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ORIGINAL RESEARCH

Idaho Rural Family Physician Workforce Study: the Community Apgar Questionnaire

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A B S T R A C T

Context: Community factors of varied importance help determine the success of achieving and maintaining a physician workforce. The purpose of this study was to develop an evaluation instrument (Community Apgar Questionnaire) useful to rural Idaho communities' in their assessment of the assets and capabilities related to physician recruitment and retention.

Methods: A quantitative scoring interview instrument was developed based on a literature review, site visits and discussions with rural physicians and hospital administrators. A total of 11 rural Idaho communities differing in geography and other known variables were selected, some identified historically to have more success in recruitment and retention (α communities) and some historically noted to have more challenges (β communities). In each community, the administrator of the hospital and the physician with recruiting responsibilities participated individually in a structured interview.

Results: A total of 11 physicians and 11 CEOs participated in the study. Differences were found across and within classes of factors associated with success in physician recruitment and retention where alpha communities scored higher on Community Apgar Questionnaire metrics. Some differences were noted by respondent class. Cumulative mean Community Apgar scores are higher in communities that have historically better track records in recruitment and retention.

Conclusion: The Community Apgar Questionnaire seems to discriminate between communities with differing assets and capabilities, based on historical community-specific workforce trends. This assessment may allow for identification of both



modifiable and non-modifiable factors and also may suggest which factors are most important for a community with limited available resources to address.

Key words: family medicine, rural community development, rural medicine, rural physician recruitment and retention, USA.

Introduction

Despite of the amount of effort spent increasing the number of physicians in rural communities in the USA, recently published reports indicate the rural physician shortage continues^{1,2}. The Matriculating Student Questionnaire (MSQ) is a survey that is distributed to all first-year medical students in the USA prior to starting medical school³. Career plans reported on the MSQ are shown to be a significant predictor of practice type and location⁴. Findings from the 2008 MSQ revealed that only 2.3% of the responding students were planning to serve in a rural area⁵. Although the last 3 years of MSQ data illustrates a steady trend, the number of physicians per rural resident is expected to decline as the 'baby boomer' generation starts to age and require more medical attention. The United States Census Bureau predicted that the US population of those aged 65 years or older will increase by 60% between 2000 and 2030⁶.

This rural physician shortage trend will especially affect the state of Idaho due to its unique geographic and demographic characteristics. Idaho is a rural state with 32 of its 44 counties considered rural⁷. During the year 2008, 52.4% of the residents of Idaho lived in these rural counties^{7,8}. Of the 44 counties, 30 have one or more designated primary care shortage areas⁹. The American Medical Association reported that 17.4% of Idaho residents live in a designated primary care shortage area, and this is among the nation's highest for any state¹⁰.

Rural Idaho also has pre-existing physician access and shortage issues. In 2007, Idaho had the second lowest total number of physicians among the 50 other states². Approximately two physicians are available to provide

services to 1000 Idaho residents, which is 44% below the national average². Idaho also has the sixth oldest physician workforce in the country, and 40% of Idaho physicians who are registered with the AMA were aged 55 years or older². With a large projected population growth, especially among persons 65 years or older, Idaho will experience a significant decrease in its physician workforce due to retirement, and a substantial increase in the number of residents with greater medical needs. The American Academy of Family Physicians identified Idaho as one of the 5 states that would face serious shortages of family medicine physicians by 2020¹.

Idaho is one of the 6 states that do not have at least one medical school². Without a medical school in Idaho, the state ranks 48th in the nation of the number of first-year medical school seats per capita¹¹. Idaho is currently limited to a total of 4 residency programs total with 2 rural training tracks. A previous study reported that graduates of such an immersion training program subsequently returned to their communities as medical staff¹². Rural Idaho communities are already limited, in contrast to their counterparts that have greater access with medical school and/or residencies when recruiting physicians. Consequently, recruitment and retention strategies become critical to addressing physician shortage problems in Idaho, and communities are anxious to better understand the factors involved. In the setting of limited resources, appreciating their relative importance from the physician's perspective is crucial. The ability to recruit and retain physicians directly affects the ability to provide adequate services to the community¹³.

The recruitment and retention of physicians in rural areas is affected by many factors, which can be conceptualized into 5 classes: geographic, financial, scope of practice, medical support, and hospital and community support.



Geographic class factors include spousal satisfaction in the community which has been identified as one of the most important factors impacting physician recruitment and retention in rural areas¹⁴⁻¹⁷. Another important geographic factor is proximity to extended family^{14,17}. Climate or geographic features as well as recreational facilities had a positive influence on physician practice location¹⁴. Other geographic characteristics that influence practice location choices include an access to a variety of social activities, close distance to larger cities, cultural opportunities, shopping, being raised in a rural area and the education system^{14,15,18-20}.

Financial class issues affect physicians' decisions on their practice location. In one study, over 70% of the responding medical students indicated that guaranteed income is important, and approximately 35% responded that long-term earning potential is one of their top three priorities when deciding whether to enter rural practice¹⁷. The mixture of payors influences physicians' current and potential income and is a factor influencing physician practice in rural areas^{15,18,21,22}. Financial incentive programs such as federal loan waivers and bonus reimbursements are often available to physicians who choose to practice in rural areas, especially in health professional shortage areas¹⁸. Other significant financial factors predicting location of practice include employment status and part-time opportunities^{14,18,23}.

Scope of practice class factors influence medical practices locations in rural areas. Type of practice was rated a very high priority among family physicians¹⁴. Physicians practicing in rural areas tend to provide a broad scope of practice^{24,25}. This broad scope of practice may include practice differences from their more urban counterparts²⁶⁻²⁸. Rural practice also provides less competition and more clinical independence²¹. Other significant factors related to scope of practice include teaching opportunities, supervision of other health professionals, and emergency room coverage^{14,18,21,24}.

Medical support class factors are important when physicians decide where to locate their practice. The working hours

required for practice was identified as one of the top 10 most influential factors of current practice location, and it was significantly more important to female physicians¹⁴. A connection between rural practice location and long working hours is also reported in other studies^{18,20,22,24}. Call responsibilities have also been identified as an important factor^{15,16,28,29}. Specialist and other health professional availability is another factor influencing choice of a practice location^{14,15,18,19}. Other medical support factors reported in previous studies include familiarity with medical community and resources, recruitment by colleagues, vacation and leisure time, and competent medical staff^{14,18,21}.

Hospital and community support class factors influence choice of practice location. Professional development opportunities are important factor for physician decisions on practice location^{14,17}. Funded learner-driven continuing medical education (CME) is also important to recruiting and retaining more physicians in rural communities^{16,17}. Perceived medical need in a community has also been recognized as an important factor^{14,17,21}. Technology, hospital equipment and facilities are other important factors for physicians' practice location preference^{14,16,19}. Other hospital and community support factors identified in previous studies are the hospital's proactive vision for the future, flexibility of the hospital, relationship with patients and colleagues, number of hospital beds, housing allocation, and plans for capital investment^{17-19,30}.

The number of published reports that documented successful case studies and/or strategies regarding rural physician recruitment is limited. Many previous studies extensively explored ways to increase the overall number of rural physicians; however, these studies' results may not be applicable in terms of increasing physician workforce in a particular rural community. As a result, many hospitals and communities still rely on expensive physician recruitment firms and/or their own experience-based recruitment strategies. Without having an opportunity to identify their communities' assets and capabilities of physician recruitment and retention, rural hospitals and communities



with a historical challenge in recruitment and retention of physicians continue to experience physician shortage problems. Comparative analysis with peers can be difficult, and addressing biases within the community or between physicians and administrator views can be unintentional barriers.

The purpose of this study was to develop an evaluation instrument useful to rural Idaho communities' in their assessment of assets and capabilities related to physician recruitment and retention. Just as the Apgar score is used to quantify resources and capabilities of the newborn that are indicative of current functioning, the Community Apgar Questionnaire (CAQ) seeks to serve the same purpose for family physician recruitment to rural communities. The results of this study may help rural Idaho hospitals and communities to find improvement opportunities for recruitment and retention strategies.

Methods

This research was approved by the Boise State University Human Subjects Institutional Review Board.

Survey development

The CAQ was developed by the researchers based on literature reviews, site visits to rural Idaho communities, and discussions with rural physicians and hospital administrators. The CAQ consists of 5 major classes that are associated with the success level of recruitment and retention of physicians. These classes were identified to be:

- geographic
- economic
- scope of practice
- medical support
- hospital and community support.

Each class consists of 10 detailed factors on which respondents were asked to rate their advantage and

importance level. The CAQ also included 3 open-ended qualitative questions. These questions were intended to cover any missing factors that may not have been included in the survey. The CAQ is provided (Appendix I), as is a glossary of terms used in the CAQ (Appendix II).

Selection and recruitment of target populations

The target population for the study was hospital administrators and physician leaders who had responsibilities for recruitment and retention of physicians in rural Idaho. The sample communities were selected based on site visits to rural communities and discussions with research colleagues at the Idaho Hospital Association, the Idaho Academy of Family Physicians, and the Office of Rural Health and Primary Care of the Idaho Department of Health and Welfare. Twelve rural communities with critical access hospitals were selected as the target sample. These 12 communities were categorized into 2 groups based on their historical success in recruitment and retention of rural family medicine physicians. Those with more success were assigned into the 'alpha (α)' group, and those with less success were classified into the 'beta (β)' group. These classifications were made based on site visits to rural communities, the discussions with research colleagues listed above, and input from physician leaders in the Family Medicine Residency of Idaho who have significant experience in placing family medicine physicians in rural Idaho communities. Hospital administrators in these communities were recruited to the study by phone and email and were asked to identify physician leaders in their hospitals. The selected physician leaders were recruited to the study in the same manner.

Survey administration

Cross-sectional structured interviews were conducted in the study. A consent form and the CAQ were mailed to the hospital administrators and physician leaders who agreed to participate in the study for their review prior to the interview visits. A one-hour interview was scheduled with each participant. A family medicine physician with rural practice



and physician recruiting experience traveled to the participating communities to conduct structured interviews using the CAQ. One hospital administrator and one physician leader were interviewed for each participating community on a separate occasion. The consent form was reviewed with the interviewer and signed by respondents prior to the interviews. These interviews were held in private locations. Responses to the CAQ were recorded by the interviewer on a printed CAQ form.

Data processing and analysis

The completed CAQs were sent to Boise State University and entered into SPSS v15 (www.spss.com) for statistical analysis by researchers at the Center for Health Policy. Numerical scores were assigned to the survey responses for advantages and challenges and for importance ratings using a 4 point Likert scale format. These scores were used to calculate the Community Apgar score. Descriptive statistics were used to report the overall responses to the CAQ. Non-parametric Mann–Whitney *U*-tests were employed to determine the statistical significance of difference in the self-rated advantage and importance level as well as Community Apgar score for each class between respondent types (hospital administrators vs physician leaders) and community types (α vs β). The completed were sent to Boise State University and were processed by researchers at the Center for Health Policy.

Results

Eleven of the 12 invited communities participated in the study, resulting in a 91.7% participation rate. One beta community was not able to participate in the study due to healthcare leadership transitions. The overall responses to the CAQ are provided (Table 1). The following sections describe the results for advantages and challenges ratings, importance ratings and Apgar scores by class.

Community Apgar Questionnaire advantages and challenges findings

Respondents were asked to rate their community's perceived advantages and challenges for the 50 factors in 5 classes. These factors were rated on a 4 point Likert scale (major advantage, minor advantage, minor challenge, major challenge), and these scale values were converted into scores (major advantage = 2, minor advantage = 1, minor challenge = -1, major challenge = -2). Statistical differences of these scores by class were determined between respondent and community types.

The advantages and challenges' mean scores for the 5 classes within the CAQ are given (Table 2). Class scores were calculated for each class by summing scores across 10 factors. A summary score was determined by summing the scores across 5 classes. Hospital and community support was identified as the most advantageous class associated with recruitment of retention of physicians, followed by economic, medical support, and scope of practice. Geographic class was the only challenging factor identified by respondents.

Hospital administrators and physicians had similar ratings on advantages and challenges both within and across classes. Comparisons between community types showed that alpha communities had significantly more advantages over beta communities in hospital and community support ($p < .001$), economic ($p < .05$), medical support ($p < .001$), scope of practice ($p < .05$), geographic ($p < .05$) classes and across the summary class composite ($p < .001$)

Community Apgar Questionnaire importance findings

Respondents were asked to rate their perceived importance levels for the 50 factors in 5 classes. These factors were rated on a 4 point Likert scale (very important, important, unimportant, very unimportant), and these scale values were converted into scores (very important = 4, important = 3, unimportant = 2, very unimportant = 1). Statistical difference of these scores by class was determined between respondent and community types.



Table 1: Distribution of responses across survey items

Class/ factor	Level of advantages and challenges <i>n</i> (%)				Level of importance <i>n</i> (%)			
	Major advantage	Minor advantage	Minor challenge	Major challenge	Very important	Important	Unimportant	Very unimportant
Geographic								
Access to larger community	4 (18)	5 (23)	9 (41)	4 (18)	5 (23)	16 (73)	1 (5)	0
Demographics/patient mix	2 (9)	8 (36)	11 (50)	1 (5)	2 (9)	14 (64)	6 (27)	0
Social networking	1 (5)	7 (32)	9 (41)	5 (23)	6 (27)	13 (59)	3 (14)	0
Recreational opportunities	16 (73)	6 (27)	0	0	15 (68)	7 (32)	0	0
Spousal satisfaction	1 (5)	3 (14)	8 (36)	10 (45)	20 (91)	2 (9)	0	0
Schools	3 (14)	4 (18)	7 (32)	8 (36)	13 (59)	8 (36)	1 (5)	0
Shopping and other services	1 (5)	3 (14)	14 (64)	4 (18)	1 (5)	16 (73)	5 (23)	0
Religious/cultural opportunities	5 (23)	8 (36)	7 (32)	2 (9)	2 (9)	18 (82)	2 (9)	0
Climate	2 (9)	10 (45)	9 (41)	1 (5)	2 (9)	16 (73)	4 (18)	0
Perception of community	1 (5)	7 (32)	11 (50)	3 (14)	10 (45)	11 (50)	1 (5)	0
Economic								
Employment status	4 (18)	11 (50)	6 (27)	1 (5)	5 (23)	15 (68)	2 (9)	0
Part-time opportunities	2 (9)	6 (27)	6 (27)	8 (36)	2 (9)	14 (64)	6 (27)	0
Loan repayment	9 (41)	7 (32)	3 (14)	3 (14)	13 (59)	9 (41)	0	0
Income guarantee	11 (50)	7 (32)	3 (14)	1 (5)	16 (73)	6 (27)	0	0
Signing bonus	4 (18)	9 (41)	5 (23)	4 (18)	7 (32)	13 (59)	2 (9)	0
Moving allowance	6 (27)	10 (45)	6 (27)	0	10 (45)	10 (45)	2 (9)	0
Start-up/marketing costs	4 (18)	13 (59)	5 (23)	0	3 (14)	11 (50)	8 (36)	0
Revenue flow	7 (32)	8 (36)	7 (32)	0	15 (68)	7 (32)	0	0
Payor mix	3 (14)	8 (36)	9 (41)	2 (9)	4 (18)	13 (59)	5 (23)	0
Competition	4 (18)	11 (50)	5 (23)	2 (9)	5 (23)	10 (45)	7 (32)	0
Scope of practice								
Obstetrics	2 (9)	8 (36)	7 (32)	5 (23)	12 (55)	9 (41)	1 (5)	0
Caesarean section	2 (9)	5 (23)	4 (18)	11 (50)	4 (18)	16 (73)	2 (9)	0
Emergency room coverage	6 (27)	10 (45)	5 (23)	1 (5)	7 (32)	14 (64)	1 (5)	0
Endoscopy/surgery	2 (9)	12 (55)	4 (18)	4 (18)	3 (14)	13 (59)	5 (23)	1 (5)
Nursing home	2 (9)	16 (73)	3 (14)	1 (5)	1 (5)	9 (41)	11 (50)	1 (5)
Inpatient care	4 (18)	14 (64)	4 (18)	0	8 (36)	14 (64)	0	0
Mental health	0	7 (32)	8 (36)	7 (32)	1 (5)	13 (59)	8 (36)	0
Mid-level supervision	1 (5)	18 (82)	3 (14)	0	0	8 (36)	14 (64)	0
Teaching	4 (18)	15 (68)	3 (14)	0	4 (18)	10 (45)	8 (36)	0
Administration	3 (14)	13 (59)	6 (27)	0	2 (9)	11 (50)	7 (32)	2 (9)
Medical support								
Perception of quality	5 (23)	12 (55)	5 (23)	0	14 (64)	8 (36)	0	0
Stability of physician workforce	9 (41)	5 (23)	5 (23)	3 (14)	15 (68)	7 (32)	0	0
Specialist availability	3 (14)	10 (45)	9 (41)	0	7 (32)	14 (64)	1 (5)	0
Transfer arrangements	6 (27)	12 (55)	4 (18)	0	10 (45)	9 (41)	2 (9)	0
Nursing workforce	5 (23)	9 (41)	7 (32)	1 (5)	11 (50)	9 (41)	2 (9)	0
Allied mental health workforce	3 (14)	4 (18)	12 (55)	3 (14)	2 (9)	18 (82)	2 (9)	0
Mid-level provider workforce	2 (9)	16 (73)	4 (18)	0	2 (9)	14 (64)	6 (27)	0
Ancillary staff workforce	3 (14)	13 (59)	5 (23)	1 (5)	5 (23)	11 (50)	5 (23)	0
Emergency medical services	1 (5)	14 (64)	5 (23)	2 (9)	6 (27)	9 (41)	6 (27)	0
Call/practice coverage	7 (32)	6 (27)	5 (23)	4 (18)	17 (77)	5 (23)	0	0



Table 1: cont'd

Class Factor	Level of advantages and challenges <i>n (%)</i>				Level of importance <i>n (%)</i>			
	Major advantage	Minor advantage	Minor challenge	Major challenge	Very important	Important	Unimportant	Very unimportant
Hospital and community support								
Physical plant and equipment	10 (45)	4 (18)	1 (5)	7 (32)	16 (73)	5 (23)	1 (5)	0
Plans for capital investment	8 (36)	10 (45)	2 (9)	2 (9)	13 (59)	6 (27)	2 (9)	1 (5)
Electronic medical records	3 (14)	4 (18)	8 (36)	7 (32)	6 (27)	16 (73)	0	0
Hospital leadership	6 (27)	15 (68)	1 (5)	0	8 (36)	12 (55)	1 (5)	1 (5)
Internet access	9 (41)	11 (50)	2 (9)	0	9 (41)	13 (59)	0	0
Tele-video support	2 (9)	11 (50)	9 (41)	0	1 (5)	11 (50)	10 (45)	0
Hospital sponsored CME	3 (14)	8 (36)	8 (36)	3 (14)	2 (9)	12 (55)	8 (36)	0
Community need/support of physician	10 (45)	10 (45)	2 (9)	0	14 (64)	8 (36)	0	0
Community volunteer opportunities	5 (23)	16 (73)	1 (5)	0	1 (5)	9 (41)	12 (55)	0
Welcome and recruitment program	7 (32)	8 (36)	7 (32)	0	6 (27)	15 (68)	1 (5)	0

The advantages and challenges' mean scores for the 5 classes within the CAQ are given (Table 2). Class scores were calculated for each class by summing scores across 10 factors. A summary score was determined by summing the scores across 5 classes. Hospital and community support was identified as the most advantageous class associated with recruitment of retention of physicians, followed by economic, medical support, and scope of practice. Geographic class was the only challenging factor identified by respondents.

Hospital administrators and physicians had similar ratings on advantages and challenges both within and across classes. Comparisons between community types showed that alpha communities had significantly more advantages over beta communities in hospital and community support ($p < .001$), economic ($p < .05$), medical support ($p < .001$), scope of practice ($p < .05$), geographic ($p < .05$) classes and across the summary class composite ($p < .001$)

Community Apgar Questionnaire importance findings

Respondents were asked to rate their perceived importance levels for the 50 factors in 5 classes. These factors were rated on a 4 point Likert scale (very important, important, unimportant, very unimportant), and these scale values were converted into scores (very important = 4, important = 3, unimportant = 2, very unimportant = 1). Statistical difference of these scores by class was determined between respondent and community types.

The importance mean scores is shown for the 5 classes within the CAQ (Table 3). Class scores were calculated for each class by summing scores across 10 factors. A summary score was determined by summing the scores across 5 classes. Medical support was identified as the most important class regarding recruitment and retention of physicians, followed by geographic, economic, hospital and community support, and scope of practice.



Table 2: Community advantages and challenges mean scores by class

Survey class	Overall score [†]	Administrator (n=11)	Physician (n=11)	<i>p</i> [¶]	α Community (n=12)	β Community (n=10)	<i>p</i> [¶]
Hospital and community support	6.55	7.55	5.55	.33	9.75	2.70	<.001**
Economic	4.59	4.09	5.09	1.00	8.25	0.20	.04*
Medical support	4.55	4.82	4.27	.80	8.50	-0.20	<.001**
Scope of practice	2.95	2.18	3.73	.48	5.08	0.50	.01**
Geographic	-1.27	0.00	-2.55	.52	1.67	-4.80	.03*
Summary Score across classes	17.41	18.64	16.09	0.65	33.25	-1.60	<.001**

p* < .05; *p* < .01.

[†]Higher scores indicate greater community advantage (N=22); [¶] Mann-Whitney *U* test used for differences between administrator and physician scores, and for differences between α and β community scores.

Table 3: Community importance mean scores by class

Survey class	Overall score [†]	Administrator (n=11)	Physician (n=11)	<i>p</i> [¶]	α Community (n=12)	β Community (n=10)	<i>p</i> [¶]
Medical support	32.68	34.82	30.55	.01*	31.58	34.00	.18
Geographic	32.41	33.73	31.09	<.001**	32.08	32.80	.50
Economic	32.18	33.82	30.55	.01*	32.67	31.60	.42
Hospital and community support	31.68	32.55	30.82	.37	31.33	32.10	.50
Scope of practice	28.95	28.45	29.45	.56	28.58	29.40	.67
Summary score across classes	157.91	163.36	152.45	.03*	156.25	159.90	.58

p* < .05; *p* < .01.

[†]Higher scores indicate greater community advantage (N=22); [¶] Mann-Whitney *U* test used for differences between administrator and physician scores, and for differences between α and β community scores.

Although both hospital administrators and physicians considered medical support, geographic, and economic classes to be important, comparisons between respondent types showed that hospital administrators recognized medical support (*p* < .05), geographic (*p* < .001) and economic (*p* < .05) as significantly more important classes than did physicians. The summary score composite across classes also indicated that hospital administrators and physicians had a significantly different perception in the levels of importance (*p* < .05). Respondents in both alpha and beta communities had similar perceived importance levels both within and across classes.

Community Apgar Questionnaire Apgar findings

The following algorithm was used to calculate the Community Apgar score from advantage/challenge and importance scores.

Community Apgar score = advantage/challenge score × importance score: The Community Apgar score ranges from -8 to 8 with a higher score indicating a more developed community asset and capability related to recruitment and retention of physicians. Statistical difference of these scores by class was determined between respondent and community types.

The mean Community Apgar scores are shown for the 5 classes within the CAQ (Table 4). Class scores were calculated for each class by summing scores across 10 factors. A summary composite score was determined by summing the scores across 5 classes. The hospital and community support class was identified as the most developed community asset and capability associated with recruitment and retention of physicians, followed by economic, medical support, scope of practice and geographic.



Table 4: Community Apgar mean scores by class

Survey class	Overall score [†]	Administrator (n=11)	Physician (n=11)	p [‡]	α Community (n=12)	β Community (n=10)	p [‡]
Hospital and community support	21.68	23.91	19.45	.44	33.08	8.00	<.001**
Economic	16.77	15.18	18.36	.90	29.58	1.40	.03*
Medical support	15.45	17.45	13.45	.56	29.42	-1.30	<.001**
Scope of practice	8.05	4.55	11.55	.24	14.42	0.70	.04*
Geographic	-3.82	-0.18	-7.45	.75	6.92	-16.70	.02*
Summary score across classes	58.27	61.18	55.36	.75	113.42	-7.90	<.001**

* $p < .05$; ** $p < .01$.

[†]Higher scores indicate greater community advantage ($N=22$); [‡]Mann-Whitney U test used for differences between administrator and physician scores, and for differences between α and β community scores.

Hospital administrators and physicians had similar opinions regarding their community assets and capabilities. However, comparisons between community types revealed that alpha communities had significantly more developed community assets and capabilities than beta communities in all 5 classes, including hospital and community support ($p < .001$) and medical support ($p < .001$), geographic ($p < .05$), economic ($p < .05$), and scope of practice ($p < .05$). Overall, across the class composite measure, alpha communities showed significantly more developed community assets and capabilities than beta communities ($p < .001$).

The cumulative Apgar scores for alpha and beta communities are shown (Table 5). Cumulative Apgar scores are a sum of the Apgar scores for each of the 5 classes in the instrument. All alpha communities have higher cumulative Apgar scores than beta communities.

Qualitative results

The CAQ contained 3 open-ended questions. Respondents were asked to identify the greatest barriers to recruitment and retention of family medicine physicians and potential solutions to overcome these barriers. They were also asked to identify the reasons why a successful physician candidate did not accept a position in the community and what he/she

would ultimately do instead in terms of employment. The answers to these questions suggested that the CAQ included all relevant variables related to recruitment and retention of physicians to rural communities.

Discussion

Communities in the state of Idaho have experienced challenges with recruiting and retaining physicians due to unique factors of varying importance. Many pre-existing healthcare access and physician shortage problems among rural Idaho communities are expected to become more challenging because of recent aging and retirement trends. Limited community resources require addressing the most important factors affecting physician choices and satisfaction. Knowledge of these most crucial modifiable factors becomes invaluable to strategic planning, including understanding of comparative advantages in the marketing process. Therefore, recruitment and retention self-assessment becomes critical to addressing physician shortage problems in Idaho.



Table 5: Cumulative community Apgar score by hospital

Hospital code	Community type	Overall Apgar score [†]	Survey classes				
			Geographic	Economic	Scope of practice	Medical support	Hospital and community support
3	α	340	70	52	45	75	98
6	α	230	21	99	42	48	20
11	α	219	30	10	16	88	75
9	α	199	-49	67	30	76	75
8	α	195	33	40	15	37	70
4	α	175	-22	87	22	29	59
5	β	53	-37	68	18	-16	20
1	β	-3	-5	8	-4	3	-5
7	β	-30	-55	46	8	-21	-8
2	β	-40	-41	-64	-1	24	42
10	β	-59	-29	-44	-14	-3	31

[†]Higher scores suggest greater community assets and capabilities.

Previous studies have identified many factors influencing physicians' decisions on their practice location. Physicians, residents, and students have been reported to be influenced by factors categorized as geographic characteristics, financial issues, medical support, scope of practice, and community and hospital support when deciding their practice location. The purpose of this study was to develop an evaluation instrument useful in exploring rural Idaho communities' assets and capabilities regarding physician recruitment and retention. The CAQ was developed to assess and differentially diagnose the strengths and weakness of an individual community, as well as to provide information about the aggregate group. The CAQ assists in quantifying and visually demonstrating what has traditionally been a problem more commonly addressed by a more qualitative, expert-opinion approach. This instrument, accompanied by a growing database of aggregated data, also provides the opportunity for a community to gain peer comparison and time sequence comparison analysis.

Comparisons between community advantages and challenges scores by respondent types showed no statistically significant difference between hospital administrators and physicians in their perceived community's advantages and challenges. That is, respondents from the same community

consistently identified their community's advantages and challenges. However, alpha communities had significantly greater advantages over beta communities in recruitment and retention of physicians in all CAQ classes and across classes. The hospital and community support class was identified as the most advantageous class for physician recruitment and retention, while the geographic class was identified as the least advantageous.

Comparison of community importance class scores between community types identified no significant difference among respondents in both alpha and beta communities. Thus, all the responding communities consistently recognized the classes of factors important in recruitment and retention. However, some differences in their importance levels of CAQ classes were observed between hospital administrators and physicians. Hospital administrators rated medical support, geographic, economic and the summary score higher in importance than physicians. That these areas appear to be more under the authority of hospital administrators may explain the differences in scores. Overall, the medical support class was identified as the most important class, while the scope of practice class was rated least important.



Comparison of community Apgar class scores between respondent types identified no significant difference but there were significant differences in all CAQ classes and the summary CAQ score between alpha and beta communities. Comparisons between community types using the CAQ instrument indicated that alpha communities had significantly more developed community assets and capabilities related to recruiting and retaining physicians than did beta communities. This result correlates with its classification criteria, in which alpha communities were identified as communities with a historical success in recruitment and retention of physicians. This data supports the validity of the CAQ, which was developed to assess the success levels regarding physician recruitment and retention among rural Idaho communities. The highest rated Apgar class was hospital and community support while the lowest was geography.

In the open-ended questions, spousal satisfaction was the most frequently reported barrier. Respondents described lack of spousal satisfaction as a 'deal breaker' for both recruitment and retention of physicians. Respondents identified that inadequate employment opportunities and the lack of cultural opportunities were associated with spousal dissatisfaction. Further research is recommended to explore factors associated with spousal satisfaction and dissatisfaction.

Limitations

One of the major limitations of this study was the limited number of sample communities. Eleven of the 12 communities recruited participated in the study. One critical access hospital administrator and one physician leader were interviewed for each community. In addition, these communities were selected as a targeted sample based on site visits and discussions with research colleagues at the Idaho Hospital Association, the Idaho Academy of Family Physicians, and the Office of Rural Health and Primary Care of the Idaho Department of Health and Welfare. Although a careful selection process was introduced to assure the quality

of samples, they may have been biased and may not represent the target population.

Another limitation of this study was the data collection method. Because the face-to-face interview method was used in the study, a response bias may have occurred. Some respondents may have felt uncomfortable sharing their opinions on certain factors such as a relationship with their communities and their hospitals' economic status. In addition, although the use of non-parametric tests was appropriate considering the sample size and the format of the instrument, some significant relationships may not have been detected due to the limited statistical power.

Conclusion

Effective strategies for recruitment and retention of physicians will remain a crucial issue for communities in Idaho and elsewhere. Utilization of the CAQ and the aggregate peer database is a targeted response to this problem. Application advantages of this instrument include its unique quantification approach to a traditionally qualitative description of the issues. The tool could be used to track a community's progress in comparison with their real-time peers, or with regard to their own progress over time, similar to the clinical use of the Apgar scores in newborns. This instrument is designed to be a real-time assessment tool providing guidance for the most helpful interventions at the present time.

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Appendix I: Community Apgar Questionnaire

Site Code:				Subject Code:				
Instructions:	The interviewer will ask the subject to assess how each of the following factors, organized into five classes, impacts recruitment and retention of Family Medicine physicians in their community. Each factor will be rated on two dimensions: relative advantage or challenge for their community and relative importance to recruiting Family Medicine physicians to the community.							
	Major	Minor	Minor	Major	Very			Very
Class/Factor	Advantage	Advantage	Challenge	Challenge	Important	Important	Unimportant	Unimportant
Geographic								
Access to larger community								
Demographics/ patient mix								
Social networking								
Recreational opportunities								
Spousal satisfaction (education, work, general)								
Schools								
Shopping and other services								
Religious/cultural opportunities								
Climate								
Perception of community								
Economic								
Employment status								
Part-time opportunities								
Loan repayment								
Income guarantee								
Signing bonus								
Moving allowance								
Start-up/marketing costs								
Revenue flow								
Payor mix								
Competition								
Scope of Practice								
Obstetrics								
C-section								
Emergency room coverage								
Endoscopy / surgery								
Nursing home								
Inpatient care								
Mental health								
Mid-level supervision								
Teaching								
Administration								



Appendix I: cont'd.

Class/Factor	Major Advantage	Minor Advantage	Minor Challenge	Major Challenge	Very Important	Important	Unimportant	Very Unimportant
Medical Support								
Perception of quality								
Stability of physician workforce								
Specialist availability								
Transfer arrangements								
Nursing workforce								
Allied mental health workforce								
Mid-level provider workforce								
Ancillary staff workforce								
Emergency medical services								
Call/practice coverage								
Hospital and community support								
Physical plant and equipment								
Plans for capital investment								
Electronic medical records (EMR)								
Hospital leadership								
Internet access								
Televideo support								
Hospital sponsored CME								
Community need/support of physician								
Community volunteer opportunities								
Welcome and recruitment program								
Open-ended questions								
1. What are your greatest barriers to recruitment and retention of Family Medicine physicians?								
2. What can be done to overcome these barriers?								
3. What reasons has a successful physician candidate given for not accepting a position in the community? What did that person ultimately do instead (if you know)?								



Appendix II: Glossary of terms

Geographic Class Factors

Access to larger community

The ability to access or ease of access to a larger community

Demographics/patient mix

The demographics of patients in the community including age, race, gender or other

Social networking

Opportunities or ease of socializing for the physician

Recreational opportunities

Opportunities for local, enjoyable non-work time activities

Spousal satisfaction (education, work, general)

Overall satisfaction of the spouse in regard to local community living such as education, work, and in general

School

Adequacy of schools for the physician's children

Shopping and other services

Adequacy of local access to shopping or services for physician and family

Religious/cultural opportunities

Adequacy of local access for religious or cultural participation for physician and family

Climate

Weather

Perception of community

Perception of the community overall by someone not from the community

Economic Class Factors

Employment status

Whether or not a desire for employee status is available or encouraged or required

Part-time opportunities

Whether or not a desire for part-time work status is available or supported

Loan repayment

Whether or not loan repayment is available for qualifying physician

Income guarantee

Whether or not an income guarantee is available for new physician

Signing bonus

Whether or not a signing bonus is available for new physician

Moving allowance

Whether or not a moving allowance is available for new physician

Start-up/marketing costs

Whether or not start-up or marketing cost support is available for new physician

Revenue flow

No matter by what specific means, the amount of revenue earned by the physician



Payor mix

Independent of physician earnings, the payor mix of the patients seen

Competition

The sense of competition amongst primary care providers for patients

Scope of Practice Class Factors

Obstetrics

The impact of whether or not Obstetrics is an option, not an option, or mandatory.

C-section

The impact of whether or not C-Sections is an option, not an option, or mandatory.

Emergency room coverage

The impact of whether or not ER coverage is an option, not an option, or mandatory.

Endoscopy/surgery

The impact of whether or not EGD and/or colonoscopy is an option, not an option, or mandatory.

Nursing home

The impact of whether or not nursing home care is an option, not an option, or mandatory.

Inpatient care

The impact of whether or not inpatient hospital care is an option, not an option, or mandatory.

Mental health

The impact of whether or not mental health care by the physician is an option, not an option, or mandatory.

Mid-level supervision

The impact of whether or not mid-level supervision by the physician is an option, not an option, or mandatory.

Teaching

The impact of whether or not teaching residents or medical students by physicians is an option, not an option, or mandatory.

Administration

The impact of whether or not administrative duties for the physician is an option, not an option, or mandatory.

Medical Support Class Factors

Perception of quality

The overall reputation for quality of medical care for this community as seen by someone not from this community

Stability of physician workforce

The stability of the physician workforce and longevity of the retained physicians

Specialist availability

The availability of specialists and sub-specialist for patient care; either on site or by other means

Transfer arrangements

The existence and adequacy of transfer arrangements for patients to referral hospital(s)

Nursing workforce

The adequacy of nursing workforce for both quantity and quality

Allied mental health workforce

The adequacy allied mental health workforce for both quantity and quality



Mid-level provider workforce

The adequacy of mid-level provider for both quantity and quality

Ancillary staff workforce

The adequacy of ancillary staff (such as laboratory, x-ray technician, respiratory therapy, physical therapy, occupational therapy) workforce for both quantity and quality

Emergency medical services

The adequacy of pre-hospital emergency medical services for both quantity and quality

Call/practice coverage

The adequacy of call coverage and practice coverage for physician leave, holidays and vacation for both quantity and quality

Hospital and Community Support Class Factors

Physical plant and equipment

The current adequacy of the hospital and clinic physical plant and equipment

Plans for capital investment

The adequacy of the hospital plans for capital investment in the hospital and/or clinic

Electronic medical records (EMR)

The existence and adequacy of electronic medical records in the hospital and clinic environments

Hospital leadership

The adequacy of hospital leadership including the CEO, CFO and hospital board functions

Internet access

The existence and adequacy of internet access in the hospital and clinic

Televideo support

The existence and adequacy of televideo capability in the community for patient care or other communications

Hospital sponsored CME

The existence and adequacy of local hospital-sponsored continuing medical education

Community need/support of physician

The perceived sense of need for and/or community support of a new physician

Community volunteer opportunities

The existence and adequacy for local opportunities for physician volunteering, either medical or nonmedical

Welcome and recruitment program

The existence and adequacy of any recruitment plan and/or welcome for an interviewing or newly recruited physician