

Performance Improvement Assessment of the Interservice Physician Assistant Program (IPAP)

L Fulton, A David Mangelsdorff, L Bewley, W Tozier, J Belote

Citation

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Abstract

Purpose. The Interservice Physician Assistant Program (IPAP) located at Fort Sam Houston, Texas, provides the education for the majority of all Army, Navy, and Air Force physician assistants. As such, ensuring that program maintains premier performance to support combat and peacetime healthcare is vital to the interests of the Department of Defense. To support this mission, an analysis of structure, process, and outcomes for the program was conducted using survey data and Physician Assistant National Certifying Examination (PANCE) scores. **Methods.** Methods employed included Chi Square analysis, regression, small multiple comparisons. Graphical and statistical results provided evidence of program strengths and weaknesses. **Results.** Analysis of survey data (33% response rate) revealed that students who had graduated four or more years ago were more likely to self-report that IPAP prepared them for clinical work (Chi-Square = 8.16, $p < .006$, Odds Ratio: 3.1:1). Students reported high-confidence in the disciplines of EENT, orthopedics, and dermatology as well as low-confidence in hematology and dentistry. Analysis of performance deltas provided statistically significant and practically relevant results ($F(16,48) = 17.59$, $p < .001$, adj. $R^2 = .806$). IPAP student first-time test-takers routinely performed above the national average; however, performance in recent years has declined. Areas of strength identified in the analysis included EENT and dermatology confirming student self-assessments. One area of weakness identified was psychiatry and behavioral health. **Conclusions.** Based on the analysis of structure, process, and outcome, IPAP leadership is evaluating specific performance improvement initiatives to maintain program strengths and address weaknesses.

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INTRODUCTION

The Interservice Physician Assistant Program (IPAP) located at Fort Sam Houston, Texas, provides the education for the majority of all Army, Navy, and Air Force physician assistants. Ensuring that program maintains premier performance to support combat and peacetime healthcare is vital to the interests of the Department of Defense. IPAP began as an Army-only program for training physician assistants in 1972 [1], and became a tri-service (Army, Air Force, and Navy) program in 1996. The program, similar to other physician assistant education programs, consists of a didactic year with three trimesters followed by 53 week rotations in one of 20 medical facilities.[2] Unlike typical programs which are composed mainly of women [3], the majority (nearly 80%) of IPAP's attendees are male. The

program awards a Master of Physician Assistant Studies degree in conjunction with the University of Nebraska. [4]

This study evaluates structure, process, and outcome measures of the IPAP as part of performance improvement initiatives. Three management questions provide the basis for this research.

Structure: Is the students' perceived preparation for their career related to military pay grade at entry, service component, prior field service, and recency of graduation?

Process: What topic areas are perceived by students to be strengths and weaknesses?

Outcome: Are there differences in performance on the Physician Assistant National Certifying Examination (PANCE) over time and by discipline area for IPAP first-time test takers versus all first-time test takers?

Physician assistant educators might benefit from both the structure of this analysis and the methods employed to

evaluate program efficacy.

Some analysis of IPAP performance exists in the literature. A previous study of IPAP (1998 through 2002) revealed that overall pass rates of first-time test-takers on the PANCE were higher than civilian programs.[5] The results are not surprising as programs that award master degrees such as the IPAP typically perform better [6]. An earlier study of IPAP performance used variables internal to the program to forecast PANCE scores. The study of 88 students from (1996 data) indicated that certain demographic variables (including military component and grade) influence performance.[7] Expanding the work of these authors through mixed methods provides richness and serves to identify specific program strengths and weaknesses.

Two data sources provided address the study questions. The first source was a survey of resident students and alumni conducted by IPAP leadership. The survey targeted program attendees, 2003 through 2007. The population for this study was 1,019 students, and 341 submissions were usable (33%) out of the 350 submitted. The second source of data was PANCE mean percentage scores by year and by discipline. The IPAP leadership maintained performance scores for each graduating class in each of 13 specialty areas along with national averages. The data available spanned 5 years and provided $5 * 13 = 65$ relevant observations.

METHODS

For the first study question (perceived preparation as related to structural variables), the dependent variable is defined as students' perceived preparation as noted by an "agree" or "strongly agree" with the statement, "The IPAP adequately prepared me for military clinical practice." The dependent variable is a Bernoulli trial. The independent variables of interest follow.

Military grade prior to entering the course: {E4 - E5 = 1, E6-E8 = 2, Officer = 3}

Service component: {Army, other than Army}

Prior service in deployable units (field time), self-reported: {no, yes}

Recency of graduation: {<4 years = 0, >=4 years = 1}

Perceived preparation is then a function of rank, service component, prior field service, and recency of graduation. Based on the categorical nature of all variables, the methods selected were simple Chi Square testing and odds ratio

analysis.

The second research question regarding program strengths and weaknesses lends itself to graphical and statistical descriptive analysis. One of the important questions about the process involves self-reported student confidence in performing clinical skills in various disciplines. The question assesses 23 separate clinical areas and is indicated by a yes / no response to the following question. "Did you feel confident to practice in the following clinical areas after graduating from the IPAP?"

The third study question involves PANCE performance by discipline and by year. The dependent variable is the IPAP PANCE mean percentage score by discipline by year minus the overall PANCE mean percentage score by discipline by year for the years 2003 through 2007 (delta scores). This difference reflects the positive or negative delta in performance of the IPAP first-time test takers. The independent variables follow.

Year of examination: {2003, 2004, 2005, 2006, 2007}, each coded as separate Bernoulli trials

Specialty score: scores associated with 13 disciplines of the PANCE, each coded as separate Bernoulli trials

Small multiple graphs [9] of delta scores by specialty and over time provide a clear picture of program strengths and weaknesses. The PANCE delta scores are also modeled as a function of sub-specialty score and year to provide statistical information regarding coefficient size and statistical significance. The method employed is regression.

RESULTS

Table 1 provides the descriptive statistics for the structure analysis (perceived preparation as related to structural variables). Of the survey respondents, 92.4% indicated that they felt prepared for clinical practice, which is an excellent indicator of program performance. About 75.7% of the respondents had "field" time (assignments to units that might deploy) prior to attendance. About 69% of the respondents were Army (compared to 58% of the total population) and 70% were within four years of graduation. Most of the sample (57.0%) was mid-careerists (E6-E8).

Figure 1

Table 1. Descriptive statistics for the structural analysis follow.

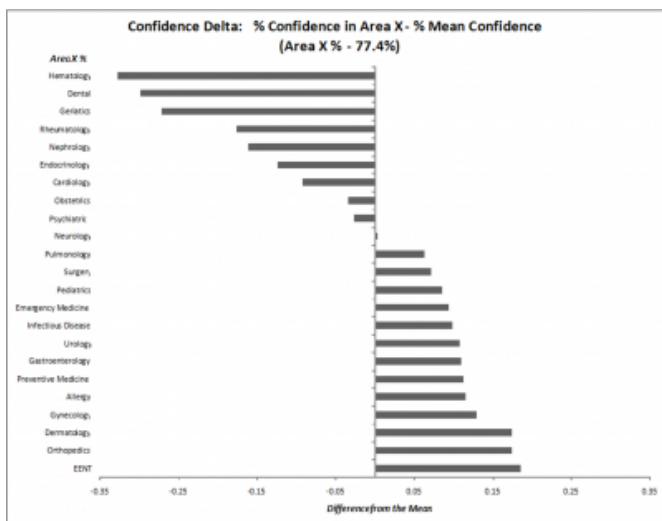
	Prepared?	Field time?	Army?	Within 4 Years of Graduation?	Grade
Mean	92.4%	75.7%	68.9%	70.0%	E4-E5: 32.2%
Std Dev	26.6%	43.0%	46.4%	45.9%	E6-E8: 57.0%
n	341	362	363	363	Officer: 10.7% n =363

Chi Square analysis and odds ratio analysis reveal only one variable of statistical relevance. Recent graduates (those within four years of graduation) are more likely to self-report that they are not prepared for clinical practice (odds ratio, 3.1 : 1, Chi Square = 8.16, $p < .006$). Some explanations for this phenomenon may be that opinions change over time, or the program may have been more rigorous in previous years. Other variables (including service component, grade, and field time) have no statistically or practically relevant associations.

The process analysis evaluated students' self-reported confidence in performing tasks related to 23 separate disciplines. The mean confidence for all tasks is 77.4%. Figure 1 illustrates differences between confidence in each area versus the grand mean confidence for all areas (see Figure 1). The top three strengths reported by students are in the fields of eye, ear, nose, and throat (EENT); orthopedics; and dermatology. Less than 50% report confidence in two areas, hematology and dentistry. The psychiatric discipline is below the mean confidence level and reappears prominently in the outcome analysis.

Figure 2

Figure 1. Mean percent confidence differences by area from the grand mean are illustrated on this chart.



For study question 3, descriptive analysis of PANCE delta scores indicates normality, both visually and via statistical testing (Kolmogorov-Smirnov test, $p = .143$). The mean delta score of 2.9% indicates that students in IPAP generally outperform the national average (3.0% standard deviation.) Figure 2 illustrates the differences in scores by specialty area. Only one area (psychiatric / behavioral medicine) scores below the national mean.

Figure 3

Figure 2: IPAP examination scores minus the national mean scores illustrate that students in the program score well on all but one section (psychiatric / behavioral medicine.)

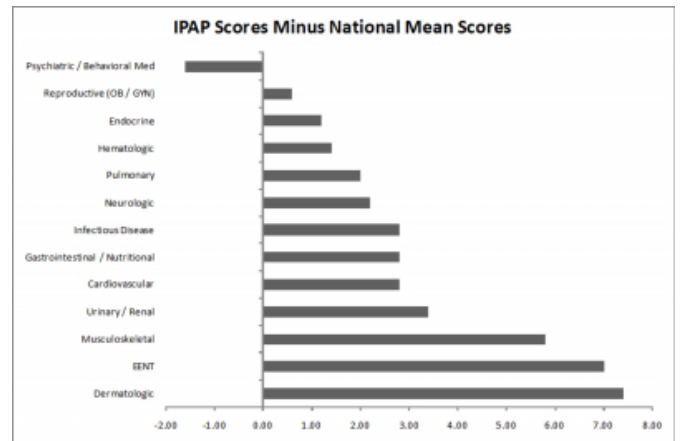


Figure 3 provides a scatterplot of the difference of IPAP student scores from the national mean over time. The program mean scores remain above the national mean but have declined in recent years.

Figure 4

Figure 3. Over the past five years, IPAP scores have remained above the national mean scores but are declining.

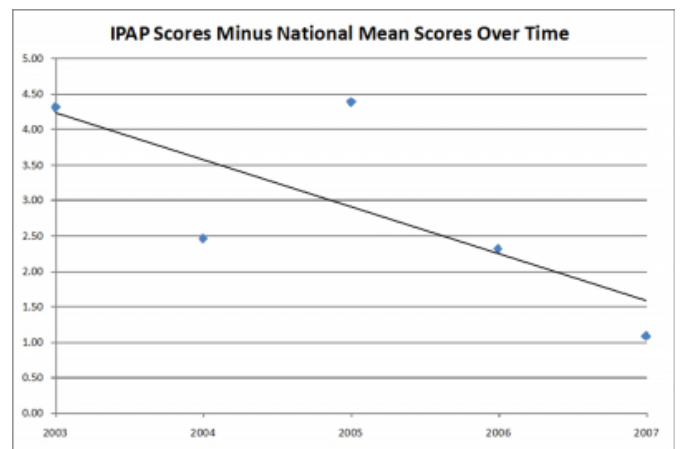
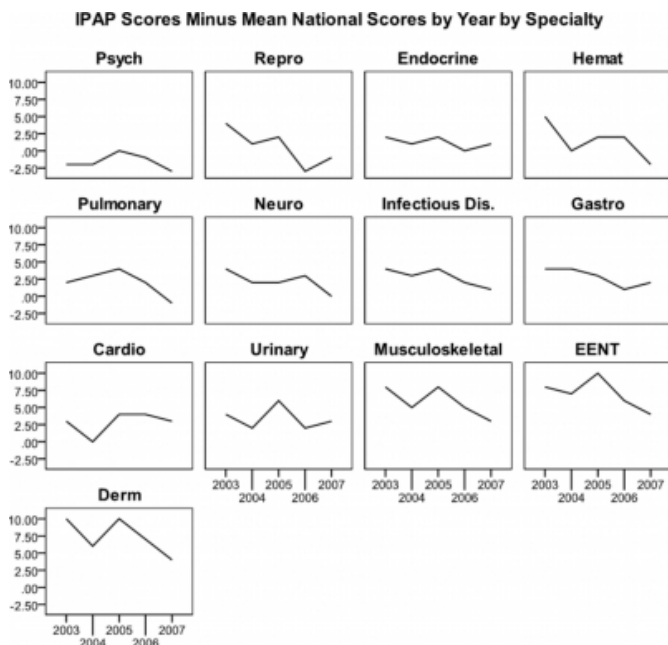


Figure 4 provides a final look at the performance trend by year and by discipline area. This chart indicates that students have not performed above the mean score on the psychiatric

section of the exam from 2003 through 2007.

Figure 5

Figure 4. The final figure for the outcome analysis (arranged from lowest delta scores for each specialty to highest) provides interesting insight into outcomes.



A regression analysis of the IPAP delta from the national mean scores using binary variables for years (with 2003 as the base year) and binary variables for each discipline score (with the reproductive discipline as the base due to its proximity to the national mean) resulted in a significant model ($F(16,48) = 17.59, p < .001$, see Table 2) that captured 80.6% of the variance (adjusted R^2).

Figure 6

Table 2. The standard ANOVA table for the outcome regression model of PANCE delta scores follows.

	df	SS	MSE	F	p
Regression	16	493.323	30.833	17.593	<.001
Residual	48	84.123	1.753		
Total	64	577.446			

Table 3 provides the coefficient estimates which should be interpreted as variable contributions to the delta scores. The estimates by discipline illustrate that student performance on the dermatological, EENT, musculoskeletal, gastrointestinal / nutritional, and cardiovascular portions of the national exam have significant and positive effects on the overall exam score deviations. The psychiatry / behavioral medicine component is negative, statistically significant, and large (practically relevant). Significant and negative effects exist for years 2004, 2006, and 2007. The decline over time requires additional analysis.

Figure 7

Table 3. The coefficient estimates for each variable follow.

Variable	Coefficient	Std. Error	t	p
(Constant)	2.000	.677	2.954	.005
*** Dermatological	6.800	.837	8.122	.000
*** EENT	6.400	.837	7.644	.000
*** Musculoskeletal	5.200	.837	6.211	.000
** Urinary / Renal	2.800	.837	3.344	.002
* Infectious Disease	2.200	.837	2.628	.012
* Gastrointestinal / Nutritional	2.200	.837	2.628	.012
* Cardiovascular	2.200	.837	2.628	.012
* Psychiatric / Behavioral Med	-2.200	.837	-2.628	.012
*** Y 2007	-3.231	.519	-6.222	.000
*** Y 2006	-2.000	.519	-3.852	.000
** Y 2004	-1.846	.519	-3.555	.001
Neurological	1.600	.837	1.911	.062
Pulmonary	1.400	.837	1.672	.101
Hematological	.800	.837	.955	.344
Endocrine	.600	.837	.717	.477
Y 2005	.077	.519	.148	.883

***p<.001, **p<.01, *p<.05

DISCUSSION

This study provides insight into the IPAP program in several ways. First, students responding to the survey who graduated more than four years ago report improved opinions of preparedness over newer graduates. The reasons for this difference are unknown but might be linked to changes in graduate perceptions or program content. Secondly, the IPAP pass rate on the PANCE exceeds the national rate but has declined in recent years. This decline is particularly noted in 2006 and 2007. Additionally, the IPAP students perform in superior fashion on the dermatology and EENT components of the PANCE; however, some concern should be placed on the psychiatric / behavioral medicine component. Future work will continue to focus on measuring and improving structure, process, and outcomes.

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Author Information

Lawrence V. Fulton, PhD

Department of the Army United States of America, U.S. Army Graduate Program in Health and Business Administration

A David Mangelsdorff, PhD

Department of the Army United States of America, U.S. Army Graduate Program in Health and Business Administration

Lee Bewley, PhD

Department of the Army United States of America, U.S. Army Graduate Program in Health and Business Administration

William L. Tozier, PA-C, MPH, Ph.D.

Director, Department of the Army United States of America, Interservice Physician Assistant Program

Janna Belote, MSc

Department of the Army United States of America, Department of Veterans' Affairs