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Readiness Estimate and Deployability Index for Air Force Nurse Anesthetists

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*The views expressed in this article are those of the author and do not reflect the official policy or position of the United States Air Force, the Uniformed Services University of the Health Sciences, the Department of Defense, or the United States Government.


Key words: Readiness Anesthesia Military Nursing
Abstract

Air Force (AF) Certified Registered Nurse Anesthetists (CRNAs) play an important role in the support of the Global War on Terror. The purpose of the present investigation was to use an AF CRNA specific modification of the Readiness Estimate and Deployability Index revised for Air Force Nurses to assess readiness for deployment. Dimensions included (1) clinical competencies, (2) operational competencies, (3) soldier survival skills, (4) personal/psychosocial/physical readiness, (5) leadership and administrative support, and (6) group integration/identification. Readiness Skills Verifications for Air Force CRNAs were used to develop clinical competency questions. Two experts assessed validity, and reliability was evaluated using Cronbach's alpha. Available stateside AF CRNAs (N=105) were surveyed with a 60% response rate. Descriptive statistics described the sample and a mean score for each variable. Using a five point scale participants rated themselves an overall readiness score of 4.09, suggesting Air Force CRNAs perceive themselves ready to deploy.
Abstract

Air Force (AF) Certified Registered Nurse Anesthetists (CRNAs) play an important role in the support of the Global War on Terror. The purpose of the present investigation was to use an AF CRNA specific modification of the Readiness Estimate and Deployability Index revised for Air Force Nurses to assess readiness for deployment. Dimensions included (1) clinical competencies, (2) operational competencies, (3) soldier survival skills, (4) personal/psychosocial/physical readiness, (5) leadership and administrative support, and (6) group integration/identification. Readiness Skills Verifications for Air Force CRNAs were used to develop clinical competency questions. Two experts assessed validity, and reliability was evaluated using Cronbach’s alpha. Available stateside AF CRNAs (N=105) were surveyed with a 60% response rate. Descriptive statistics described the sample and a mean score for each variable. Using a five point scale participants rated themselves an overall readiness score of 4.09, suggesting Air Force CRNAs perceive themselves ready to deploy.
Introduction

Air Force (AF) certified registered nurse anesthetists (CRNAs) are experiencing an increase in operational tempo to support troops deployed in the Global War on Terror. As important members of the Expeditionary Medical Support (EMEDS), AF CRNAs must respond quickly anywhere in the world. Air Force medical teams must be light and mobile while maintaining speed and accuracy to be an effective force once on station. A measurement of readiness is potentially helpful to both the AF CRNA and AF leadership.

Reineck and colleagues\textsuperscript{1} developed the Readiness Estimate and Deployability Index (READI) to assess the Army nurse’s readiness to deploy. Dremsa et al.\textsuperscript{2} modified this instrument to develop the Readiness Estimate and Deployability Index Revised for AF Nurses (READI-R-AFN). Data from a pilot study supported the reliability and validity of the READI-R-AFN and was used to refine the instrument.\textsuperscript{2} However, the READI-R-AFN does not measure specific wartime skills for Air Force CRNAs. The purpose of the present investigation was to implement modifications to the READI-R-AFN to assess AF CRNAs readiness for deployment.

Research Question

What is the medical readiness of Air Force CRNAs for deployment?

Literature Review

A literature review lacked research involving AF CRNAs deployment readiness. The main focus of literature presented accounts of deployed CRNAs and anesthesiologists from the Vietnam War to the present. Most are centered on the experiences of British and Australian anesthesiologists.\textsuperscript{4,20} There are brief accounts of CRNAs preparing for duty in World War II.\textsuperscript{21} In past articles CRNAs have presented the
anesthetic care of combat casualties. CRNAs have also authored reviews and performed investigations on the Universal Portable Anesthesia Complete (UPAC, Datex-Ohmeda, Madison, WI). The UPAC is a drawover anesthesia delivery system currently used in deployed operations. In addition, CRNAs have performed investigations in the area of chemical warfare.

Military registered nurses have been the subject of recent studies regarding deployment and level of readiness. West and Clark interviewed 90 Army nurses who served during Operation Restore Hope in Somalia. The authors reported three primary lessons learned. The first is that despite all of the difficulties, the lack of supplies, discomfort, and danger, the Army nurses surveyed were always available to provide quality patient care. Second, the old methods of operation will not always work. Nurses must continue to be flexible and innovative in accomplishing their missions. They cannot expect everything in a peacetime hospital to be available in an austere theater of operation. The third lesson requires understanding that Army nurses are more than just nurses; they are also soldiers. To be the greatest asset, an Army nurse must know basic soldier skills such as use of weapons, personal defense, and field craft. West and Clark demonstrated that these experiences could serve to form a template for future operations. Haines and Weidenbach described the capabilities for providing health care of two rapid-deployment teams in disaster situations. The authors compared individual readiness of military providers to civilian disaster team planning. They suggested that clinical skills, overall health, potential stress reaction, and ability to withstand physical work are important considerations in disaster planning. The authors concluded that these factors have implications for readiness at the individual level.
Reineck and colleagues\textsuperscript{1} reported that historically, individual readiness was reduced to indicators such as weapons qualification, receipt of immunizations, possession of a will, and gas mask inserts. This approach of evaluating readiness is not adequate to support service member with more complex deployment issues. Reineck\textsuperscript{1} (2001) states “it is imperative to assist each service member with the more complex issues such as competency to use clinical nursing skills in an unfamiliar and austere environment with rudimentary equipment and numerous inherent personal and organizational stressors” (pg 255). Reineck’s study aimed to develop a systematic clarification of individual readiness so that measurements would become more representative of the concept.\textsuperscript{1}

Reineck and colleagues\textsuperscript{1} used a focus group technique to define individual readiness. Thirty participants with a broad range of deployment experience were divided into three groups. They were composed of active duty and reserve components. During the course of the study the following six inter-related components of individual readiness were identified by Reineck and colleagues.\textsuperscript{1} These dimensions include: (1) clinical competencies; (2) operational competency; (3) soldier survival skills; (4) personal/psychosocial/physical readiness; (5) leadership and administrative support; and (6) group integration and identification. Reineck’s group\textsuperscript{1} used the dimensions of individual readiness to develop, test, and revise the Readiness Estimate and Deployability Index (READI). The READI is an instrument that evaluates Individual Medical Readiness (IMR) of Army Nurse Corps personnel. They defined individual readiness as a dynamic concept with dimensions at the individual, group, and system levels. These dimensions influence one’s ability to prepare and carry out the mission.
Using standard test development, Dremsa et al. broadened Reineck’s work to develop the READI-Revised for Air Force Nurses (READI-R-AFN).\(^2\) Instrument development involved three phases. Phase I (initial Validation Phase) developed a prototype instrument. The prototype instrument was subjected to Phase II (Discriminative Validity) studies. Following completion of successful Phase II investigations, the instrument was tested for sensitivity to an intervention in Phase III (Comprehensive Field Validation). Results from the pilot study of Dremsa et al.\(^2\) indicated the READI-R-AFN was internally consistent (coefficient alpha 0.80 to 0.96 on the six dimensions). Dremsa et al.\(^2\) presented the READI-R-AFN as a reliable and accurate instrument to assess Air Force nurses level of readiness.

Method

Appropriate Institutional Review Boards approved the study. Through an ongoing working relationship with the author the investigators modified the READI-R-AFN.\(^2\) These modifications developed the READI for Air Force Nurse Anesthetists (READI-AFNA). The READI-AFNA contains all six dimensions of individual readiness identified by Reineck et al.\(^1\) and modified by Dremsa’s group.\(^2\) Clinical competency examines such skills as fluid resuscitation, total anesthesia care, regional anesthesia, and using the field anesthesia machine. Operational competency evaluates knowledge of the Law of Armed Conflict, setting up field sanitation, and hygiene. Soldier survival skills evaluate the ability to protect self and patients, knowledge of status under the Geneva Convention, and decontamination procedures if exposed to chemical or biological agents. Personal/psychosocial/physical readiness evaluates the ability of support systems to meet psychosocial needs, manage stress, and status of personal finances. Leadership and
administrative support evaluates perception of military regulations, level of
independence, and ability to serve in a leadership position. Group integration and
identification evaluates the capacity to deal with crowded quarters and perception of unit
mission and values. The variables are measured using an ordinal scale, ranging from one
(“not competent” or “totally disagree”) to five (“totally competent” or “totally agree”).
Scores from these six dimensions indicate the AF nurse’s overall perceived state of
readiness for deployment.²

The clinical competencies section of the READI-R-AFN was revised using the
Readiness Skills Verifications for Air Force Specialty Code 46M3 (AF CRNAs).³ These
questions regarded total anesthetics, complex/trauma cases, arterial and central venous
catheter placement, management of complicated airways, regional anesthesia, field
equipment, extreme environments, advanced cardiac life support, and care for nuclear,
biological, and chemical casualties.

To assess content validity, two experts reviewed the READI-AFNA. These
experts were two senior Air Force CRNAs that have been deployed at least 2 times for
periods greater than 3 months. To determine relevancy to deployment each question was
rated on a five-point ordinal scale. All clinical competencies questions received a
relevancy score of five from both experts. This suggests that the clinical competencies
section is relevant to deployment situations. Of the remaining sections only three
questions received a score of three or less by both experts. These questions involve
aeromedical evacuation procedures, knowledge about capacity of Levels of Care, and
ability to protect self and patient if called upon to do so. Although aeromedical
evacuation procedures received a low score, one expert noted that his deployed location
evacuated approximately 500 patients. This question remained because he assisted in securing the airway of some critical patients being evacuated. The question concerning Level of Care received a score of one by both experts. They commented that CRNAs would do what needs to be done regardless of resources available. This question was included after experts agreed that knowledge about resources would better prepare CRNAs to function at any level. The ability to protect self and patient if called upon to do so received scores of three and one. This question remained given that both experts carried small arms while deployed.

The READI-AFNA was used to survey all available active duty Air Force CRNAs (N=105) serving within the Continental United States (CONUS). Surveys were mailed to chief nurse anesthetists who distributed them at seventeen Air Force medical treatment facilities. Completing the survey implied consent and confidentiality was maintained by returning each survey individually. The return rate was 60%.

Dremsa et al.\textsuperscript{2} indicated the READI-R-AFN was internally consistent (coefficient alpha 0.80 to 0.96 on the six dimensions). Reliability of the present survey was evaluated in the same fashion. The READI-AFNA was evaluated for internal consistency using a test-retest method. Ten percent of respondents were retested two weeks after completing their initial survey. The coefficient alpha was 0.78 to 0.88 for the following dimensions: clinical competency (modified from the READI-R-AFN), operational competency, soldier survival skills, and personal/psychosocial/physical readiness. The coefficient alpha for solely those questions assessing clinical competency was 0.58. The coefficient alpha for leadership and administrative support and group
integration and identification were 0.35 and 0.63, respectively. These lower measures of reliability (coefficient alpha less than 0.70) may be explained by the small sample size.

Results

The demographics of the sample are described in Table I. Sixty-eight percent of respondents were field grade officers. Thirty-seven of the respondents have previously deployed, while twenty-six have never deployed. The range of the mean and standard deviation of all items are contained in Table II. The mean scores and the overall average are presented in Table III. This overall average represents the general level of medical readiness. From responses in all 6 categories participants rated themselves a readiness score of 4.094 out of 5.

Discussion

The results of this investigation indicate that the AF CRNAs who responded to the survey perceive themselves ready to deploy. A comparison of the range of the means and standard deviations of the sample surveyed by Dremsa et al.² (Table IV) suggest AF CRNAs perceive they are more prepared to deploy compared to AF nurses. Caution must be used in comparing these results since different samples were surveyed. In addition the READI-R-AFN was modified for the current investigation.

Further review of the data analyzed the effects of deployment and field medical training on the perceived level of readiness. A comparison was performed between AF CRNAs who have deployed and never deployed. The overall readiness score of those who had deployed was slightly higher (mean 4.16, SD 0.80) compared to AF CRNAs who have never deployed (mean 3.99, SD 0.90). Deployed CRNAs who have attended EMEDS field training (n = 15) reported a slightly higher score compared to deploy
CRNAs without this training (mean 4.24, SD 0.77; mean 4.11 SD 0.81, respectively).

This data demonstrates that prior deployment experience improves the perceived level of readiness. Furthermore, those who have deployed are a valuable resource for those preparing to deploy for the first time. The data also suggests that EMEDS training has a positive effect on readiness.

Evaluation of the clinical competencies offered an area to consider. There is a disparity in the competency level to operate the two field anesthesia devices. These devices are the UPAC and the Narcomed M field anesthesia machine. The UPAC is the principal device used in forward locations. AF CRNAs rated their competency level of using the UPAC a mean score of 3.6 (SD 1.15) in contrast to 4.5 (SD 0.86) for the Narcomed M. A potential explanation is the UPAC is not routinely used in peacetime operations. This is because without modification it lacks some standard monitoring capabilities. The Narcomed M however is utilized daily by non-deployed CRNAs. It is essentially a more mobile version of any modern anesthesia machine. This finding may encourage AF leadership to provide funds and personnel to develop routine and realistic UPAC training.

Despite a mean overall readiness score of 4.09, further reviews of the data suggest areas for improvement. Operational competencies and soldier/survival skills reported a mean score of less than 4.0. These findings indicated the need to increase training in the areas of chemical warfare, aeromedical evacuation, field communications, and leadership and administration.
This investigation was conducted with the following limitations that should be addressed in future investigations. First, this is a self-evaluation. AF CRNAs may inaccurately perceive themselves ready to deploy. Second, due to time constraints the state of readiness of many AF CRNAs is unknown. These include all CRNAs stationed overseas and the 42 CONUS CRNAs that did not respond to the survey. Third, only two experts evaluated the READI-AFNA for content validity. Fourth, due to time constraints, the authors were not able to pilot the READI-AFNA. And finally, the omission of inquiries about attending training at a Center for Sustainment of Trauma and Readiness Training, this program offers AF CRNAs who are near deployment, real-life trauma training at a busy urban trauma center. AF CRNAs attending this program may perceive themselves more ready to deploy.

The READI-AFNA has the potential to be used in future investigations. The instrument could be used to compare CRNAs perception of readiness with supervisor evaluation during simulated deployment scenarios. Field training could be evaluated by completing the READI-AFNA before and after instruction to estimate the efficacy of the intervention. AF CRNAs should be surveyed routinely so results can be used in a longitudinal fashion to improve the level of readiness. In addition, inclusion of AF reserve CRNAs is important to assess the total force concept. And finally the instrument could establish readiness on a larger scale with refinement to other medical AFSCs and all military branches. Furthermore, refinement of the instrument should be conducted to address the reliability concerns for those dimensions that exhibited a coefficient alpha less than 0.70.
Conclusion

AF CRNAs must be ready to deploy to support the Global War on Terror. While this research demonstrates AF CRNAs perceive themselves ready to deploy, there are opportunities for improvement. This investigation has provided AF leadership with an accurate level of deployment readiness that may assist in shaping future CRNA training.
References


<table>
<thead>
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<th>Characteristic</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>63</td>
</tr>
<tr>
<td>Nursing experience (years)</td>
<td>16.7 ± 5.62</td>
</tr>
<tr>
<td>Nurse anesthesia experience</td>
<td>Not Assessed</td>
</tr>
<tr>
<td>Age (years)</td>
<td>41.6 ± 5.97</td>
</tr>
<tr>
<td>Sex, frequency (%)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>43 (68%)</td>
</tr>
<tr>
<td>Female</td>
<td>20 (32%)</td>
</tr>
<tr>
<td>Grade, frequency (%)</td>
<td></td>
</tr>
<tr>
<td>Lieutenant Colonel</td>
<td>10 (16%)</td>
</tr>
<tr>
<td>Major</td>
<td>33 (52%)</td>
</tr>
<tr>
<td>Captain</td>
<td>20 (32%)</td>
</tr>
<tr>
<td>Prior deployment, frequency (%)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>37 (59%)</td>
</tr>
<tr>
<td>No</td>
<td>26 (41%)</td>
</tr>
<tr>
<td>Number of prior deployments</td>
<td>1.95 ± 1.1</td>
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<tr>
<td>Anesthetics performed per deployment</td>
<td>21.6 ± 18.4</td>
</tr>
</tbody>
</table>

Data are presented as means ± SD and frequency and percent.
Table II

READI-R-AFNA

NUMBER OF ITEMS, MEAN and STANDARD DEVIATION FOR EACH ITEM

<table>
<thead>
<tr>
<th>Subscale</th>
<th>No. of Items for Each</th>
<th>Mean Item Subscale</th>
<th>Range</th>
<th>SD Range</th>
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<tr>
<td>Clinical competency</td>
<td>11</td>
<td>3.60-4.90</td>
<td>1.15-0.25</td>
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<tr>
<td>Operational competency</td>
<td>7</td>
<td>3.60-4.06</td>
<td>0.99-0.80</td>
<td></td>
</tr>
<tr>
<td>Soldier/survival skills</td>
<td>8</td>
<td>3.22-4.40</td>
<td>1.01-0.73</td>
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<tr>
<td>Personal/psychosocial/physical readiness</td>
<td>6</td>
<td>4.30-4.70</td>
<td>1.03-0.47</td>
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</tr>
<tr>
<td>Leadership and administrative support</td>
<td>5</td>
<td>3.33-4.32</td>
<td>1.01-0.75</td>
<td></td>
</tr>
<tr>
<td>Group integration and identification</td>
<td>6</td>
<td>3.09-4.45</td>
<td>1.20-0.79</td>
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<tr>
<td>READI-R-AFN total</td>
<td>43</td>
<td>3.09-4.9</td>
<td>1.01-0.25</td>
<td></td>
</tr>
</tbody>
</table>
### Table III

**READI-R-AFNA**

**MEAN DIMENSION SCORES**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Mean Score</th>
<th>SD</th>
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<tbody>
<tr>
<td>Clinical competency</td>
<td>4.38</td>
<td>0.68</td>
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<tr>
<td>Operational competency</td>
<td>3.73</td>
<td>0.85</td>
</tr>
<tr>
<td>Soldier/survival skills</td>
<td>3.93</td>
<td>0.84</td>
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<tr>
<td>Personal/psychosocial/physical readiness</td>
<td>4.62</td>
<td>0.66</td>
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<tr>
<td>Leadership and administrative support</td>
<td>3.78</td>
<td>1.66</td>
</tr>
<tr>
<td>Group integration and identification</td>
<td>4.01</td>
<td>0.86</td>
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<tr>
<td>READI-AFNA total</td>
<td>4.09</td>
<td>0.88</td>
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Table IV

RESULTS of PILOT STUDY of READI-R-AFN

NUMBER OF ITEMS, MEAN AND STANDARD DEVIATION FOR EACH ITEM²

<table>
<thead>
<tr>
<th>No. of Items for Each Subscale</th>
<th>Mean Item Range</th>
<th>SD Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical competency</td>
<td>28</td>
<td>2.0-4.4</td>
</tr>
<tr>
<td>Operational competency</td>
<td>9</td>
<td>2.7-4.1</td>
</tr>
<tr>
<td>Soldier/survival skills</td>
<td>10</td>
<td>2.7-3.6</td>
</tr>
<tr>
<td>Personal/psychosocial/physical readiness</td>
<td>24</td>
<td>3.5-4.8</td>
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<tr>
<td>Leadership and administrative support</td>
<td>6</td>
<td>4.5-4.8</td>
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<tr>
<td>Group integration and identification</td>
<td>6</td>
<td>3.2-4.7</td>
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<tr>
<td>READI-R-AFN total</td>
<td>83</td>
<td>2.0-4.8</td>
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