above	297.88(44.98)			40.00(6.85)		
Working Position		0.827	0.408		1.533	0.125
Nurse	293.20(50.34)			40.13(7.71)		
Head Nurse	288.23(44.49)			38.02(8.90)		
In charge of WOCN training		-2.279	0.023*		-2.233	0.026*
Yes	293.81(47.02)			39.64(8.11)		
No	264.31(43.22)			34.23(9.20)		
Joined in WOCN professional conference		-3.231	0.001*		-2.027	0.043*
Yes	297.05(45.80)			39.85(8.10)		
No	263.04(44.86)			35.65(8.81)		
Participated in WOCN continuing education		-2.130	0.033*		-2.198	0.028*
Yes	293.93(46.81)			39.72(8.31)		
No	267.40(46.15)			34.33(7.39)		
Days of stoma care per month		10.841	0.013*		4.964	0.174
<=7 days	281.90(50.16)			37.91(8.65)		
7-14 days	283.91(46.98)			38.26(7.38)		
14-21 days	315.00(32.56)			42.17(8.73)		
>21 days	309.30(37.03)			41.50(6.11)		
Days of wound care per month		7.372	0.061		14.312	0.003*
<=7 days	278.37(50.91)			36.31(8.08)		
7-14 days	296.67(45.63)			40.05(8.69)		
14-21 days	301.84(38.04)			42.24(8.09)		
>21 days	308.61(40.76)			42.56(6.52)		
Days of incontinence care per month		5.564	0.135		4.557	0.207
<=7 days	285.23(49.35)			38.27(8.59)		
7-14 days	311.86(36.37)			41.00(6.66)		
14-21 days	312.00(26.58)			43.25(8.17)		
>21 days	302.20(40.63)			42.20(6.61)		
Published paper in journals		-2.847	0.004*		-1.140	0.254
Yes	299.19(47.01)			39.69(7.95)		
No	277.42(45.23)			38.08(8.97)		
Research programs		2.613	0.009*		0.578	0.563
Yes	300.83(48.16)			39.36(7.79)		
No	281.34(44.96)			38.80(8.92)		

Abbreviation: CCSS, Chinese Career Success Scale; CCS-WOCN, Core Competency Scale for Wound Ostomy Continence Nurses.

*P<0.05.

Table 4. Logistic Regression Analysis for Career Success (N=123)

Variable	Estimated	SE	Waldχ^2	p	OR	95%CI	
						Lower	Upper
Step 1							
Sum score of core competencies（ref=1）	0.795	0.225	12.527	0.000**	4.900	2.032	11.814
In charge of WOCN training	0.961	0.546	3.099	0.078	6.834	0.804	58.084
Joined in WOCN professional conference	-0.630	0.379	2.769	0.096	0.284	0.064	1.251
Participated in WOCN continuing education	0.391	0.394	0.983	0.322	2.184	0.466	10.224
Days of wound care per month（ref=1）							
7-14 days	-0.255	0.417	0.375	0.541	1.733	0.554	5.424
14-21 days	0.409	0.395	1.067	0.302	3.366	1.147	9.876
>21 days	0.652	0.465	1.960	0.162	4.292	1.201	15.337
Step 2							
Competency in specialized clinical practice（ref=1）	-0.256	0.385	0.444	0.505	0.599	0.133	2.705
Competency in critical thinking（ref=1）	0.125	0.455	0.076	0.783	1.284	0.216	7.630
Competency in health education（ref=1）	-0.483	0.504	0.917	0.338	0.381	0.053	2.747
Competency in interpersonal communication（ref=1）	0.651	0.415	2.459	0.117	3.677	0.722	18.724
Competency in nursing management（ref=1）	0.139	0.404	0.119	0.730	1.321	0.272	6.425
Competency in professional development（ref=1）	0.892	0.416	4.591	0.032*	5.955	1.164	30.459
In charge of WOCN training	1.049	0.553	3.596	0.058	8.147	0.932	71.217
Joined in WOCN professional conference	-0.625	0.391	2.548	0.111	0.287	0.062	1.329
Participated in WOCN continuing education	0.369	0.412	0.802	0.370	2.093	0.416	10.531
Days of wound care per month（ref=1）							
7-14 days	-0.375	0.463	0.655	0.418	1.423	0.398	5.080
14-21 days	0.343	0.416	0.680	0.409	2.917	0.939	9.056
>21 days	0.760	0.507	2.248	0.134	4.425	1.101	17.780

*P<0.05

**P<0.01

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3-5
Objectives	3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5-6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5-6
Bias	9	Describe any efforts to address potential sources of bias	6
Study size	10	Explain how the study size was arrived at	6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	6-7
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	6-7
		(*b*) Describe any methods used to examine subgroups and interactions	6-7
		(*c*) Explain how missing data were addressed	6-7
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	6-7
		(*e*) Describe any sensitivity analyses	6-7
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	7
		(b) Give reasons for non-participation at each stage	7
		(c) Consider use of a flow diagram	None
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7-8
		(b) Indicate number of participants with missing data for each variable of interest	7-8
Outcome data	15*	Report numbers of outcome events or summary measures	7-8
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	7-8
		(*b*) Report category boundaries when continuous variables were categorized	7-8
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	7-8
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	None
Discussion			
Key results	18	Summarise key results with reference to study objectives	8-10
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	3
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	8-10
Generalisability	21	Discuss the generalisability (external validity) of the study results	8-10
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	None

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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The Status of Core Competencies of Wound, Ostomy, and Continence Nurses and their Influence on Career Success: a cross-sectional study

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Abstract

Objectives The wound, ostomy, and continence nursing practice has its own scope and standards, and each standard requires relevant competency. However, the core competencies of wound, ostomy, and continence nurses that contribute to the career success are poorly known. To identify associations between career success and core competencies of wound, ostomy, and continence nurses in China.

Design A cross-sectional survey with a convenience sample.

Setting Participants were recruited from 108 hospitals in 28 provinces.

Participants A total of 123 wound, ostomy, and continence nurses were surveyed.

Measures Career success, core competencies and demographic characteristics of wound, ostomy, and continence nurses, were measured in this study.

Methods A survey was distributed to 123 wound, ostomy, and continence nurses were recruited from 108 hospitals in 28 provinces. Multivariate logistic regression was undertaken to explore associations between career success outcomes and core competency scores of wound ostomy and continence nurses, and their demographic characteristics.

Results The career success and core competency of wound, ostomy, and continence nurses were both above average. Nurses who had higher total scores of core competency were more likely to have higher career success, including total score (OR=4.90), career satisfaction (OR=5.58), and perceived internal (OR=4.55)/external (OR=3.42) organization competitiveness. Higher competency in interpersonal communication (OR=7.70), and more time for wound care per month (OR=8.80) predicted higher career satisfaction. Additionally, nurses with higher professional development were more likely to score higher in perceived internal organization competitiveness of career success (OR=4.36) and the overall career success (OR=5.96).

Conclusions The career success and core competency of the wound, ostomy, and continence nurses in China were at an above average level. The associations between career success and core competency of the wound, ostomy, and continence nurses were positive, suggesting that competency enhancement could improve nurses' career success.

Key words: Career success, Core competencies, Ostomy, Continence, Wound.

Strengths and limitations of this study

► Participants from 108 hospitals in 28 provinces in China, which involved wide range.

► The logistic regression models were used in this study, which could identify both the relationships and strength of relationships cross variables.

► A cross-sectional design might limit its ability to identify the causal relationships between variables.

► The majority of the variables were measured by subjective data, which could introduce report bias.

INTRODUCTION

As specialist nurses, wound, ostomy, and continence (WOC) nurses resolve specialized and specific clinical problems in wound, stoma, and incontinence. WOC nurses play an important role in reducing the occurrence of various complications, reducing the economic burden of patients and the healthcare system, and improving medical care quality[1,2]. Meanwhile, they also play a positive role in saving manpower and hours for the general surgical or medical nurses and in enhancing the quality of life of patients with incontinence and stoma problems[3,4]. In 2009, the Wound, Ostomy and Continence Nurses Society (WOCNS) defined the role of a continence nurse and advanced practices of continence nurses, which was updated in 2018[1,5,6]. The WOCNS believes that the tri-specialty certified WOC nurses possess unique knowledge, expertise for assessment, and first-line management of incontinence as well as for prevention of incontinence. According to WOCNS, WOC nurses provide care to patients with urinary and/or fecal incontinence by conducting a focused assessment, performing physical examinations, synthesizing data, developing a plan of care, and evaluating interventions. The role includes, but is not limited to, serving as a clinician, consultant, educator, and/or administrator/manager in various health care settings[5,6]. Then, it could be seen that each of the various role of WOC nurses requires a corresponding competence. Competencies are an essential foundation for effective practice, education and evaluation of the professional role and core competencies reflect the knowledge and skills that all nursing practitioners (NP) should have and are considered the gold standard[7,8]. As an essential professional in NP, WOC nurses are required to hold certain core competences to fulfill their professional demandings.

Though initiated in developed countries originally, the number of WOC nurses in

developing countries like China has grown rapidly since the last decade due to the ever-increasing number of patients suffering from complex and changeable acute and chronic wounds. The role of WOC nurses in China comprises the core elements of what was defined by the WOCNS and was modified according to culture and practice. For example, though specialized in wound care, there is no clear classification of WOC nurses in mainland China. Different hospitals have various models, such as certified wound specialists and enterostomal therapists, who are divided into different subspecialties (pressure ulcer and refractory wound, surgical wound, and lower limb ulcer and diabetic foot ulcer)[1]. However, their roles are specific and quite different from the general nurses, which determines their distinct competency[1]. The concept of competencies dated back to David McClelland in 1973 who believed that testing one's competencies was a more effective predictor of job success than testing one's intelligence[9]. Since then, the concept of competency has been explored in a number of fields including businesses, organizations, industries as well as among health professionals like nurses. Shortly after its foundation, the National Association of Clinical Nurse Specialist (NACNS) began to explicate core competencies for clinical nurse specialist practice[3]. For WOC nurses, core competencies are essential for the quality of care provided; therefore, the indices that should be included in the system when assessing the core competencies for WOC nurses have been put on the agenda[4,10]. Base on the role defined by WOCNS and the practice of WOC nurses in China, Yin et al have developed a six-dimension system of core competencies for WOC nurses, namely: specialized clinical practice, critical thinking, health education, professional development, interpersonal communication, and nursing management[11]. This competency system was according to the roles and was found present in specialists of WOC nurses. Therefore, WOC nurses got wide acceptance and employment in China[12,13].

As a crucial concept in nursing, career success combines the achievements and positive mental feelings pertaining to work that one accumulates and obtains gradually during their work experience. When analyzing career success, both objective and subjective perspectives should be considered[14]. While objective career success is the achievement that an individual gains during the career that can be observed and measured,[15] subjective career success is the inner understanding and assessment of success on dimensions that an individual considers important, such as meaning of the job, job satisfaction and contributions to the organization[15]. Though job satisfaction and career satisfaction are the most commonly measured indices for subjective career success, job mobility in different organizations, different regions and different countries has also been focused upon[16]. In this boundary-less career era, successful

individuals are those who can create value for the current organization and who can be considered competitive by external organizations. Therefore, the three-dimensional theory of career success espoused by Eby, Butts and Lockwood is widely accepted[17]. A number of studies have investigated the influencing factors of career success and demonstrated that both external factors like work environment[18], organizational support[19], and internal factors like emotional intelligence and gender could influence career success[20,21]. Recently, the association between ability, which is quite similar to competency, and career success has been focused on and explored in psychology[22].

The effect of competences on career success has been explored and confirmed by relevant studies[23], however, not been explored in this group of specialist nurses. Theoretically, the role of WOC nurses determines its competency, where the required competencies were most essential for their profession that contribute most for their career success. Then, it is reasonable to correlate the two variables together by suggesting that better core competency will benefit, advance, or improve career success.

Therefore, due to limit information about the career success and core competencies of WOC nurses, the present investigation aims to examine the status of core competencies and career success among the highly specialized nursing population of WOC nurses in China, and compare the difference between core competencies and career success among WOC nurses bearing different characteristics, testing whether core competency and occupational character could exert influence on career success.

METHODS

Design

A cross-sectional survey was conducted with a convenience sample of nurses through continuing recruitment, from 28 provinces, autonomous regions, and municipalities directly under the Central Government (total 31 in mainland China), except the provinces of Hainan, Tibet, and Ningxia.

Participants

We included 108 hospitals in this study from March to May 2020. The inclusion criteria of eligible participants were: (1) as a certified WOC nurse; (2) the personnel worked in a hospital or community; (3) full-time or part-time job as a WOC nurse. Individuals were excluded if they were just students studying at school of nursing. A total of 126 questionnaires were distributed and completed, and 123 were eventually eligible (3 removed

with the role of nursing students), with a response rate of 97.62%.

Measures

Demographic characteristics

We developed a self-designed questionnaire to acquire general information including age, gender, level of hospital, years of work experience, educational level, certificated as a WOC nurses' form, work form of WOC nurses, form of employment, scope of service, work in stoma clinic, professional title, working position, in charge of WOC nurses' training, attending the WOC nurses' professional conference or WOC nurses' continuing education, days of stoma care or wound care or incontinence care per month, papers published in journals and research programs undertaken.

Core competencies of WOC nurses

The Chinese version of the core competency framework for WOC nurses was developed by a three-round Delphi method. The degree of expert authority is showed by the coefficient of expert authority (Cr) with the value of greater than 0.8, which shows a good degree of expert authority; Cr is the average derived from the familiarity coefficient (Cs) and the judgement coefficient (Ca)[24]. The authority coefficient of experts was 0.90, a familiar coefficient was 0.85, and a determination coefficient was 0.95 in this study[11]. This questionnaire includes 6 primary indicators (dimensions), 19 secondary indicators (sub-dimensions), and 69 tertiary indicators (items). The coordination coefficient of primary and secondary and third indicators were 0.495, 0.472, 0.282 (all $P < 0.001$), respectively[11]. The Chinese version uses a Likert-type 5-point rating scale (1 for strongly disagree, 5 for strongly agree); the rang of this scale is 69-345(207 for average level), with higher scores indicating a higher level of competencies. The Cronbach's coefficients for the total scale and subscales in this study was 0.99 and 0.96-0.98, respectively.

Career success

The scale of career success was developed in 2003 and has been translated into Mandarin[17,25]. This scale covers 3 dimensions through 11 items using a 5-point rating (1 for strongly disagree; 5 for strongly agree). The scores of this scale are 11~55(33 for average level), with high scores indicating high career success. Cronbach's alpha for the total scale and subscales was 0.91 and 0.87-0.90, respectively and the test-retest reliability was 0.93. The content

validity was over 0.83. The Cronbach's alpha for the total scale and subscales in this study was 0.94 and 0.92-0.95, separately.

Procedure

This study was an on-line survey. And all procedures were reviewed and approved by the ethics committee of Peking University First Hospital in which the study was conducted. Two members of our research group issued an invitation to graduates from the education program of World Council of Enterostomal Therapists (WCET) to explain the purpose and importance of this survey through WeChat[26]. WeChat is a mobile text and voice messaging communication service developed by Tencent in China. It was clearly declared that participation was voluntary, and any information revealed by participants would be kept confidential. Respondents could answer questions online through computers or mobile phones. Each participant could complete the questionnaire only once. The survey was done anonymously. To ensure the total completion of the questionnaire, all answers were required before submission, which means that all questionnaires collected were completely filled out. After the questionnaires were collected, the invalid responses were eliminated, and the data was analyzed. The invalid responses were defined as responses from those participants who were no longer engaged in WOC related jobs.

Statistical analysis

Analyses were performed with the SAS software, version 9.4 (SAS Institute). Descriptive statistics were used to present participants' demographic characteristics, core competencies, and career success. Continuous data were described as mean and SD (standard deviation) when normally distributed, while categorical data as n (%). For univariate analysis, continuous variables were compared by independent t-test, Kruskal–Wallis test or Wilcoxon rank test, and categorical variables were compared by the chi-square test or Fisher's exact test where appropriate. Clinically relevant factors or variables with p values of less than 0.05 in the univariate analysis were explored further in a multivariate analysis with the use of ascending or descending selection techniques. We used binary logistic regression model to evaluate the scores of core competences as well as other potentially influential covariates (i.e., the demographic data) as predictors of career success, where we divided the career success scores into high and low based on a median score. Results of logistic regression models were reported as odds ratios (OR) with 95% confidence intervals and p values <0.05. In addition,

the relationship between core competencies and each dimension of the career success scale was also analyzed with multivariate logistic regression by adjusting the relevant demographic factors. We used the Pearson correlation coefficient to explore the relationship between core competencies and career success of WOC nurses. All tests were two-tailed, and a p value of less than 0.05 was considered to indicate statistical significance.

Patient and Public Involvement

Participants were involved in the design, conduct, or dissemination plans of this study.

RESULTS

Demographic information

A total of 126 WOC nurses responded to the investigation and returned the questionnaire. Among them, 123 nurses fitting the current criteria completed the questionnaires and were included in the final analysis. The demographic characteristics of the participants are shown in Table 1. The average age for the sample was 39.37 years of age (SD=6.38), ranging from 27 to 57 years. On an average, participants had more than ten years of work experience (M=18.20, SD=7.59) and had several years of practice as WOC nurses (M=5.43, SD=4.00). Most participants were women, who worked in top grade hospitals and held a bachelor's degree. As WOC nurses, most of them were certificated by the school of WCET and provide specialized care for patients. More than three quarters of them (77.24%) practiced in stoma clinics. Less than half of the participants were found to have published papers and undertaken or participated in research programs.

Descriptive statistics of variables

Table 2 presents the descriptive statistics of the main variables of the total and dimension score of career success and core competencies of WOC nurses and Figure 1 shows expected scores as well. Overall, both career success (M=39.07 SD=8.36) and core competencies (M=290.69, SD=47.35) of WOCN were rated above the average by the nurses.

Univariate analyses among the study variables are presented in Table 3. As for career success, participants undertaking different roles in WOC nurses' professional conferences, WOC nurses' training, WOC nurses' continuing education, and days of wound care per month held different levels of career success. The correlation coefficient was 0.62 (P<0.001) between core competency and career success of WOC nurses.

Logistic regression for career success

To analyze the influence of core competency on career success, two steps of regression were employed. Logistic regression was undertaken with career success or each dimension of the career success as the dependent variable separately (see table 4). The independent variables were the significant factors identified through univariate analysis and the sum scores of core competencies. As it shown in Table 4, in the first step, the total score of core competencies and significant demographic factors were put into analysis. Among these results, Higher scores in core competencies resulted in a 4.90 times more likelihood of higher scores in career success (P<0.001, 95% CI: (2.032, 11.814))，a 5.58 times more likelihood of career satisfaction of Chinese Career Success Scale (P<0.001, 95% CI: (2.184, 14.237)), a 4.55 times more likelihood of perceived in organization competitiveness (PIOC) of Chinese Career Success Scale (P<0.001, 95% CI: (1.944, 10.656)), and a 3.42 times more likelihood of perceived external organization competitiveness (PEOC) of Chinese Career Success Scale (P=0.0037, 95% CI: (1.492, 7.861)).

The second step revealed the dimensions of the impact of the core competencies on career success. The dependent variables were total scores and the dimensions of career success, and the independent variables were the six dimensions of core competencies and significant demographic factors (see table 4 and supplementary table1, table2, table3). Among these results, competency in interpersonal communication of core competencies (P<0.05, OR=7.70, 95% CI: (1.453, 40.830)) and days for wound care per month (P<0.05, OR=8.80, 95% CI: (1.975, 39.237)) were found to be factors impacting career satisfaction of Chinese Career Success Scale. Professional development (P<0.05, OR=4.36, 95%CI: (1.017, 18.672)) was identified to be impacting perceived internal organization of career success and overall career success (P=0.0321, OR=5.96, 95%CI: (1.164, 30.459)).

DISCUSSION

The results showed that career success and core competencies in Chinese WOC nurses are at the above average level. Higher scores in core competencies resulted in a 4.90 times more likelihood of higher scores in career success in this study. Our findings concluded that higher competencies are a positive predictive factor of higher career success. Moreover, we explored the effect of subscales of competencies on career success and the results showed that competency in interpersonal communication and professional development influenced WOC nurses' career success. We found that the core competencies and career success of the WOC

nurses in China are positively associated with their self-development characteristics. There are no clear differences between WOC advanced practice, WOC specialty nurses, and wound treatment associates in China; additionally, different hospitals currently have different models[1]. In addition, most specialist nurses are on unclear duties, without satisfying promotion opportunities, salaries, and welfare programs; get limited retraining after graduation; and lack a defined role or position. Specialist nurses spend most of their time on clinical practice and the participation in education, management and research is relatively limited[27].

Professional development capability covered research, personal competency development and nursing curriculum development skills in our scale, which required the nurses to provide high quality of care to patients and promote personal development through changeable and creative jobs. These were consistent with international standards. Our findings showed high professional development capability among WOC nurses predicted a 4.36 times organization competitiveness and 5.96 times career success in this study. As per WOC practice, the WOC registered nurse (RN), WOC graduate-level prepared RN, and the WOC advanced practice RN have a role in translating evidence into practice[28]. In our studies, there were only 13.01% of nurses with master's and doctoral degrees, 60.98% with papers published in journals and 47.97% participating in research programs in the last five years. The education level of participants in this study might limit the WOC nurses' ability to undertake research and promote WOC care, because a master's degree or higher is particularly helpful for professional development[29,30]. A Chinese survey with 53 316 specialist nurses reported that 96.5% nurses engaged in clinical practice and 62.4% in nursing research.[27] The specialist nurses spent almost all their time on clinical practice and had very limited time to do research. Another study in China covering 31 provincial capitals and autonomous regions showed 62.7% nurses did not undertake re-certification[31]. Furthermore, there are currently no unified training materials, uniform access standards for specialist nurses and standardized training systems and recertification regulations in China[1]. Currently, a growing number of encouraging achievements have achieved after years of efforts and explorations by the government and professionals. In 2018, Anhui Province took the lead in carrying out the pilot work of nurses' prescribing right, realizing the ice-breaking journey of prescriptive authority for nurses[32]. In 2022, The specialized nurses had the right to prescribe in Shenzhen[33], which was of the breakthrough of nurse prescription authority in legislation made for the first time. Those will promote the WOC nurses' career development in the future, with the implementation of the prescriptive authority nationally. Additionally, the performance

management of the specialized nurses had explored in multidimensional evaluation in hospital in China, according to comprehensive performances of clinical, educational, research contributions[34]. Thus, the nurse administrators should explore to provide more opportunities for further, high-level training, elucidate responsibilities and hierarchical employment of nurses and develop incentive policies for WOC nurses.

The interpersonal capability in our study included communication, self-adaptation, and teamwork/cooperation skills. WOC nurses with higher interpersonal capability had 7.70 times career success in this study. This is consistent with the findings of a previous study, reporting that these skills were necessary for conducting professional duties[35]. Interpersonal capability was developed through effective interactions in the organization, which was beneficial for the development of professional competence and transfer experience. Among advanced nurse practitioners, improving intra-practice collegiality, professional and social interaction are the notable areas to work upon which may give them the opportunity to negotiate resources, administrative support and receive better compensation, which in turn may enhance their job satisfaction[36]. Many Chinese WOC nurses work in inpatient settings and play a crucial role in the multi-disciplinary team involved in patients' management[1]. Thus, interpersonal capability is the foundation skill needed by WOC nurses, which leads to acquisition of positive attitudes and skills for improving engagement, increasing quality of care and intent to stay, achieving better job performance, and improving job satisfaction[37,38]. Thus, The WOC nurses should improve their interpersonal capability in a variety of ways, including combining with its own experience, training, participation in the conference and on-line study. Moreover, nurses' managers should give more attention to WOC nurses' interpersonal capability and provide more opportunities to promote the capability of WOC nurses.

Our study showed more time spent on wound care could lead to higher job satisfaction. More days on wound care resulted in an 8.80 times more likelihood of higher scores in career success. In China, wound care mainly includes preventing and treatment of pressure injuries and diabetic foot, delivering care for postoperative wound infection, and other wound-related complications. A study in China reported that many WOC nurses often felt overwhelmed by a lack of practical experience and coping strategies when dealing with complex wound care, because the clinical practice training was only half of that in the USA[1]. Moreover, wound care needs a multi-disciplinary approach to provide continuous wound management and is a challenging job for nurses. A review has shown that general nurses and graduating students have limited ability in wound care[39]. Thus, further wound care clinical practice could result in respect and recognition for WOC nurses from doctors as well as patients, which is an

important factor in improving job satisfaction[15]. Therefore, more targeted training and practice should also focus on knowledge and skills in wound care.

There are some limitations to this study. First, although participants were selected from 108 hospitals in 28 provinces, this study only included 123 WOC nurses, which might reduce the power of this findings. Those findings could be downgraded. Second, the study used a cross-sectional design, limiting its ability to identify the causal relationships between the core competence, demographic data and career success. Third, selection bias existed as most participants came from tertiary hospitals, the top-grade hospitals in China. Moreover, the majority of the variables were selected by subjective measures, which might introduce report bias.

CONCLUSIONS

WOC nurses with different characters hold different levels of career success and core competencies; career success and core competencies among WOC nurses in China are at an above average level. In addition, core competencies are proved to hold a positive impact on career success. These findings were in accordance with the characteristics of development of WOC nurses in China. For better competencies to contribute to higher career success, the education and training of WOC nurses are suggested to be competency-centered, goal-targeted, and specialty-focused; diversified comprehensive evaluation of work performance is to be explored to promote the career development; the prescriptive authority for nurses is to be implemented in more and more medical institutions in China. The development of WOC nurses in China has been guided by the experience of other developed countries and was adapted to Chinese culture and practice, which may provide a reference for other developing countries.

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Table 1 General Information of the Participants (N=123)

Variable	Category	N(%)/M(SD)
Age（years）		39.37(6.38)
Years of practice		18.20(7.59)
Years of practice as WOCN		5.43(4.81)
Years of practice as WOCN (ranked)	<5	68(55.28%)
	5-10	39(31.71%)
	>10	16(13.01%)
Sex	Male	7(5.69%)
	Female	116(94.31%)
Level of worked hospital	Top grade hospital	104(84.55%)
	Secondary hospital and below	19(15.45%)
Type of worked hospital	General	111(90.24%)
	Specialized	12(9.76%)
Certificated as WOCN from	school of WCET	106(86.18%)
	National/Provincial Nursing Association	17(13.82%)
Work form as WOCN	Full-time WOCN	13(10.57%)
	Part-time WOCN and nursing manager	52(42.28%)
	Part-time WOCN and clinical nursing/teaching	58(47.15%)
Scope of service	Across the hospital	72(58.54%)
	Parts of department in hospital	21(17.07%)
	In the department and other	30(24.39%)
Practice in stoma clinic	Yes	95(77.24%)
	No	28(22.76%)
Highest level of nursing education	Associate degree	4(3.25%)
	Bachelor degree	103(83.74%)
	Master and above	16(13.01%)
Professional title	Nurse	14(11.38%)
	Senior nurse	75(60.98%)
	Nurse supervisor or above	34(27.64%)
Working position	Nurse	61(49.59%)
	Head nurse	62(50.41%)
In charge of WOCN training	Yes	110(89.43%)
	No	13(10.57%)
Joined in WOCN professional conference	Yes	100(81.30%)
	No	23(18.70%)
Participated in WOCN continuing education	Yes	108(87.80%)
	No	15(12.20%)
Days of stoma care per month	<=7 days	67(54.47%)
	7-14 days	23(18.70%)

Variable	Category	N(%)/M(SD)
	14-21 days	23(18.70%)
	>21 days	10(8.13%)
Days of wound care per month	<=7 days	59(47.97%)
	7-14 days	21(17.07%)
	14-21 days	25(20.33%)
	>21 days	18(14.63%)
Days of incontinence care per month	<=7 days	96(78.05%)
	7-14 days	14(11.38%)
	14-21 days	8(6.50%)
	>21 days	5(4.07%)
Published paper in journals	Yes	75 (60.98%)
	No	48 (39.02%)
Research programs	Yes	59(47.97%)
	No	64(52.03%)

Table 2. Descriptive Statistics of Study Variables（N=123）

Category	Number of Items	Rang of actual scores	Scores within this study	95% CI of actual scores
Career Success (CCSS)	11	15~55	39.07(8.36)	37.57,40.56
Career Satisfaction (CS)	5	9~25	18.72(4.30)	17.95,19.48
Perceived in Organization Competitiveness (PIOC)	3	3~15	10.64(2.61)	10.18,11.11
Perceived External Organization Competitiveness (PEOC)	3	3~15	9.71(2.80)	9.21,10.21
Core Competencies of WOCN (CCS-WOCN)	69	99~345	290.69(47.35)	282.24,299.14
Competency in specialized clinical practice (CSCP)	21	36~105	89.76(13.63)	87.33,92.20
Competency in critical thinking (CCT)	10	13~45	38.27(6.73)	37.07,39.47
Competency in health education (CHE)	11	11~55	47.18(8.14)	45.73,48.63
Competency in professional development (CPD)	12	22~65	51.23(10.79)	49.30,53.15
Competency in interpersonal communication (CIC)	7	7~35	30.07(5.23)	29.13,31.00
Competency in nursing management (CNM)	8	10~40	34.19(6.08)	33.10,35.27

Abbreviation: CCSS, Chinese Career Success Scale; CCS-WOCN, Core Competency Scale for Wound Ostomy Continence Nurses.

Table 3. Univariate Analyses of the Factors Associated with Career Success (N=123)

Category	Sum Scores Mean (SD)	t/F	p
Years of practice as WOCN		1.944	0.378
<5	38.47(9.02)		
5-10	39.21(7.86)		
>10	41.25(6.48)		
Sex		0.464	0.658
Female	38.92(7.96)		
Male	41.43(14.14)		
Level of worked hospital		-1.766	0.077
Top grade hospital	39.54(8.56)		
Other hospital	36.47(6.79)		
Type of worked hospital		-1.251	0.211
General	39.39(8.47)		
Specialized	36.08(6.88)		
Certificated as WOCN from		-0.183	0.854
school of WCET	39.12(8.66)		
National/Provincial Nursing Association	38.71(6.44)		
Work form of WOCN		2.182	0.336
Full-time WOCN	41.62(5.59)		
Part-time WOCN and nursing manager	39.00(7.84)		
Part-time WOCN and clinical nursing/teaching	38.55(9.29)		
Scope of service		1.303	0.521
Across the hospital	39.44(7.44)		
Parts of department in hospital	39.95(9.65)		
In the department and other	37.53(9.54)		
Practice in stoma clinic		-0.864	0.388
Yes	39.38(8.70)		
No	38.00(7.14)		
Highest level of nursing education		2.492	0.288
Associate degree	41.25(2.50)		
Bachelor degree	38.51(8.47)		
Master and above	42.06(8.19)		
Professional title		1.258	0.533
Nurse	38.36(10.25)		
Senior nurse	38.77(8.68)		
Nurse supervisor or above	40.00(6.85)		
Working Position		1.533	0.125
Nurse	40.13(7.71)		
Head Nurse	38.02(8.90)		
In charge of WOCN training		-2.233	0.026*

Yes	39.64(8.11)		
No	34.23(9.20)		
Joined in WOCN professional conference		-2.027	0.043*
Yes	39.85(8.10)		
No	35.65(8.81)		
Participated in WOCN continuing education		-2.198	0.028*
Yes	39.72(8.31)		
No	34.33(7.39)		
Days of stoma care per month		4.964	0.174
<=7 days	37.91(8.65)		
7-14 days	38.26(7.38)		
14-21 days	42.17(8.73)		
>21 days	41.50(6.11)		
Days of wound care per month		14.312	0.003*
<=7 days	36.31(8.08)		
7-14 days	40.05(8.69)		
14-21 days	42.24(8.09)		
>21 days	42.56(6.52)		
Days of incontinence care per month		4.557	0.207
<=7 days	38.27(8.59)		
7-14 days	41.00(6.66)		
14-21 days	43.25(8.17)		
>21 days	42.20(6.61)		
Published paper in journals		-1.140	0.254
Yes	39.69(7.95)		
No	38.08(8.97)		
Research programs		0.578	0.563
Yes	39.36(7.79)		
No	38.80(8.92)		

*P<0.05.

Table 4. Logistic Regression Analysis for Career Success (N=123)

Variable	Estimated	SE	Waldχ^2	p	OR	95%CI	
						Lower	Upper
Step 1							
Sum score of core competencies（ref=1）	0.795	0.225	12.527	0.000**	4.900	2.032	11.814
In charge of WOCN training	0.961	0.546	3.099	0.078	6.834	0.804	58.084
Joined in WOCN professional conference	-0.630	0.379	2.769	0.096	0.284	0.064	1.251
Participated in WOCN continuing education	0.391	0.394	0.983	0.322	2.184	0.466	10.224
Days of wound care per month（ref=1）							
7-14 days	-0.255	0.417	0.893	0.345	1.733	0.554	5.424
14-21 days	0.409	0.395	4.883	0.027	3.366	1.147	9.876
>21 days	0.652	0.465	5.027	0.025	4.292	1.201	15.337
Step 2							
Competency in specialized clinical practice（ref=1）	-0.256	0.385	0.444	0.505	0.599	0.133	2.705
Competency in critical thinking（ref=1）	0.125	0.455	0.076	0.783	1.284	0.216	7.630
Competency in health education（ref=1）	-0.483	0.504	0.917	0.338	0.381	0.053	2.747
Competency in interpersonal communication（ref=1）	0.651	0.415	2.459	0.117	3.677	0.722	18.724
Competency in nursing management（ref=1）	0.139	0.404	0.119	0.730	1.321	0.272	6.425
Competency in professional development（ref=1）	0.892	0.416	4.591	0.032*	5.955	1.164	30.459
In charge of WOCN training	1.049	0.553	3.596	0.058	8.147	0.932	71.217
Joined in WOCN professional conference	-0.625	0.391	2.548	0.111	0.287	0.062	1.329
Participated in WOCN continuing education	0.369	0.412	0.802	0.370	2.093	0.416	10.531
Days of wound care per month（ref=1）							
7-14 days	-0.375	0.463	0.655	0.418	1.423	0.398	5.080
14-21 days	0.343	0.416	0.680	0.409	2.917	0.939	9.056
>21 days	0.760	0.507	2.248	0.134	4.425	1.101	17.780

*P<0.05

**P<0.01

Figure 1 The scores of Career Success and Core Competency for minimum, maximum and actual scores and abbreviations are shown in table 2

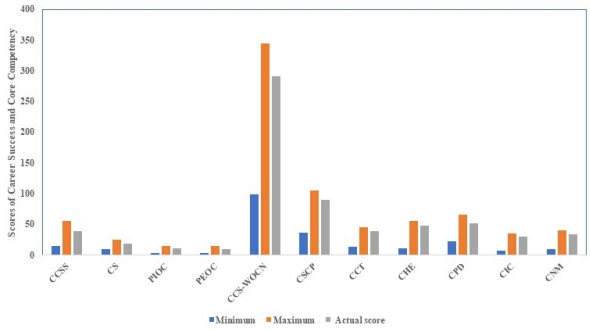

Figure 1

338x190mm (96 x 96 DPI)

Supplementary tables

Supplementary table 1. Logistic Regression Analysis for Career Satisfaction of Career Success (N=123)

Variable	Estimated	SE	Waldχ^2	p	OR	95%CI	
						Lower	Upper
Step 1							
Sum score of core competencies（ref=1）	0.8592	0.2391	12.9109	0.0003	5.576	2.184	14.237
Days of wound care per month（ref=1）							
7-14 days	-0.2093	0.4200	0.2484	0.6182	2.138	0.627	7.286
14-21 days	0.3370	0.3867	0.7597	0.3834	3.691	1.185	11.502
>21 days	0.8413	0.4348	3.7447	0.0530	6.112	1.725	21.66
Step 2							
Competency in specialized clinical practice（ref=1）	0.4784	0.3994	1.4346	0.2310	2.604	0.544	12.461
Competency in critical thinking（ref=1）	-0.3001	0.5137	0.3413	0.5591	0.549	0.073	4.110
Competency in health education（ref=1）	-0.5188	0.4985	1.0831	0.2980	0.354	0.050	2.501
Competency in interpersonal communication（ref=1）	1.0208	0.4255	5.7564	0.0164	7.703	1.453	40.830
Competency in nursing management（ref=1）	0.3071	0.3909	0.6172	0.4321	1.848	0.399	8.553
Competency in professional development（ref=1）	0.4069	0.4066	1.0015	0.3169	2.256	0.458	11.107
Days of wound care per month（ref=1）							
7-14 days	-0.4980	0.4615	1.1646	0.2805	1.589	0.423	5.971
14-21 days	0.2455	0.4384	0.3135	0.5755	3.343	0.946	11.814
>21 days	1.2139	0.5239	5.3685	0.0205	8.803	1.975	39.237

Supplementary table 2. Logistic Regression Analysis for PIOC of Career Success (N=123)

Variable	Estimated	SE	Waldχ^2	p	OR	95%CI	
						Lower	Upper
Step 1							
Sum score of core competencies（ref=1）	0.7578	0.2170	12.1954	0.0005	4.552	1.944	10.656
Working Position	-0.2854	0.2038	1.9616	0.1613	0.565	0.254	1.256
In charge of WOCN training	-0.2681	0.2991	0.8036	0.3700	0.585	0.181	1.889
Participated in WOCN continuing education	0.7131	0.4190	2.8965	0.0888	4.163	0.806	21.514
Step 2							
Competency in specialized clinical practice（ref=1）	-0.1412	0.3656	0.1493	0.6992	0.754	0.180	3.160
Competency in critical thinking（ref=1）	-0.0034	0.4405	0.0001	0.9938	0.993	0.177	5.584
Competency in health education（ref=1）	-0.3919	0.4533	0.7477	0.3872	0.457	0.077	2.699
Competency in interpersonal communication（ref=1）	0.5347	0.3743	2.0415	0.1531	2.914	0.672	12.636
Competency in nursing management（ref=1）	0.3105	0.3662	0.7186	0.3966	1.861	0.443	7.819
Competency in professional development（ref=1）	0.7360	0.3712	3.9320	0.0474	4.358	1.017	18.672
Working Position	-0.2996	0.2242	1.7862	0.1814	0.549	0.228	1.323
Joined in WOCN professional conference	-0.2595	0.3178	0.6667	0.4142	0.595	0.171	2.068
Participated in WOCN continuing education	0.6768	0.4449	2.3145	0.1282	3.872	0.677	22.146

Abbreviation: PIOC, Perceived in Organization Competitiveness

Supplementary table 3. Logistic Regression Analysis for PEOC of Career Success (N=123)

Variable	Estimated	SE	Waldχ^2	p	OR	95%CI	
						Lower	Upper
Step 1							
Sum score of core competencies（ref=1）	0.6155	0.2120	8.4293	0.0037	3.424	1.492	7.861
Level of worked hospital (ref=1)	0.5973	0.3473	2.9580	0.0855	3.302	0.846	12.882
Days of wound care per month（ref=1）							
7-14 days	-0.2491	0.4037	0.3807	0.5372	1.262	0.411	3.875
14-21 days	0.6953	0.3816	3.3199	0.0684	3.244	1.142	9.219
>21 days	0.0354	0.4304	0.0068	0.9344	1.677	0.507	5.549
Step 2							
Competency in specialized clinical practice（ref=1）	0.2618	0.3198	0.6701	0.4130	1.688	0.482	5.912
Competency in critical thinking（ref=1）	-0.0402	0.4079	0.0097	0.9214	0.923	0.187	4.565
Competency in health education（ref=1）	-0.1673	0.4416	0.1436	0.7047	0.716	0.127	4.040
Competency in interpersonal communication（ref=1）	0.2196	0.3830	0.3288	0.5664	1.551	0.346	6.962
Competency in nursing management（ref=1）	-0.1344	0.3910	0.1181	0.7311	0.764	0.165	3.540
Competency in professional development（ref=1）	0.6238	0.3730	2.7974	0.0944	3.482	0.807	15.025
Level of worked hospital	0.6300	0.3826	2.7122	0.0996	3.526	0.787	15.796
Days of wound care per month（ref=1）							
7-14 days	-0.2713	0.4253	0.4070	0.5235	1.177	0.356	3.892
14-21 days	0.6340	0.3916	2.6210	0.1055	2.910	0.989	8.565
>21 days	0.0716	0.4482	0.0255	0.8730	1.659	0.473	5.820

Abbreviation: PEOC, Perceived External Organization Competitiveness

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3-5
Objectives	3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	5-6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6-7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	6-7
Bias	9	Describe any efforts to address potential sources of bias	12
Study size	10	Explain how the study size was arrived at	7
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7-8
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	7-8
		(*b*) Describe any methods used to examine subgroups and interactions	7-8
		(*c*) Explain how missing data were addressed	7-8
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	7-8
		(*e*) Describe any sensitivity analyses	7-8
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	5-6
		(b) Give reasons for non-participation at each stage	5-6
		(c) Consider use of a flow diagram	None
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	8
		(b) Indicate number of participants with missing data for each variable of interest	5-6
Outcome data	15*	Report numbers of outcome events or summary measures	8
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	8-9
		(*b*) Report category boundaries when continuous variables were categorized	8-9
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	8-9
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	None
Discussion			
Key results	18	Summarise key results with reference to study objectives	9-12
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	12
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	9-12
Generalisability	21	Discuss the generalisability (external validity) of the study results	9-12
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	12

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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The Status of Core Competencies of Wound, Ostomy, and Continence Nurses and their Influence on Career Success: a cross-sectional study

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Abstract

Objectives The wound, ostomy, and continence nursing practice has its own scope and standards, and each standard requires relevant competency. However, the core competencies of wound, ostomy, and continence nurses that contribute to the career success are poorly known. To identify associations between career success and core competencies of wound, ostomy, and continence nurses in China.

Design A cross-sectional survey with a convenience sample.

Setting Participants were recruited from 108 hospitals in 28 provinces.

Participants A total of 123 wound, ostomy, and continence nurses were surveyed.

Measures Career success, core competencies and demographic characteristics of wound, ostomy, and continence nurses, were measured in this study.

Methods A survey was distributed to 123 wound, ostomy, and continence nurses were recruited from 108 hospitals in 28 provinces. Multivariate logistic regression was undertaken to explore associations between career success outcomes and core competency scores of wound ostomy and continence nurses, and their demographic characteristics.

Results The career success and core competency of wound, ostomy, and continence nurses were both above average. Nurses who had higher total scores of core competency were more likely to have higher career success, including total score (OR=4.90), career satisfaction (OR=5.58), and perceived internal (OR=4.55)/external (OR=3.42) organization competitiveness. Higher competency in interpersonal communication (OR=7.70), and more time for wound care per month (OR=8.80) predicted higher career satisfaction. Additionally, nurses with higher professional development were more likely to score higher in perceived internal organization competitiveness of career success (OR=4.36) and the overall career success (OR=5.96).

Conclusions The career success and core competency of the wound, ostomy, and continence nurses in China were at an above average level. The associations between career success and core competency of the wound, ostomy, and continence nurses were positive, suggesting that competency enhancement could improve nurses' career success.

Key words: Career success, Core competencies, Ostomy, Continence, Wound.

Strengths and limitations of this study

► Participants from 108 hospitals in 28 provinces in China, which involved wide range.

► A cross-sectional design might limit its ability to identify the causal relationships between variables.

► The majority of the variables were measured by subjective data, which could introduce report bias.

INTRODUCTION

As specialist nurses, wound, ostomy, and continence (WOC) nurses resolve specialized and specific clinical problems in wound, stoma, and incontinence. WOC nurses play an important role in reducing the occurrence of various complications, reducing the economic burden of patients and the healthcare system, and improving medical care quality [1,2]. Meanwhile, they also play a positive role in saving manpower and hours for the general surgical or medical nurses and in enhancing the quality of life of patients with incontinence and stoma problems [3,4]. In 2009, the Wound, Ostomy and Continence Nurses Society (WOCNS) defined the role of a continence nurse and advanced practices of continence nurses, which was updated in 2018[1,5,6]. The WOCNS believes that the tri-specialty certified WOC nurses possess unique knowledge, expertise for assessment, and first-line management of incontinence as well as for prevention of incontinence. According to WOCNS, WOC nurses provide care to patients with urinary and/or fecal incontinence by conducting a focused assessment, performing physical examinations, synthesizing data, developing a plan of care, and evaluating interventions. The role includes, but is not limited to, serving as a clinician, consultant, educator, and/or administrator/manager in various health care settings [5,6]. Then, it could be seen that each of the various role of WOC nurses requires a corresponding competence. Competencies are an essential foundation for effective practice, education and evaluation of the professional role and core competencies reflect the knowledge and skills that all nursing practitioners (NP) should have and are considered the gold standard [7,8]. As an essential professional in NP, WOC nurses are required to hold certain core competences to fulfill their professional demandings.

Though initiated in developed countries originally, the number of WOC nurses in developing countries like China has grown rapidly since the last decade due to the ever-increasing number of patients suffering from complex and changeable acute and chronic wounds. The role of WOC nurses in China comprises the core elements of what was defined

by the WOCNS and was modified according to culture and practice. For example, though specialized in wound care, there is no clear classification of WOC nurses in mainland China. Different hospitals have various models, such as certified wound specialists and enterostomal therapists, who are divided into different subspecialties (pressure ulcer and refractory wound, surgical wound, and lower limb ulcer and diabetic foot ulcer) [1]. However, their roles are specific and quite different from the general nurses, which determines their distinct competency [1]. The concept of competencies dated back to David McClelland in 1973 who believed that testing one's competencies was a more effective predictor of job success than testing one's intelligence [9]. Since then, the concept of competency has been explored in a number of fields including businesses, organizations, industries as well as among health professionals like nurses. Shortly after its foundation, the National Association of Clinical Nurse Specialist (NACNS) began to explicate core competencies for clinical nurse specialist practice [3]. For WOC nurses, core competencies are essential for the quality of care provided; therefore, the indices that should be included in the system when assessing the core competencies for WOC nurses have been put on the agenda [4,10]. Base on the role defined by WOCNS and the practice of WOC nurses in China, Yin et al have developed a six-dimension system of core competencies for WOC nurses, namely: specialized clinical practice, critical thinking, health education, professional development, interpersonal communication, and nursing management [11]. This competency system was according to the roles and was found present in specialists of WOC nurses. Therefore, WOC nurses got wide acceptance and employment in China [12,13].

As a crucial concept in nursing, career success combines the achievements and positive mental feelings pertaining to work that one accumulates and obtains gradually during their work experience. When analyzing career success, both objective and subjective perspectives should be considered [14]. While objective career success is the achievement that an individual gains during the career that can be observed and measured [15], subjective career success is the inner understanding and assessment of success on dimensions that an individual considers important, such as meaning of the job, job satisfaction and contributions to the organization [15]. Though job satisfaction and career satisfaction are the most commonly measured indices for subjective career success, job mobility in different organizations, different regions and different countries has also been focused upon [16]. In this boundary-less career era, successful individuals are those who can create value for the current organization and who can be considered competitive by external organizations. Therefore, the three-dimensional theory of career success espoused by Eby, Butts and Lockwood is widely accepted [17]. A number of

studies have investigated the influencing factors of career success and demonstrated that both external factors like work environment [18], organizational support [19], and internal factors like emotional intelligence and gender could influence career success [20,21]. Recently, the association between ability, which is quite similar to competency, and career success has been focused on and explored in psychology [22].

The effect of competences on career success has been explored and confirmed by relevant studies [23], however, not been explored in this group of specialist nurses. Theoretically, the role of WOC nurses determines its competency, where the required competencies were most essential for their profession that contribute most for their career success. Then, it is reasonable to correlate the two variables together by suggesting that better core competency will benefit, advance, or improve career success.

Therefore, due to limit information about the career success and core competencies of WOC nurses, the present investigation aims to examine the status of core competencies and career success among the highly specialized nursing population of WOC nurses in China, and compare the difference between core competencies and career success among WOC nurses bearing different characteristics, testing whether core competency and occupational character could exert influence on career success.

METHODS

Design

A cross-sectional survey was conducted with a convenience sample of nurses through continuing recruitment, from 28 provinces, autonomous regions, and municipalities directly under the Central Government (total 31 in mainland China), except the provinces of Hainan, Tibet, and Ningxia.

Participants

We included 108 hospitals in this study from March to May 2020. The inclusion criteria of eligible participants were: (1) as a certified WOC nurse; (2) the personnel worked in a hospital or community; (3) full-time or part-time job as a WOC nurse. Individuals were excluded if they were just students studying at school of nursing. A total of 126 questionnaires were distributed and completed, and 123 were eventually eligible (3 removed with the role of nursing students), with a response rate of 97.62%.

Measures

Demographic characteristics

We developed a self-designed questionnaire to acquire general information including age, gender, level of hospital, years of work experience, educational level, certificated as a WOC nurses' form, work form of WOC nurses, form of employment, scope of service, workplace in stoma clinic, professional title, working position, in charge of WOC nurses' training, attendance of the WOC nurses' professional conference or WOC nurses' continuing education, days of stoma care or wound care or incontinence care per month, papers published in journals and research programs undertaken.

Core competencies of WOC nurses

The Chinese version of the core competency framework for WOC nurses was developed by a three-round Delphi method [24]. The degree of expert authority is showed by the coefficient of expert authority (Cr) with the value of greater than 0.8, which shows a good degree of expert authority; Cr is the average derived from the familiarity coefficient (Cs) and the judgement coefficient (Ca) [25]. The authority coefficient of experts was 0.90, a familiar coefficient was 0.85, and a determination coefficient was 0.95 in this study [11]. This questionnaire includes 6 primary indicators (dimensions), 19 secondary indicators (sub-dimensions), and 69 tertiary indicators (items). The coordination coefficient of primary and secondary and third indicators were 0.495, 0.472, 0.282 (all $P < 0.001$), respectively [11]. The Chinese version uses a Likert-type 5-point rating scale (1 for strongly disagree, 5 for strongly agree); the range of this scale is 69-345(207 for a mid-range), with higher scores indicating a higher level of competencies. The Cronbach's coefficients for the total scale and subscales in this study was 0.99 and 0.96-0.98, respectively.

Career success

The scale of career success was developed in 2003 and has been translated into Mandarin [17,26]. This scale covers 3 dimensions through 11 items using a 5-point rating (1 for strongly disagree; 5 for strongly agree). The scores of this scale are 11~55(33 for a mid-range), with high scores indicating high career success. Cronbach's alpha for the total scale and subscales was 0.91 and 0.87-0.90, respectively and the test-retest reliability was 0.93. The content validity was over 0.83. The Cronbach's alpha for the total scale and subscales in this study was 0.94 and 0.92-0.95, separately.

Procedure

This study was an on-line survey. And all procedures were reviewed and approved by the ethics committee of Peking University First Hospital in which the study was conducted. Two members of our research group issued an invitation to graduates from the education program of World Council of Enterostomal Therapists (WCET) to explain the purpose and importance of this survey through WeChat [27]. WeChat is a mobile text and voice messaging communication service developed by Tencent in China. It was clearly declared that participation was voluntary, and any information revealed by participants would be kept confidential. Respondents could answer questions online through computers or mobile phones. Each participant could complete the questionnaire only once. The survey was done anonymously. To ensure the total completion of the questionnaire, all answers were required before submission, which means that all questionnaires collected were completely filled out. After the questionnaires were collected, the invalid responses were eliminated, and the data was analyzed. The invalid responses were defined as responses from those participants who were no longer engaged in WOC related jobs.

Statistical analysis

Analyses were performed with the SAS software, version 9.4 (SAS Institute). Descriptive statistics were used to present participants' demographic characteristics, core competencies, and career success. Continuous data were described as mean and SD (standard deviation) when normally distributed, while categorical data as n (%). For univariate analysis, continuous variables were compared by independent t-test, Kruskal–Wallis test or Wilcoxon rank test, and categorical variables were compared by the chi-square test or Fisher's exact test where appropriate. Clinically relevant factors or variables with p values of less than 0.05 in the univariate analysis were explored further in a multivariate analysis with the use of ascending or descending selection techniques. We used binary logistic regression model to evaluate the scores of core competences as well as other potentially influential covariates (i.e., the demographic data) as predictors of career success, where we divided the career success scores into high and low based on a median score. Results of logistic regression models were reported as odds ratios (OR) with 95% confidence intervals and p values <0.05. In addition, the relationship between core competencies and each dimension of the career success scale was also analyzed with multivariate logistic regression by adjusting the relevant demographic factors. We used the Pearson correlation coefficient to explore the relationship between core

competencies and career success of WOC nurses. All tests were two-tailed, and a p value of less than 0.05 was considered to indicate statistical significance.

Patient and Public Involvement

Participants were involved in the design, conduct, or dissemination plans of this study.

RESULTS

Demographic information

A total of 126 WOC nurses responded to the investigation and returned the questionnaire. Among them, 123 nurses fitting the current criteria completed the questionnaires and were included in the final analysis. The demographic characteristics of the participants are shown in Table 1. The average age for the sample was 39.37 years of age (SD=6.38), ranging from 27 to 57 years. On an average, participants had more than ten years of work experience (M=18.20, SD=7.59) and had several years of practice as WOC nurses (M=5.43, SD=4.00). Most participants were women, who worked in top grade hospitals and held a bachelor's degree. As WOC nurses, most of them were certificated by the school of WCET and provided specialized care for patients. More than three quarters of them (77.24%) practiced in stoma clinics. Less than half of the participants were found to have published papers and undertaken or participated in research programs.

Descriptive statistics of variables

Table 2 presents the descriptive statistics of the main variables of the total and dimension score of career success and core competencies of WOC nurses and Figure 1 shows expected scores as well. Overall, both career success (M=39.07 SD=8.36) and core competencies (M=290.69, SD=47.35) of WOC nurses were rated above the average by the nurses.

Univariate analyses among the study variables are presented in Table 3. As for career success, participants undertaking different roles in WOC nurses' professional conferences, WOC nurses' training, WOC nurses' continuing education, and days of wound care per month held different levels of career success. The correlation coefficient was 0.62 (P<0.001) between core competency and career success of WOC nurses.

Logistic regression for career success

To analyze the influence of core competency on career success, two steps of regression were employed. Logistic regression was undertaken with career success or each dimension of the

career success as the dependent variable separately (see table 4 and supplementary table1, table2, table3). The independent variables were the significant factors identified through univariate analysis and the sum scores of core competencies. As it shown in Table 4, in the first step, the total score of core competencies and significant demographic factors were put into analysis. Among these results, Higher scores in core competencies resulted in a 4.90 times more likelihood of higher scores in career success (P<0.001, 95% CI: (2.032, 11.814))，a 5.58 times more likelihood of career satisfaction of Chinese Career Success Scale (P<0.001, 95% CI: (2.184, 14.237)), a 4.55 times more likelihood of perceived in organization competitiveness (PIOC) of Chinese Career Success Scale (P<0.001, 95% CI: (1.944, 10.656)), and a 3.42 times more likelihood of perceived external organization competitiveness (PEOC) of Chinese Career Success Scale (P=0.0037, 95% CI: (1.492, 7.861)).

The second step revealed the dimensions of the impact of the core competencies on career success. The dependent variables were total scores and the dimensions of career success, and the independent variables were the six dimensions of core competencies and significant demographic factors (see table 4 and supplementary table1, table2, table3). Among these results, competency in interpersonal communication of core competencies (P<0.05, OR=7.70, 95% CI: (1.453, 40.830)) and days for wound care per month (P<0.05, OR=8.80, 95% CI: (1.975, 39.237)) were found to be factors impacting career satisfaction of Chinese Career Success Scale. Professional development (P<0.05, OR=4.36, 95%CI: (1.017, 18.672)) was identified to be impacting perceived internal organization of career success and overall career success (P=0.0321, OR=5.96, 95%CI: (1.164, 30.459)).

DISCUSSION

The results showed that career success and core competencies in Chinese WOC nurses are at the above average level. Higher scores in core competencies resulted in a 4.90 times more likelihood of higher scores in career success in this study. Our findings concluded that higher competencies are a positive predictive factor of higher career success. Moreover, we explored the effect of subscales of competencies on career success and the results showed that competency in interpersonal communication and professional development influenced WOC nurses' career success. We found that the core competencies and career success of the WOC nurses in China are positively associated with their self-development characteristics. There are no clear differences between WOC advanced practice, WOC specialty nurses, and wound treatment associates in China; additionally, different hospitals currently have different models

[1]. In addition, most specialist nurses are on unclear duties, without satisfying promotion opportunities, salaries, and welfare programs; get limited retraining after graduation; and lack a defined role or position. Specialist nurses spend most of their time on clinical practice and the participation in education, management and research is relatively limited [28].

Professional development capability covered research, personal competency development and nursing curriculum development skills in our scale, which required the nurses to provide high quality of care to patients and promote personal development through changeable and creative jobs. These were consistent with international standards. Our findings showed high professional development capability among WOC nurses predicted a 4.36 times organization competitiveness and 5.96 times career success in this study. As per WOC practice, the WOC registered nurse (RN), WOC graduate-level prepared RN, and the WOC advanced practice RN have a role in translating evidence into practice [29]. In our studies, there were only 13.01% of nurses with master's and doctoral degrees, 60.98% with papers published in journals and 47.97% participating in research programs in the last five years. The educational level of participants in this study might limit the WOC nurses' ability to undertake research and promote WOC care, because a master's degree or higher is particularly helpful for professional development [30,31]. A Chinese survey with 53 316 specialist nurses reported that 96.5% nurses engaged in clinical practice and 62.4% in nursing research [28]. The specialist nurses spent almost all their time on clinical practice and had very limited time to do research. Another study in China covering 31 provincial capitals and autonomous regions showed 62.7% nurses did not undertake re-certification [32]. Furthermore, there are currently no unified training materials, uniform access standards for specialist nurses and standardized training systems and recertification regulations in China [1]. Currently, a growing number of encouraging achievements have achieved after years of efforts and explorations by the government and professionals. In 2018, Anhui Province took the lead in carrying out the pilot work of nurses' prescribing right, realizing the ice-breaking journey of prescriptive authority for nurses [33]. In 2022, The specialized nurses had the right to prescribe in Shenzhen [34], which was a breakthrough of nurse prescription authority in legislation made for the first time. These actions will promote the WOC nurses' career development in the future, with the implementation of the prescriptive authority nationally. Additionally, the performance management of the specialized nurses had explored in multidimensional evaluation in hospital in China, according to comprehensive performances of clinical, educational, research contributions [35]. Thus, the nurse administrators should explore to provide more opportunities for further, high-level training, elucidate responsibilities and hierarchical employment of

nurses and develop incentive policies for WOC nurses.

The interpersonal capability in our study included communication, self-adaptation, and teamwork/cooperation skills. WOC nurses with higher interpersonal capability had 7.70 times career success in this study. This is consistent with the findings of a previous study, reporting that these skills were necessary for conducting professional duties [36]. Interpersonal capability was developed through effective interactions in the organization, which was beneficial for the development of professional competence and transfer experience. Among advanced nurse practitioners, improving intra-practice collegiality, professional and social interaction are the notable areas to work upon which may give them the opportunity to negotiate resources, administrative support and receive better compensation, which in turn may enhance their job satisfaction [37]. Many Chinese WOC nurses work in inpatient settings and play a crucial role in the multi-disciplinary team involved in patients' management [1]. Thus, interpersonal capability is the foundation skill needed by WOC nurses, which leads to acquisition of positive attitudes and skills for improving engagement, increasing quality of care and intent to stay, achieving better job performance, and improving job satisfaction [38,39]. Thus, The WOC nurses should improve their interpersonal capability in a variety of ways, including combining with its own experience, training, participation in the conference and on-line study. Moreover, nurses' managers should give more attention to WOC nurses' interpersonal capability and provide more opportunities to promote the capability of WOC nurses.

Our study showed more time spent on wound care could lead to higher job satisfaction. More days on wound care resulted in an 8.80 times more likelihood of higher scores in career success. In China, wound care mainly includes preventing and treatment of pressure injuries and diabetic foot, delivering care for postoperative wound infection, and other wound-related complications. A study in China reported that many WOC nurses often felt overwhelmed by a lack of practical experience and coping strategies when dealing with complex wound care, because the clinical practice training was only half of that in the USA [1]. Moreover, wound care needs a multi-disciplinary approach to provide continuous wound management and is a challenging job for nurses. A review has shown that general nurses and graduating students have limited ability in wound care [40]. Thus, further wound care clinical practice could result in respect and recognition for WOC nurses from doctors as well as patients, which is an important factor in improving job satisfaction [15]. Therefore, more targeted training and practice should also focus on knowledge and skills in wound care.

There are some limitations to this study. First, although participants were selected from

108 hospitals in 28 provinces, this study only included 123 WOC nurses, which might reduce the power of this findings. Those findings could be downgraded. Second, the study used a cross-sectional design, limiting its ability to identify the causal relationships between the core competence, demographic data and career success. Third, selection bias existed as most participants came from tertiary hospitals, the top-grade hospitals in China. Moreover, the majority of the variables were selected by subjective measures, which might introduce report bias.

CONCLUSIONS

WOC nurses with different characters hold different levels of career success and core competencies; career success and core competencies among WOC nurses in China are at an above average level. In addition, core competencies are proved to hold a positive impact on career success. These findings were in accordance with the characteristics of development of WOC nurses in China. For better competencies to contribute to higher career success, the education and training of WOC nurses are suggested to be competency-centered, goal-targeted, and specialty-focused; diversified comprehensive evaluation of work performance is to be explored to promote the career development; the prescriptive authority for nurses is to be implemented in more and more medical institutions in China. The development of WOC nurses in China has been guided by the experience of other developed countries and was adapted to Chinese culture and practice, which may provide a reference for other developing countries.

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Table 1 General Information of the Participants (N=123)

Variable	Category	N(%)/M(SD)
Age（years）		39.37(6.38)
Years of practice		18.20(7.59)
Years of practice as a WOC nurse		5.43(4.81)
Years of practice as a WOC nurse (ranked)	<5	68(55.28%)
	5-10	39(31.71%)
	>10	16(13.01%)
Sex	Male	7(5.69%)
	Female	116(94.31%)
Level of worked hospital	Top grade hospital	104(84.55%)
	Secondary hospital and below	19(15.45%)
Type of worked hospital	General	111(90.24%)
	Specialized	12(9.76%)
Certificated as a WOC nurse' from	school of WCET	106(86.18%)
	National/Provincial Nursing Association	17(13.82%)
Work form as a WOC nurse	Full-time	13(10.57%)
	Part-time and nurse manager	52(42.28%)
	Part-time and clinical nursing/teaching	58(47.15%)
Scope of service	Across the hospital	72(58.54%)
	Parts of department in hospital	21(17.07%)
	In the department and other	30(24.39%)
Practice in stoma clinic	Yes	95(77.24%)
	No	28(22.76%)
Highest level of nursing education	Associate degree	4(3.25%)
	Bachelor degree	103(83.74%)
	Master and above	16(13.01%)
Professional title	Nurse	14(11.38%)
	Senior nurse	75(60.98%)
	Nurse supervisor or above	34(27.64%)
Working position	Nurse	61(49.59%)
	Head nurse	62(50.41%)
In charge of WOC nurses' training	Yes	110(89.43%)
	No	13(10.57%)
Joined in WOC nurses' professional conference	Yes	100(81.30%)
	No	23(18.70%)
Participated in WOC nurses' continuing education	Yes	108(87.80%)
	No	15(12.20%)
Days of stoma care per month	<=7 days	67(54.47%)
	7-14 days	23(18.70%)

Variable	Category	N(%)/M(SD)
	14-21 days	23(18.70%)
	>21 days	10(8.13%)
Days of wound care per month	<=7 days	59(47.97%)
	7-14 days	21(17.07%)
	14-21 days	25(20.33%)
	>21 days	18(14.63%)
Days of incontinence care per month	<=7 days	96(78.05%)
	7-14 days	14(11.38%)
	14-21 days	8(6.50%)
	>21 days	5(4.07%)
Published paper in journals	Yes	75 (60.98%)
	No	48 (39.02%)
Research programs	Yes	59(47.97%)
	No	64(52.03%)

1

Table 2. Descriptive Statistics of Study Variables（N=123）

Category	Number of Items	Range of actual scores	Scores within this study	95% CI of actual scores
Career Success (CCSS)	11	15~55	39.07(8.36)	37.57,40.56
Career Satisfaction (CS)	5	9~25	18.72(4.30)	17.95,19.48
Perceived in Organization Competitiveness (PIOC)	3	3~15	10.64(2.61)	10.18,11.11
Perceived External Organization Competitiveness (PEOC)	3	3~15	9.71(2.80)	9.21,10.21
Core Competencies of WOCN (CCS-WOCN)	69	99~345	290.69(47.35)	282.24,299.14
Competency in specialized clinical practice (CSCP)	21	36~105	89.76(13.63)	87.33,92.20
Competency in critical thinking (CCT)	10	13~45	38.27(6.73)	37.07,39.47
Competency in health education (CHE)	11	11~55	47.18(8.14)	45.73,48.63
Competency in professional development (CPD)	12	22~65	51.23(10.79)	49.30,53.15
Competency in interpersonal communication (CIC)	7	7~35	30.07(5.23)	29.13,31.00
Competency in nursing management (CNM)	8	10~40	34.19(6.08)	33.10,35.27

Abbreviation: CCSS, Chinese Career Success Scale; CCS-WOCN, Core Competency Scale for Wound Ostomy Continence Nurses.

Table 3. Univariate Analyses of the Factors Associated with Career Success (N=123)

Category	Sum Scores Mean (SD)	t/F	p
Years of practice as a WOC nurse		1.944	0.378
<5	38.47(9.02)		
5-10	39.21(7.86)		
>10	41.25(6.48)		
Sex		0.464	0.658
Female	38.92(7.96)		
Male	41.43(14.14)		
Level of worked hospital		-1.766	0.077
Top grade hospital	39.54(8.56)		
Other hospital	36.47(6.79)		
Type of worked hospital		-1.251	0.211
General	39.39(8.47)		
Specialized	36.08(6.88)		
Certificated as a WOC nurse from		-0.183	0.854
school of WCET	39.12(8.66)		
National/Provincial Nursing Association	38.71(6.44)		
Work form of a WOC nurse		2.182	0.336
Full-time	41.62(5.59)		
Part-time and nurse manager	39.00(7.84)		
Part-time and clinical nursing/teaching	38.55(9.29)		
Scope of service		1.303	0.521
Across the hospital	39.44(7.44)		
Parts of department in hospital	39.95(9.65)		
In the department and other	37.53(9.54)		
Practice in stoma clinic		-0.864	0.388
Yes	39.38(8.70)		
No	38.00(7.14)		
Highest level of nursing education		2.492	0.288
Associate degree	41.25(2.50)		
Bachelor degree	38.51(8.47)		
Master and above	42.06(8.19)		
Professional title		1.258	0.533
Nurse	38.36(10.25)		
Senior nurse	38.77(8.68)		
Nurse supervisor or above	40.00(6.85)		
Working Position		1.533	0.125
Nurse	40.13(7.71)		
Head Nurse	38.02(8.90)		
In charge of WOC nurses' training		-2.233	0.026*
Yes	39.64(8.11)		

No	34.23(9.20)		
Joined in WOC nurses' professional conference		-2.027	0.043*
Yes	39.85(8.10)		
No	35.65(8.81)		
Participated in WOC nurses' continuing education		-2.198	0.028*
Yes	39.72(8.31)		
No	34.33(7.39)		
Days of stoma care per month		4.964	0.174
<=7 days	37.91(8.65)		
7-14 days	38.26(7.38)		
14-21 days	42.17(8.73)		
>21 days	41.50(6.11)		
Days of wound care per month		14.312	0.003*
<=7 days	36.31(8.08)		
7-14 days	40.05(8.69)		
14-21 days	42.24(8.09)		
>21 days	42.56(6.52)		
Days of incontinence care per month		4.557	0.207
<=7 days	38.27(8.59)		
7-14 days	41.00(6.66)		
14-21 days	43.25(8.17)		
>21 days	42.20(6.61)		
Published paper in journals		-1.140	0.254
Yes	39.69(7.95)		
No	38.08(8.97)		
Research programs		0.578	0.563
Yes	39.36(7.79)		
No	38.80(8.92)		

*P<0.05.

Table 4. Logistic Regression Analysis for Career Success (N=123)

Variable	Estimated	SE	Waldχ^2	p	OR	95%CI	
						Lower	Upper
Step 1							
Sum score of core competencies（ref=1）	0.795	0.225	12.527	0.000**	4.900	2.032	11.814
In charge of WOC nurses' training	0.961	0.546	3.099	0.078	6.834	0.804	58.084
Joined in WOC nurses' professional conference	-0.630	0.379	2.769	0.096	0.284	0.064	1.251
Participated in WOC nurses' continuing education	0.391	0.394	0.983	0.322	2.184	0.466	10.224
Days of wound care per month（ref=1）							
7-14 days	-0.255	0.417	0.893	0.345	1.733	0.554	5.424
14-21 days	0.409	0.395	4.883	0.027*	3.366	1.147	9.876
>21 days	0.652	0.465	5.027	0.025*	4.292	1.201	15.337
Step 2							
Competency in specialized clinical practice（ref=1）	-0.256	0.385	0.444	0.505	0.599	0.133	2.705
Competency in critical thinking（ref=1）	0.125	0.455	0.076	0.783	1.284	0.216	7.630
Competency in health education（ref=1）	-0.483	0.504	0.917	0.338	0.381	0.053	2.747
Competency in interpersonal communication（ref=1）	0.651	0.415	2.459	0.117	3.677	0.722	18.724
Competency in nursing management（ref=1）	0.139	0.404	0.119	0.730	1.321	0.272	6.425
Competency in professional development（ref=1）	0.892	0.416	4.591	0.032*	5.955	1.164	30.459
In charge of WOC nurses' training	1.049	0.553	3.596	0.058	8.147	0.932	71.217
Joined in WOC nurses' professional conference	-0.625	0.391	2.548	0.111	0.287	0.062	1.329
Participated in WOC nurses' continuing education	0.369	0.412	0.802	0.370	2.093	0.416	10.531
Days of wound care per month（ref=1）							
7-14 days	-0.375	0.463	0.655	0.418	1.423	0.398	5.080
14-21 days	0.343	0.416	0.680	0.409	2.917	0.939	9.056
>21 days	0.760	0.507	2.248	0.134	4.425	1.101	17.780

*P<0.05

**P<0.01

Figure 1 The scores of Career Success and Core Competency for minimum, maximum and actual scores and abbreviations are shown in table 2

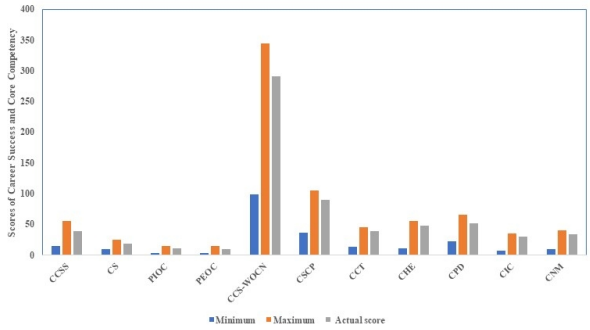

Figure 1

338x190mm (96 x 96 DPI)

Supplementary tables

Supplementary table 1. Logistic Regression Analysis for Career Satisfaction of Career Success (N=123)

Variable	Estimated	SE	Waldχ^2	p	OR	95%CI	
						Lower	Upper
Step 1							
Sum score of core competencies（ref=1）	0.8592	0.2391	12.9109	0.0003	5.576	2.184	14.237
Days of wound care per month（ref=1）							
7-14 days	-0.2093	0.4200	0.2484	0.6182	2.138	0.627	7.286
14-21 days	0.3370	0.3867	0.7597	0.3834	3.691	1.185	11.502
>21 days	0.8413	0.4348	3.7447	0.0530	6.112	1.725	21.66
Step 2							
Competency in specialized clinical practice（ref=1）	0.4784	0.3994	1.4346	0.2310	2.604	0.544	12.461
Competency in critical thinking（ref=1）	-0.3001	0.5137	0.3413	0.5591	0.549	0.073	4.110
Competency in health education（ref=1）	-0.5188	0.4985	1.0831	0.2980	0.354	0.050	2.501
Competency in interpersonal communication（ref=1）	1.0208	0.4255	5.7564	0.0164	7.703	1.453	40.830
Competency in nursing management（ref=1）	0.3071	0.3909	0.6172	0.4321	1.848	0.399	8.553
Competency in professional development（ref=1）	0.4069	0.4066	1.0015	0.3169	2.256	0.458	11.107
Days of wound care per month（ref=1）							
7-14 days	-0.4980	0.4615	1.1646	0.2805	1.589	0.423	5.971
14-21 days	0.2455	0.4384	0.3135	0.5755	3.343	0.946	11.814
>21 days	1.2139	0.5239	5.3685	0.0205	8.803	1.975	39.237

Supplementary table 2. Logistic Regression Analysis for PIOC of Career Success (N=123)

Variable	Estimated	SE	Waldχ^2	p	OR	95%CI	
						Lower	Upper
Step 1							
Sum score of core competencies（ref=1）	0.7578	0.2170	12.1954	0.0005	4.552	1.944	10.656
Working Position	-0.2854	0.2038	1.9616	0.1613	0.565	0.254	1.256
In charge of WOC nurses' training	-0.2681	0.2991	0.8036	0.3700	0.585	0.181	1.889
Participated in WOC nurses' continuing education	0.7131	0.4190	2.8965	0.0888	4.163	0.806	21.514
Step 2							
Competency in specialized clinical practice（ref=1）	-0.1412	0.3656	0.1493	0.6992	0.754	0.180	3.160
Competency in critical thinking（ref=1）	-0.0034	0.4405	0.0001	0.9938	0.993	0.177	5.584
Competency in health education（ref=1）	-0.3919	0.4533	0.7477	0.3872	0.457	0.077	2.699
Competency in interpersonal communication（ref=1）	0.5347	0.3743	2.0415	0.1531	2.914	0.672	12.636
Competency in nursing management（ref=1）	0.3105	0.3662	0.7186	0.3966	1.861	0.443	7.819
Competency in professional development（ref=1）	0.7360	0.3712	3.9320	0.0474	4.358	1.017	18.672
Working Position	-0.2996	0.2242	1.7862	0.1814	0.549	0.228	1.323
In charge of WOC nurses' training	-0.2595	0.3178	0.6667	0.4142	0.595	0.171	2.068
Participated in WOC nurses' continuing education	0.6768	0.4449	2.3145	0.1282	3.872	0.677	22.146

Abbreviation: PIOC, Perceived in Organization Competitiveness

Supplementary table 3. Logistic Regression Analysis for PEOC of Career Success (N=123)

Variable	Estimated	SE	Waldχ^2	p	OR	95%CI	
						Lower	Upper
Step 1							
Sum score of core competencies（ref=1）	0.6155	0.2120	8.4293	0.0037	3.424	1.492	7.861
Level of worked hospital (ref=1)	0.5973	0.3473	2.9580	0.0855	3.302	0.846	12.882
Days of wound care per month（ref=1）							
7-14 days	-0.2491	0.4037	0.3807	0.5372	1.262	0.411	3.875
14-21 days	0.6953	0.3816	3.3199	0.0684	3.244	1.142	9.219
>21 days	0.0354	0.4304	0.0068	0.9344	1.677	0.507	5.549
Step 2							
Competency in specialized clinical practice（ref=1）	0.2618	0.3198	0.6701	0.4130	1.688	0.482	5.912
Competency in critical thinking（ref=1）	-0.0402	0.4079	0.0097	0.9214	0.923	0.187	4.565
Competency in health education（ref=1）	-0.1673	0.4416	0.1436	0.7047	0.716	0.127	4.040
Competency in interpersonal communication（ref=1）	0.2196	0.3830	0.3288	0.5664	1.551	0.346	6.962
Competency in nursing management（ref=1）	-0.1344	0.3910	0.1181	0.7311	0.764	0.165	3.540
Competency in professional development（ref=1）	0.6238	0.3730	2.7974	0.0944	3.482	0.807	15.025
Level of worked hospital	0.6300	0.3826	2.7122	0.0996	3.526	0.787	15.796
Days of wound care per month（ref=1）							
7-14 days	-0.2713	0.4253	0.4070	0.5235	1.177	0.356	3.892
14-21 days	0.6340	0.3916	2.6210	0.1055	2.910	0.989	8.565
>21 days	0.0716	0.4482	0.0255	0.8730	1.659	0.473	5.820

Abbreviation: PEOC, Perceived External Organization Competitiveness

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3-5
Objectives	3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	5-6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6-7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	6-7
Bias	9	Describe any efforts to address potential sources of bias	12
Study size	10	Explain how the study size was arrived at	7
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7-8
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	7-8
		(*b*) Describe any methods used to examine subgroups and interactions	7-8
		(*c*) Explain how missing data were addressed	7-8
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	7-8
		(*e*) Describe any sensitivity analyses	7-8
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	5-6
		(b) Give reasons for non-participation at each stage	5-6
		(c) Consider use of a flow diagram	None
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	8
		(b) Indicate number of participants with missing data for each variable of interest	5-6
Outcome data	15*	Report numbers of outcome events or summary measures	8
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	8-9
		(*b*) Report category boundaries when continuous variables were categorized	8-9
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	8-9
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	None
Discussion			
Key results	18	Summarise key results with reference to study objectives	9-12
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	12
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	9-12
Generalisability	21	Discuss the generalisability (external validity) of the study results	9-12
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	12

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.