

Supplemental Digital Table 1

Summary of Studies about Rural Medical Education Training Experiences of Medical Students in North America, from a 2009 Literature Review and Analysis

Study	Year	Outcomes measured	Results
Amundson and Hancock	1983	<ul style="list-style-type: none"> • Student evaluation of clerkship • Faculty evaluation • Number of students in family medicine residencies 	<ul style="list-style-type: none"> • 74% stated experience was exceptional • Nearly 2/3 of the students received an A grade • 25% entered family practice residencies
Barnett et al	1978	<ul style="list-style-type: none"> • Educational value • Impact of services • Value of the program for preceptors 	<ul style="list-style-type: none"> • Medical and dental preceptors found the program valuable both to themselves and the students • Enhanced perception of increased health services to migrant families • Preceptors perceived an increased efficiency in their offices
Bartline	1997	<ul style="list-style-type: none"> • Value of medical students to practice • Practice location 	<ul style="list-style-type: none"> • 98% of physicians felt medical students were valuable • Students experiences predictor of future employment
Bass and Paulman	1983	<ul style="list-style-type: none"> • Subjective assessment of preceptorship value 	<ul style="list-style-type: none"> • Graduates choosing family practice training generally found the experience more valuable than those in other specialties
Bennard et al	2004	<ul style="list-style-type: none"> • Student evaluation of clerkship experience 	<ul style="list-style-type: none"> • Students valued rural experience because it provided them with hands on experience, autonomy, exposure to community providers, and a better understanding of under-served populations
Bianchi et al	2008	<ul style="list-style-type: none"> • OSCE scores • Scores on clinical reasoning exercise • Scores on medical knowledge test 	<ul style="list-style-type: none"> • Students with rural experiences had significantly higher OSCE scores • No difference • No difference
Blue et al	2004	<ul style="list-style-type: none"> • Perceptions about rural primary care 	<ul style="list-style-type: none"> • Significant positive increase in student perceptions of rural primary care
Boulger	1991	<ul style="list-style-type: none"> • Career choice • Practice location 	<ul style="list-style-type: none"> • 52% of medical students in rural program selects family practice • More than 41% practice in communities of less than 20,000

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Brazeau et al	1990	<ul style="list-style-type: none"> Practice location Career choice 	<ul style="list-style-type: none"> Intervention group more likely to choose rural practice More likely to choose primary care specialties than comparison group
Brown and Birnbaum	2005	<ul style="list-style-type: none"> Career choice 	<ul style="list-style-type: none"> 45% of IHS physicians participated in rural rotation as medical students, 80% of IHS felt rotation influenced their decision to join HIS
Chaulk et al	1987	<ul style="list-style-type: none"> Rating of experience Career choice Practice location 	<ul style="list-style-type: none"> 55% rated experience excellent, 33.6% as good Rural preceptorship significantly influenced specialty choice Respondents divided concerning preceptorship impact on practice location
Davidson	2002	<ul style="list-style-type: none"> Career choice 	<ul style="list-style-type: none"> 63% felt experience effected their career choice somewhat or a great deal; 28% stated influence was slight, only five students reported no effect
Easterbrook et al	1999	<ul style="list-style-type: none"> Career choice 	<ul style="list-style-type: none"> No association between choosing rural practice and rural undergraduate medical exposure
Ebbesson	1988	<ul style="list-style-type: none"> Practice location and career choice 	<ul style="list-style-type: none"> Medical school experience played an important role in the decisions about practice location and career choice
Fields et al	1994	<ul style="list-style-type: none"> Economic impact of M3 students in a rural community-based primary care practice 	<ul style="list-style-type: none"> Gross charges declined \$52.80 per day, visits dropped .71 per day, neither change statistically significant
Fryer et al	1993	<ul style="list-style-type: none"> Practice location Career choice 	<ul style="list-style-type: none"> SEARCH rotation participants more likely (13.7% vs. 7.8%) to chose rural practice SEARCH participants more likely to chose primary care specialty (50.4% vs. 34.0%)
Fryer et al	1994	<ul style="list-style-type: none"> Career choice Practice location 	<ul style="list-style-type: none"> More preceptorship participants in a primary care specialty (46.9% versus 30.6%) More preceptorship participants established practices in rural counties (16.4% versus 9.6%)
Glasser et al	2008	<ul style="list-style-type: none"> USMLE scores Campus awards Perceived skills Career choice Practice location 	<ul style="list-style-type: none"> No difference between RMED students vs control group RMED students received 48% of the awards while comprising only 1/3 of the student body Students in preceptor evaluations show significant changes in their clinical and professional skill development 76% of graduates entered primary care residencies 82.5% of graduates are in primary care practice

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Halaas et al	2008	<ul style="list-style-type: none"> Career choice Practice location 	<ul style="list-style-type: none"> 82% chose primary care; 68% family medicine 44% in rural setting another 14% with more than 50% of their time in rural practice
Hamilton et al	1997	<ul style="list-style-type: none"> Complementary extramural educational experiences 	<ul style="list-style-type: none"> 82.7% reported some type of rural training or public service; 21.2% sponsored a rural community-based interdisciplinary health team program
Harris et al	1977	<ul style="list-style-type: none"> Career choice Practice location Perceived competencies 	<ul style="list-style-type: none"> More interest in family medicine post preceptorship No change in practice location Significant changes favoring rural preceptorship in Ob/Gyn and peds on 28 of 83 skill items
Harris and Ebbert	1983	<ul style="list-style-type: none"> Practice location Career choice 	<ul style="list-style-type: none"> Respondents reported experience influenced practice site Respondents report experience influenced specialty choice
Holve	1994	<ul style="list-style-type: none"> Career choice 	<ul style="list-style-type: none"> 3 students (2.5%) took positions with IHS
Hooper	1994	<ul style="list-style-type: none"> Career choice Practice location 	<ul style="list-style-type: none"> Several sites report students plan to switch to primary care because of experience No student later returned as a staff member
Hunsaker,et al.	2006	<ul style="list-style-type: none"> Self-reported skill development in 11 major areas such as chronic diseases management and ability to handle acute problems 	<ul style="list-style-type: none"> Students report skills significantly increased on all domains; largest gain was in understanding health systems and the community
Irigoyen et al	1999	<ul style="list-style-type: none"> Student satisfaction Patient volume Student performance 	<ul style="list-style-type: none"> Rural teaching site associated with higher student satisfaction Students at rural sites saw on average 15 more patients per rotation Geographic location did not influence student performance
Jones et al	2000	<ul style="list-style-type: none"> Career choice before and after inception of clerkship in comparison to national trends 	<ul style="list-style-type: none"> Appears to be an association between the rural clerkship experience and career choice
Kaufman et al	1982	<ul style="list-style-type: none"> Student stress level Students exam scores from Quarterly Profile Examination Career choice Community relations 	<ul style="list-style-type: none"> Primary care students reported a greater appreciation of their learning environment, less stress and were less cynical No significant differences scores on the basic and clinical science exam sections Preliminary outcomes revealed reinforcement of career interest in rural primary care Program forged important linkages between the university and communities.

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Kaufman et al	1989	<ul style="list-style-type: none"> NBME Step 1 scores NBME Step 2 scores Clinical Clerkship grade Career choice 	<ul style="list-style-type: none"> Step 1 scores lower for PCC track Step 2 scores higher for PCC track Clinical grades higher for PCC track PCC track influences students to choose family medicine
Lacy et al	2005	<ul style="list-style-type: none"> Self-perceived confidence in clinical skills 	<ul style="list-style-type: none"> No difference in perceived clinical skills between rural and non-rural students
Lang et al	2005	<ul style="list-style-type: none"> Practice location 	<ul style="list-style-type: none"> Students completing rural rotation were 3 times more likely to practice in a rural community compared to national average
Leeper et al	2001	<ul style="list-style-type: none"> Attitude to rural practice Self-assessed clinical competencies 	<ul style="list-style-type: none"> No change in overall attitude towards working in rural areas Significant increase in clinical competencies related to rural practice
Levy and Merchant	2005	<ul style="list-style-type: none"> Experience with clinical skills 	<ul style="list-style-type: none"> Students at rural sites reported a higher mean level of experience with clinical skills
Londo and Glasser	1999	<ul style="list-style-type: none"> Impact of rural preceptorship in the evaluation and ranking of RMED students 	<ul style="list-style-type: none"> Overall slightly positive impact positive for family medicine residencies, neutral for other types of residencies
Londo and Glasser	1999	<ul style="list-style-type: none"> Degree to which the students functioned like a junior partner Time it took for this transition to occur 	<ul style="list-style-type: none"> Preceptors felt all students attained this stage to some degree Mean time 7.62 weeks (SD = 3.25)
Lynch et al	2001	<ul style="list-style-type: none"> Percent matching into primary care residencies Percent matching into family medicine residencies Percent matching to community hospitals Percent matching to North Carolina 	<ul style="list-style-type: none"> UNC RHS students more likely to match into primary care residencies RHS students more likely to match into family medicine residents ECU RHS students more likely to match into community hospitals residencies No difference between RHS participants and comparison group in per cent of students matching to North Carolina residencies
Lynch and Willis	2000	<ul style="list-style-type: none"> Students opinions about living in or working in a small town or rural area 	<ul style="list-style-type: none"> Preceptorship did not appear to influence opinions about living or working in small towns. Practice plans did not change
Martin et al	1981	<ul style="list-style-type: none"> Career choice USMLE scores 	<ul style="list-style-type: none"> 26% of the rural group chose family practice residencies compared to 16% of control group Similar scores in NBME surgery test scores

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Norris et al	2003	<ul style="list-style-type: none"> Career choice 	<ul style="list-style-type: none"> Participation in rural program associated with matching in a primary care specialty
Pathman et al	1994	<ul style="list-style-type: none"> Rural retention of physician 	<ul style="list-style-type: none"> No difference on rural retention duration for those who completed rural rotations as students or residents
Pathman et al	1999	<ul style="list-style-type: none"> Impact of medical education experience on preparedness Retention in a rural practice 	<ul style="list-style-type: none"> Extended medical school rural rotations predicted greater preparedness for rural practice for physicians in first practice; no correlation for experienced physicians No correlation of medical school experience related to retention in first practice
Paulman and Davidson-Stroh	1993	<ul style="list-style-type: none"> Residency choice 	<ul style="list-style-type: none"> 94.5% were uninfluenced by the preceptor-ship. Of the 33 reporting a change in residency choice 15 chose family medicine
Phillips and Swanson	1974	<ul style="list-style-type: none"> Career choice 	<ul style="list-style-type: none"> 64% are pursuing family practice training or rural general practice
Phillips and Swanson	1974	<ul style="list-style-type: none"> Career choice 	<ul style="list-style-type: none"> 84% pursuing primary care; 73% family practice
Phillips et al	1982	<ul style="list-style-type: none"> Number and type of diagnostic encounters and clinical procedures Self-rated level of student responsibility 	<ul style="list-style-type: none"> Students encountered a mean of 83 diagnostic problems; average student saw 56% of the diagnoses common in family practice; students encountered 22 clinical procedures weekly, the average student performed 26 % of the common procedures The mean level of student responsibility (self-rated with 3 = independent management, 2 = assisted and 1 = observed) was 2.7 for diagnostic encounters and 2.4 for procedures
Potts	1994	<ul style="list-style-type: none"> Attitude toward primary care Student performance evaluations 	<ul style="list-style-type: none"> Participants exhibit increased knowledge about social agencies, attitudes of social responsibilities not statistically significant Students performance exceeded faculty expectations
Power et al	2006	<ul style="list-style-type: none"> OSCE scores 	<ul style="list-style-type: none"> Rural trained students performed equally well on stations using primary care problems but not as well on stations assessing of specific content taught in traditional clerk-ship curriculum
Rabinowitz et al	2008	<ul style="list-style-type: none"> Practice location 	<ul style="list-style-type: none"> Weighted average of graduates practicing in rural areas ranged from 53% to 64%
Rabinowitz et al	2005	<ul style="list-style-type: none"> Long-term retention 	<ul style="list-style-type: none"> PSAP more likely to remain in rural practice longer
Rabinowitz et al	2001	<ul style="list-style-type: none"> Career choice 	<ul style="list-style-type: none"> Rural preceptorship was independently predictive of rural primary care (OR, 2.5; 95% CI, 1.3-4.7)
Rabinowitz et al	1999	<ul style="list-style-type: none"> Practice location 	<ul style="list-style-type: none"> Medical school curriculum did not influence likelihood of rural practice
Rabinowitz et al	1999	<ul style="list-style-type: none"> Practice location 	<ul style="list-style-type: none"> 84% of PSAP graduates were practicing in rural and underserved areas in Pennsylvania

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Rabinowitz	1993	<ul style="list-style-type: none"> Career choice Practice location 	<ul style="list-style-type: none"> PSAP graduates 4 times more likely to practice family medicine More likely to practice in rural areas and underserved areas
Rabinowitz	1983	<ul style="list-style-type: none"> Career choice Test scores 	<ul style="list-style-type: none"> PSAP graduates more likely to enter family medicine residency PSAP students score at slightly lower level based on yearly GPA and NBME scores
Riley et al	1991	<ul style="list-style-type: none"> Exposure to community medicine and local health care system Career interest 	<ul style="list-style-type: none"> Students satisfied with their first-hand exposure to community medicine 78% expressed interest in rural practice
Rourke et al	2005	<ul style="list-style-type: none"> Career choice 	<ul style="list-style-type: none"> Rural physicians were more likely (55.4%) than urban physicians (35.2%) to have rural clinical experiences during medical school
Schauer and Schieve	2006	<ul style="list-style-type: none"> Test scores 	<ul style="list-style-type: none"> No significant differences in Step 1, Step 2 scores or subject exams scores between the two groups
Shannon et al	2005	<ul style="list-style-type: none"> Student perception of experience 	<ul style="list-style-type: none"> 72% rated overall quality of rotation as very good or excellent; increased interest in rural health and social responsibility
Smucny et al	2005	<ul style="list-style-type: none"> Career choice Test scores Impact on host communities 	<ul style="list-style-type: none"> 26% of RMED students practice in rural locations vs. 7% of non-RMED students, 84% of RMED students felt rural training was important influence in career choice Rural students scored higher on USMLE step 2 than non-rural graduates Hospital administrators felt rural training aided physician recruiting and retention and improved care
Stearns et al	2000	<ul style="list-style-type: none"> Understanding of rural practice Preceptor evaluations Clinical data Community Oriented Primary Care (COPC) projects Career choice 	<ul style="list-style-type: none"> Increased understanding of rural family practice M4 students functioned as junior partners Students see up to 750 patients; exposed to full range of family practice Most projects fall into category of health education/health promotion Of 39 graduates 69% choose family practice; 82% selected primary care residencies
Steinwald and Steinwald	1975	<ul style="list-style-type: none"> Practice location 	<ul style="list-style-type: none"> Overall impact of rural programs on practice location is relatively slight, most pronounced with respect to physicians from urban communities in non-primary care specialties. Many physicians considering rural practice chose urban locations because they feared social isolation.
Verby et al	1974	<ul style="list-style-type: none"> Multiple choice examination testing all specialty field 	<ul style="list-style-type: none"> No differences between rural students and classmates Rural students scored higher in practice management knowledge

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		<ul style="list-style-type: none"> Insight into practice management Self-reported changes in domains such as motivation, technical ability, level of responsibility and concepts of primary care 	<ul style="list-style-type: none"> Rural students reported greater positive change in 29 of 32 tested items
Verby	1988	<ul style="list-style-type: none"> Practice location 	<ul style="list-style-type: none"> 57% of students chose to practice in rural communities
Verby	1985	<ul style="list-style-type: none"> Practice location Career choice 	<ul style="list-style-type: none"> 59% of graduates practice in a rural setting 65% graduates are family physicians
Verby et al	1991	<ul style="list-style-type: none"> Specialty selection Step-1 and step-2 test scores Biological treatment skills, behavioral skills and professional skills 	<ul style="list-style-type: none"> 74% chose primary care, 64% family practice. Rural students significantly more confident about their career choice Baseline RPAP step-1 scores slightly worse, step-2 test scores better for RPAP with greater improvement in scores from part 1 to part 2 RPAP students report more confidence on 26 of 29 biological treatment skills, 4 of 18 behavioral skills and 3 of 7 professional skills
Verby et al	1981	<ul style="list-style-type: none"> Career choice Number of clinical encounters Perceived confidence in clinical skills 	<ul style="list-style-type: none"> Of 275 students in either residencies or practice: 179 in family practice, 40 in internal medicine, 3 in pediatrics, 4 in ob/gyn, 14 in general surgery and 35 in other specialties RPAP students averaged 344 encounters per month versus 115 encounters per month for non-RPAP RPAP reported greater measurement in confidence, roughly 2/3 of the measured skill areas
Verby et al	1982	<ul style="list-style-type: none"> Clinical confidence 	<ul style="list-style-type: none"> RPAP students report significantly higher gain in biological treatment skills, behavioral skills and related professional skills
Wigton and Steinmann	1981	<ul style="list-style-type: none"> Practice location 	<ul style="list-style-type: none"> 62% who had a rural preceptorship reported that it positively affected their views toward rural practice
Woloschuk and Tarrant	2002	<ul style="list-style-type: none"> Practice location 	<ul style="list-style-type: none"> Students with rural education experience were more likely to do a rural locum compared to their urban-raised peers. Students from rural backgrounds reported a significantly greater likelihood of doing a rural locum irrespective of rural education experience
Xu et al	1997	<ul style="list-style-type: none"> Practice location 	<ul style="list-style-type: none"> Rural medical school experiences have little effect on physicians decisions to practice in underserved areas
Zink et al.	2008	<ul style="list-style-type: none"> Qualitative experiences Numbers of encounters 	<ul style="list-style-type: none"> Students highlight hands-on experience and one-on-one teaching Mean of 681.8 (SD 336.5) mean of 172.67 (SD 97.3) procedures logs exceed the university standards in qualities of 5

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Zorzi et al	2005	<ul style="list-style-type: none"> Interest in rural medicine and knowledge of rural medicine 	<ul style="list-style-type: none"> Students reported an increased interest in rural medicine and knowledge of rural medicine