

Thomas O. Forslund, Director

Governor Matthew H. Mead

MEMORANDUM

Date: October 1, 2016

To: Joint Appropriations Interim Committee
Joint Labor, Health and Social Services Interim Committee

From: Thomas O. Forslund, Director
Wyoming Department of Health *TOF*

Subject: Legislative Report: University of Wyoming Family Medicine Residency Review

Ref: F-2016-547

In the 2016 Budget Session of the Wyoming Legislature, Footnote 2 to Section 167 of Senate Enrolled Act 19 directed the Wyoming Department of Health to submit a comprehensive review of the University of Wyoming Family Medical Residency Programs to the Joint Appropriations Committee and the Joint Labor, Health, and Social Services Interim Committee. Footnote 2 to Section 167 of Senate Enrolled Act 19 from the 2016 Budget Session states:

2. Of this other funds appropriation, up to two hundred thousand dollars (\$200,000.00) SR may be expended to contract for a comprehensive review of the state medical residency programs including the services provided; past, present and future revenue streams; alternative service delivery options; and alternative organizational structures. The University of Wyoming shall contract with a nonstate entity to conduct the review only in the event that the director of the department of health provides written notice to the university and the joint appropriations committee that the department cannot complete such a review without expenditure of these funds. The findings of the review shall be reported to the joint appropriations committee and the joint labor, health and social services interim committee by the department of health, or if review is conducted by a nonstate entity, by the University of Wyoming, not later than October 1, 2016.

Attached is the report that fulfills this mandate. For any questions, please contact Stefan Johansson, Administrator, Director's Unit for Policy, Research, and Evaluation, at (307) 777-2408, or stefan.johansson@wyo.gov.

TOF/SJ/ff/jg

Attachment: Legislative Report

c: Governor Matthew H. Mead
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THE UW FAMILY MEDICINE RESIDENCY PROGRAM

HISTORY, OPERATIONS AND ALTERNATIVES REVIEWED IN TERMS OF CORE
PURPOSE



Wyoming Department of Health

October 1, 2016

TABLE OF CONTENTS

Executive Summary	3
Introduction and Scope	4
Legislative Requirements	4
Study Scope	4
Part I: Background	5
Medical education in the United States	5
The purpose of the UW Family Medicine Residency Programs	16
Provider shortages in Wyoming	18
Part II: Operations Review	21
Summary	21
Inputs and Outputs	21
Efficiencies	24
Part III: Alternative Options	39
Considerations	40
Alternative Options.....	40
Appendix A: Timeline - Medical Education in Wyoming	43

EXECUTIVE SUMMARY

Study scope

In Footnote 2 to Section 167 of Senate Enrolled Act 19 from the 2016 Budget Session, the Wyoming Department of Health (“the Department”) was tasked with conducting a comprehensive review of the University of Wyoming Family Medicine residency program.

In addition to studying its current operations, the Department made specific efforts to trace the history and core purpose of the program, both of which will inform any potential alternatives.

Core purpose of the residency programs

The residency programs were conceived in the late 1960s and early 1970s, a time when the nation perceived a shortage of physicians and the federal government was actively investing in medical education. In Wyoming, physician supply was significantly below the national average, and the State was having difficulties recruiting and retaining physicians, particularly in rural areas. The initial purpose of the residencies was therefore to:

- **Increase the number** of family medicine physicians in Wyoming; and to
- **Improve the distribution** of these physicians across counties.

In later years, a tertiary purpose emerged: **provide indigent primary care** to the uninsured.

Current operations

The residencies continue to provide two major services: (1) training future doctors and (2) providing primary care. These services cost approximately \$17 million per year, a cost that is paid for with approximately \$9.8 million of State General Funds (SGF), \$5.4 million in clinic revenue, and an estimated \$1.8 million in indirect cost to two teaching hospitals.

Where almost all other residency programs nationally can rely on significant federal Graduate Medical Education (GME) funding, the UW program remains ineligible for most of this funding because it is not directly tied to a hospital.

In terms of achieving the core purpose stated above, results are mixed. Generally speaking, the residencies are:

- **Less efficient** than other clinics at delivering primary care services;
- **More efficient** than most other residency programs at training physicians;
- **Improving** in quality, though still slightly below the national average; and,
- **Poor** at retaining its graduates in-State;

It should be noted that the Casper site performs better than the Cheyenne site in all of these areas.

Alternatives

This study does not recommend any particular alternative. Instead, it prompts the Legislature to think critically about the core purpose of the residencies: specifically, what is the problem that the residencies are attempting to solve? All alternative options that this study presents in Part III, from expanding the program to closing it down, are framed around this decision.

INTRODUCTION AND SCOPE

In the 2016 Budget Session, the Wyoming Legislature tasked the Department of Health with conducting a comprehensive review of the University of Wyoming Family Medicine residency program, to include an examination of:

- Services provided;
- Past, present and future revenue streams; and,
- Alternative service delivery options and organizational structures.

Legislative Requirements

Footnote 2 to Section 167 of Senate Enrolled Act 19 from the 2016 Budget Session states:

2. Of this other funds appropriation, up to two hundred thousand dollars (\$200,000.00) SR may be expended to contract for a comprehensive review of the state medical residency programs including the services provided; past, present and future revenue streams; alternative service delivery options; and alternative organizational structures. The University of Wyoming shall contract with a nonstate entity to conduct the review only in the event that the director of the department of health provides written notice to the university and the joint appropriations committee that the department cannot complete such a review without expenditure of these funds. The findings of the review shall be reported to the joint appropriations committee and the joint labor, health and social services interim committee by the department of health, or if review is conducted by a nonstate entity, by the University of Wyoming, not later than October 1, 2016.

Study Scope

The Department of Health has conducted this comprehensive review per the following study scope:

1. Background

- a. Medical education in the United States
- b. The history and purpose of the UW Family Medicine Residency program
- c. Provider shortages, 1940 - 2016.

2. Operations review

- a. Services delivered
- b. Costs and revenues
- c. Outputs and efficiencies
- d. Outcomes - retention

3. Alternative service delivery options

- a. Considerations
- b. Options

PART I: BACKGROUND

Medical education in the United States

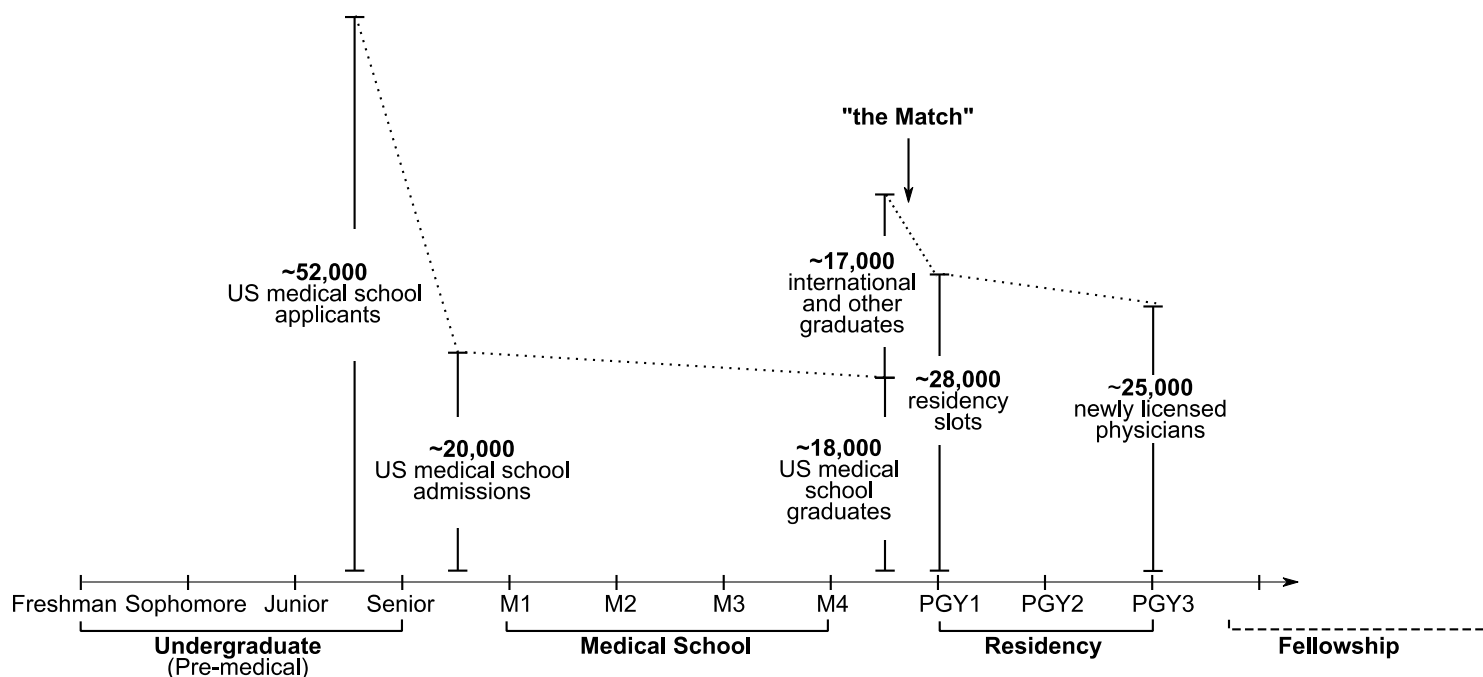
This section describes the larger medical education system in which the University of Wyoming Family Medicine residency program operates, in order to provide context for the review and recommendations. It begins by describing the physician training pipeline, noting the significant complications of primary care specialization and graduate medical education (GME) funding, and then summarizes the history of medical education and medical education funding nationally and in Wyoming.

The modern physician training pipeline

In order to legally practice medicine in the United States, aspiring physicians must commit to a minimum of six years of medical training. Depending on chosen specialty, this educational commitment can extend to over fourteen years. The training continuum spans undergraduate pre-medical education, medical school, and post-graduate residency before individuals are eligible to apply for licensure in the state in which they choose to practice. Post-residency, physicians can also pursue optional fellowships. In addition, nearly all state medical boards, except for Colorado, Indiana, Montana, New York, and South Dakota¹, require continuing medical education (CME) credits to maintain licensure, as do most specialty boards.

Although individual career paths vary, the typical physician training “pipeline” is visualized in Figure 1, below, with the number of individuals passing through the pipeline indicated by the height of the bars.

Figure 1: The typical physician training pipeline in the United States (various data sources, 2014 - 2016)²



¹ http://www.cmeweb.com/gstate_requirements.php

² Medical school applicants and admissions: <https://www.aamc.org/data/facts/>

Graduates and match statistics: <http://www.nrmp.org/press-release-results-of-2016-nrmp-main-residency-match-largest-on-record-as-match-continues-to-grow/>

Physician licensure statistics: <http://www.fsmb.org/media/default/pdf/census/2014census.pdf>

The pipeline begins on the left, with undergraduates choosing “pre-med” majors during college, taking the Medical College Admission Test (MCAT), and applying to medical schools. In that last hurdle, approximately 52,000 undergrads submit an average of 15 applications each. Just under 40% are accepted.

Once in medical school, curricula are typically divided into “pre-clinical” phase (M1 and M2) of laboratory and classroom instruction and a “clinical” phase (M3 and M4) involving rotations in an actual practice. Throughout medical school, curricula and assessments are highly standardized through two accrediting bodies. The Liaison Committee on Medical Education (LCME) accredits **allopathic** medical colleges (graduates receive the M.D. degree); and the Commission on Osteopathic College Accreditation (COCA) accredits **osteopathic** medical colleges (graduates receive the D.O. degree).

While osteopathic degrees do contain some alternative training involving manipulation of joints and muscles, the allopathic and osteopathic curricula are similar enough for both disciplines to be considered modern Western medicine.

After medical school graduation is another large hurdle: “**the Match**” between new graduates and post-graduate residency positions. “The Match” has been conducted annually by the private, non-profit National Resident Matching Program (NRMP) since 1952. In “the Match,” a pool of approximately 18,000 US medical school graduates is augmented by a similarly-sized and growing number of **international medical school graduates** (“IMGs”, who may also be US citizens).

Neither the LCME nor the COCA accredits international medical colleges, nor is there an internationally recognized accreditation program for these colleges.³ However, all medical students, including students studying at international medical colleges and intending to practice in the U.S., are required to pass the Step 1, Step 2, and Step 3 of the United States Medical Licensing Examination (USMLE) at the end of their second and fourth years of medical school and the first year of residency, respectively.⁴

Compared with medical school enrollment, the number of first-year (PGY-1) residency positions has increased at a slower rate since the 1950s (this is illustrated in later pages). The differential has raised questions as to the adequacy of first-year residency slots compared to medical student demand, and the residency phase is broadly considered the main “bottleneck” in physician supply today. While the match rate of 75.6% in 2016 for all medical school student and graduate applicants to residency positions appears to support this concern, there is wide variation in match rates by educational program for first-year residents (PGY-1):⁵

- Medical school seniors of U.S. allopathic medical colleges matched at 93.8% in 2016;
- Osteopathic medical college students/graduates matched at 80.3%;
- U.S. citizen IMGs matched at 53.9%; and,
- Foreign citizen IMGs matched at 50.5%.

The lower residency match rates for IMGs may reflect a preference for the quality control offered by accreditation standards applied in the U.S., but not used internationally. Despite lower rates, however, IMGs make up a substantial and increasing proportion of all residents (27%), as well as all physicians practicing in the U.S. (25%).⁶

³ Eckhert, N. Lynn. “Perspective: Private Schools of the Caribbean: Outsourcing Medical Education.” *Academic Medicine*, Vol. 85. No. 4. 2010. p. 626.

⁴ <http://www.princetonreview.com/med-school-advice/usmle>

⁵ Results and Data: 2016 Main Residency Match®. National Resident Matching Program, Washington, DC. 2016. (<http://www.nrmp.org/wp-content/uploads/2016/04/Main-Match-Results-and-Data-2016.pdf>)

⁶ Eckhert, N. Lynn. “Perspective: Private Schools of the Caribbean: Outsourcing Medical Education.” *Academic Medicine*, Vol. 85. No. 4. 2010. p. 625.

Medical education and specialization - primary care shortages

In addition to the general “bottleneck” of residency slots, physician supply faces a secondary problem: financial and cultural disincentives for students to pursue a career in primary care.

Culturally, medical students often report that specialty medicine has greater prestige than primary care.⁷ Additionally, they view internal medicine as both more stressful and less lucrative than other specialties, and are less likely in their fourth year to choose a residency in primary care than when they first entered medical school.⁸

Specialty practice is indeed more lucrative. According to the 2016 Medscape Physician Compensation report, for example, where cardiologists and dermatologists reported average annual incomes of \$410,000 and \$381,000 respectively, the average for family medicine and internal medicine physicians was \$207,000 and \$222,000.⁹

Increasing student debt may also drive U.S. medical students to select higher-paying specialties. Between 1960 and 1984, the percent of medical students graduating with debt increased from 31% to 86%. Since 1984, this number has plateaued, but the average amount of debt has increased substantially.¹⁰ Analysis of both 1989 and 2007 data has found a strong correlation between salary and U.S. medical student residency match rates by specialty, with lower match rates for specialties with lower salaries, such as family medicine and pediatrics.¹¹

The result is that while 49.3%¹² of residency positions might be in primary care specialties,¹³ only 45.4% of those slots were filled by U.S. medical students. The remaining positions were filled by IMGs.¹⁴

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⁷ Gordon, M. 18 September, 2014. “Why I’m Becoming a Primary-Care Doctor”. *The Atlantic*. Retrieved from <http://www.theatlantic.com/health/archive/2014/09/why-im-becoming-a-primary-care-doctor/379231/>

⁸ “Changes in medical students’ views of internal medicine careers from 1990 to 2007.” 2011. *JAMA Internal Medicine*. 171, 8. pp. 744-749. Retrieved from: <http://www.ncbi.nlm.nih.gov/pubmed/21518941>

⁹ Sample size of 19,183 physicians. Orthopedic surgeons top the Medscape list at \$443,000, but there is wide variation in this category, depending on sub-speciality. <http://www.medscape.com/features/slideshow/compensation/2016/public/overview#page=2>

¹⁰ Greysen, R.S., Candice, C., Fitzhugh, M. “A History of Medical Student Debt: Observations and Implications for the Future of Medical Education.” *Academic Medicine*. 86, 7. pp. 840-845. Retrieved from:

http://journals.lww.com/academicmedicine/Fulltext/2011/07000/A_History_of_Medical_Student_Debt__Observations.16.aspx

¹¹ Future Salary and US Residency Fill Rate Revisited. 2008. *Journal of the American Medical Association*. 300, 10. pp. 1131-1132. Retrieved from <http://jama.jamanetwork.com/article.aspx?articleid=182526>

¹² Ibid.

¹³ Ibid. Of those positions, 23.8% were specific to family medicine.

¹⁴ Results and Data: 2016 Main Residency Match®. National Resident Matching Program, Washington, DC. 2016.

Medical education funding - residencies

How residencies are funded is a third major concern. Postgraduate residency programs are part of what is more formally known as **Graduate Medical Education (GME)**, which is almost entirely federally-funded. Estimates from 2012 put total GME funding at approximately \$15 billion annually. The vast majority of GME comes from four federal agencies:

- Medicare (\$9.7 billion);
- Medicaid (\$3.9 billion);
- The Veterans Health Administration (\$1.4 billion); and
- The Health Resources and Services Administration (\$464 million).¹⁵

These federal payments are not made directly to residents, but rather to the sponsoring institutions, with the intention of subsidizing the increased burden of operating a training program.

Because they are the two largest sources, brief descriptions of Medicare and Medicaid GME funding are provided below.

Medicare has funded GME since its inception. Initially, the intent was that the funding would be temporary and thought to be necessary in order to ensure that Medicare beneficiaries had access to the highest-quality teaching hospitals. As Congressional reports noted, “educational activities enhance the quality of care in an institution, and it is intended, *until the community undertakes to bear such education costs in some other way*, that a part of the net cost of such activities (including stipends of trainees, as well as compensation of teachers and other costs) should be borne to an appropriate extent by the hospital insurance program.”¹⁶

Despite this temporary intent, Medicare remains the largest funder of GME today. While previously based on reported costs, since the advent of the Prospective Payment System (PPS) for hospitals in the early 1980s, this funding has come in two flavors: **Direct Graduate Medical Education (DGME)** and **Indirect Medical Education (IME)** funding.

DGME funding is paid to both hospitals and other provider types (including Federally-Qualified Health Centers, the current designation of the UW FMR). The payments are intended to cover residents’ salaries and some facility overhead. DGME funding to PPS acute hospitals is set by statute in a complex formula involving base DGME cost levels in the mid-1980s, current rolling average resident counts, and Medicare patient volume. DGME funding to non-PPS hospitals (i.e., Critical Access Hospitals) and other providers (FQHCs) remains on the somewhat more straightforward cost basis.

IME funding represents the larger share (70%) of Medicare GME payments, and comes in the form of an adjustment factor to Medicare prospective inpatient reimbursement rates. Adjustment factors are specific to each hospital, and the formula is far more complex than DGME; for the purposes of this study, note only that, because it is built in as an adjustment to hospital prospective payment rates, IME is not available to non-PPS hospitals and other providers like the UW FMR program.

¹⁵ An excellent primer on Graduate Medical Education generally is: Eden et al. “Graduate Medical Education that Meets the Nation’s Health Needs.” National Academies Press. 2014
(http://www.ncbi.nlm.nih.gov/books/NBK248027/pdf/Bookshelf_NBK248027.pdf)

¹⁶ 1965 Social Security Act (Senate Report No. 404, Pt. 1, 89th Congress, 1st Sess. 36 [1965]; H.R. No. 213, 89th Cong., 1st Sess. 32 [1965]).

Federal legislation has periodically tweaked both DGME and IME formulas over the years. Most significantly, the 1997 Balanced Budget Act (BBA) capped the number of residency positions funded by Medicare at 1996 levels, due to fears that cost-based GME was inflationary and encouraging the overproduction of physicians. **Medicaid** is the second largest payer of GME in the US. Currently, 42 states have some kind of GME methodology built into their program. Wyoming does not. Unlike Medicare, Medicaid GME payments are not standardized, since there is actually no statutory authority for Medicaid to pay for medical education costs in the first place. All GME payments must therefore be incorporated into the rates for other Medicaid covered services, typically as add-on payments to inpatient hospital rates.¹⁷ Because the funding is built into rates for medical services, targeting funding towards specific State priorities has been difficult.

The absence of statutory authority does allow some flexibility, however. The Centers for Medicare and Medicaid Services (CMS) has historically given states the latitude to devise various payment methodologies in their State Plans, as long as the payments do not exceed what Medicare would have paid for the services.

Some creative examples of how States have attempted to tailor Medicaid GME funding towards primary care medical education include:¹⁸

- Ohio has paid Medicaid GME to teaching hospitals under its inpatient rate structure since 1984.¹⁹ The State has recently proposed, however, to withhold 25% of these funds and place them into a pool that could be targeted to residency programs that better meet the State’s medical workforce needs (i.e., in underserved areas, or producing primary care specialties).
- New Mexico is proposing to incorporate GME payments into its per-encounter rates to Federally Qualified Health Centers involved in training residents. CMS has not yet approved the State Plan Amendment.
- Colorado is developing a resident provider loan repayment program through Memoranda of Understanding with the hospitals and providers receiving Medicaid GME funding. In other words, the funding comes through the traditional service-benefit Medicaid channels, but the providers agree to use the funds for the specific loan repayment program.

While many creative methodologies are possible, all Medicaid GME proposals must (a) be built into service rates, (b) approved by CMS through the State Plan, and (c) not exceed what Medicare would have paid.

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¹⁷ <https://www.federalregister.gov/documents/2007/05/23/07-2576/medicaid-program-graduate-medical-education#h-11>

¹⁸ “State Examples of Medicaid Graduate Medical Education Initiatives.” National Governor’s Association memorandum of 9/9/2016.

¹⁹ <http://www.healthtransformation.ohio.gov/LinkClick.aspx?fileticket=WvonZuMotws%3d&tabid=162>

The development of modern medical education

The current system of medical education and its funding is the product of a unique history involving interactions between physician quality, physician supply, and government intervention in the education market. These are important to summarize because the same dynamics affected the founding of the UW Family Medicine Residency program in the 1970s.

While medical education first began in the United States as an apprenticeship system, by the mid-19th century it had devolved into a growth industry of diploma mills and quackery.²⁰ Most schools at the time were for-profit, had virtually no entrance requirements, and promised a degree after two 16-week semesters filled with lectures, textbooks, and rote memorization.²¹

This began to change in the late 19th century, when the concept of modern medicine (i.e., evidence-based, and built around germ theory) spread from Paris, Vienna and Berlin to a handful of medical schools on the East Coast and Midwest. Establishments like the Johns Hopkins School of Medicine (1893) set the new standard for education, requiring a college degree for admission, and building a four-year curriculum around hands-on clinical work and laboratory study.

It wasn't until the early 20th century, however, that the rest of the industry was purged. The catalyst was a report written by Dr. Abraham Flexner for the Carnegie Foundation in 1910. To write the report, Flexner toured 155 medical schools in the United States, evaluating each along a set of standard criteria. An example for Denver and Gross College of Medicine is shown in Figure 2, below.

Figure 2: Excerpt of Flexner's evaluation of Denver and Gross College of Medicine

DENVER: Population, 158,329.

(1) DENVER AND GROSS COLLEGE OF MEDICINE. Organized by consolidation 1902. Nominally the medical department of the University of Denver, with which institution it has, however, only a six months' contract; to all intents and purposes, a proprietary school, managed by its own faculty.

Entrance requirement: Less than high school graduation, loosely enforced.

Attendance: 109, over one-half from Colorado.

Teaching staff: 44 professors and 35 of other grade, none of them giving their whole time to teaching.

Resources available for maintenance: The school has no resources but fees, amounting to \$12,624 per annum (estimated).

Laboratory facilities: Its equipment consists of a chemical laboratory of the ordinary medical school type, a dissecting-room, containing a few subjects as dry as leather, a physiological laboratory with slight equipment, and the usual pathology and bacteriology laboratories. There is a total absence of scientific activity. The rooms are poorly kept. A few cases of books are found in the college office behind the counter.

On the whole, Flexner found an “enormous over-production of un-educated and ill-trained medical practitioners ... in absolute disregard of the public welfare.” And in its place, Flexner proposed a series of foundational reforms.²² Most importantly, these included:

- The adoption of the **scientific method** and evidence-based medicine (at the time, this included vaccination, antiseptic surgery, public sanitation and laboratory work), instead of prevalent alternatives (e.g. bleeding, homeopathy, chiropractic).

²⁰ Flexner, Abraham. “Medical education in the United States and Canada.” Carnegie Foundation for the Advancement of Teaching. Bulletin No. 4. 1910. http://archive.carnegiefoundation.org/pdfs/elibrary/Carnegie_Flexner_Report.pdf

²¹ Ludmerer, Kenneth. “Understanding the Flexner report.” *Academic Medicine*, Vol. 85. No. 2. 2010.

²² Beck, Andrew. “The Flexner Report and the standardization of American medical education.” *Journal of the American Medical Association*. 2004. <http://jama.jamanetwork.com/article.aspx?articleid=198677>

- Enforcing a “**uniformly arduous and expensive**” German model of university-based medical education, with stringent entry requirements, rigorous standards, and an emphasis on original research and learning-by-doing.

With the financial backing of the Rockefeller Foundation, support from the American Medical Association, and the regulatory power of state licensing boards, standards were sharply increased and hundreds of diploma mills were shut down. By the 1930s, medical education had been effectively professionalized.²³

“Physician shortage” to “physician surplus” and back again

Raising the barriers to entry, however, had the side-effect of decreasing the overall supply of physicians. The number of medical schools and enrollees roughly halved between 1910 and 1930. And where Flexner had noted an overall rate of approximately 176 physicians per 100,000 people in 1910,²⁴ rates had fallen to approximately 120 per 100,000 by 1950.²⁵ In a prosperous post-war United States, where medical care was seen as increasingly relevant to health and longevity, this perceived physician shortage became alarming.

In 1953, a commission established by President Truman released the first major report calling for major public investments in medical education. This was followed by three reports in 1958 - 60 (most famously the Surgeon General’s “Bane Report” of 1959) and an increasing number of journal articles and op-eds with the same call to action. From this point until the mid-1970s, the zeitgeist was straightforward: there were not enough doctors, and the government needed to do something about it. And, indeed, from 1963 to 1976, Federal legislation began to fund medical education in earnest, largely through amendments to Title VII of the Public Health Service Act:²⁶

- The **Health Professions Educational Assistance Act** (PL 88-129, 1963) provided significant matching funds for medical school construction and medical student loans.
- The **Health Professions Educational Assistance Amendments** (PL 89-290, 1965) continued medical school construction funding, and added scholarships and other financial assistance to students.
- **Medicare** (1965) included the concept of Graduate Medical Education funding for residencies.
- The **Health Manpower Act** (1968) continued construction funding, and began including nurse and other allied health professional training.
- The **Comprehensive Health Manpower Training Act** (1971) reorganized medical school funding on a capitated incentive basis. The act also began funding post-graduate training (e.g. residencies).
- The **Health Professions Educational Assistance Act** (1976) extended capitated grant support and scholarship

This influx of federal funding had a large impact: the number of medical schools, the number of students, and ultimately the overall physician supply began to grow in earnest. The effort was successful enough that, by the 1980s, advisory bodies began to warn of an impending “physician surplus”.

²³ <https://www.hsph.harvard.edu/news/magazine/centennial-reports-around-world/>

²⁴ Flexner reports an average of 1 physician for every 568 people. 14.

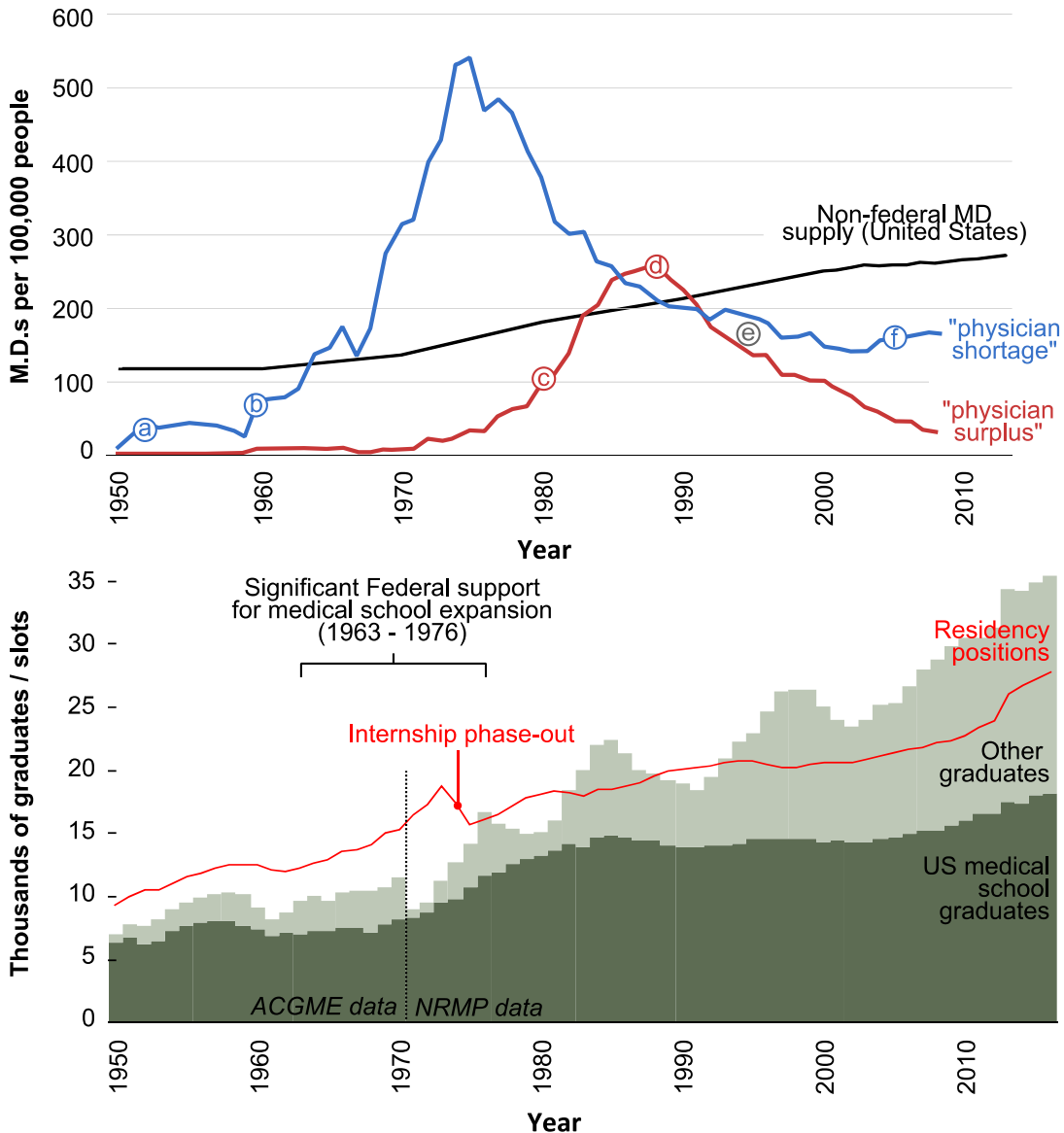
²⁵ Health Resources and Services Administration (HRSA) Area Health Resource File (2015)

²⁶ MacBride, Own. “An overview of the Health Professions Educational Assistance Act.” Robert Wood Johnson Foundation. June 1973. (<http://files.eric.ed.gov/fulltext/ED111245.pdf>) and “Health Professions Educational Assistance Act of 1976.” HRSA. Sept. 1977 (<http://files.eric.ed.gov/fulltext/ED148192.pdf>) and Reynolds, Preston. “A legislative history of Federal assistance for health professions training in primary care medicine and dentistry in the United States, 1963 - 2008.” Academic Medicine, 2008.

Trends in physician supply and *perceived* physician supply since 1950 are summarized in the top half of Figure 3, below. The actual per-capita supply of M.D.s is the black line, and the measures of the “zeitgeist” -- perceptions of that supply -- is shown by the blue and red lines.²⁷

The bottom half of Figure 3 shows the input side: the number of medical school graduates (U.S. seniors in dark green, IMGs in light green) and total residency positions (red line) over the same time period. Note how the doubling of medical school graduates was directly correlated (i.e., with a four-year lag) to the 1963 and 1976 period of federal support for medical education.²⁸

Figure 3: Trends in physician supply, perceived physician supply, and medical education opportunities in the United States, 1950 - 2013.



²⁷ HRSA, 2015 and Google Books Ngram Viewer.

²⁸ National Resident Matching Program, Results and Data: 2016 Main Residency Match®. National Resident Matching Program, Washington, DC. 2016. ACGME data from Liaison Committee on Graduate Medical Education. Directory of Accredited Residencies. 1977-78. American Medical Association. Table 14. Note that NRMP and ACGME data are not entirely equivalent; the ACGME counted all graduates, for example; NRMP only counts active applicants. The discrepancy is marked by a dashed line on the figure.

Table 1, below, notes the landmark studies annotated on Figure 3. On the table, blue shading indicates an overall “physician shortage” conclusion, red shading indicates a “physician surplus” conclusion, and gray indicates a mixed conclusion.

Table 1: Landmark studies on medical education.

	Year	Report	Major Conclusions
(a)	1953	President’s Commission on the Health Needs of the Nation ²⁹	<ul style="list-style-type: none"> Substantial national shortage of physicians. Recommended State and Federal supplementary funding to medical education.
(b)	1959	Bane Report ³⁰	<ul style="list-style-type: none"> More physicians needed. Recommended significant increase in public and private support for medical education.
(c)	1980	Graduate Medical Education National Advisory Committee (GMENAC) ³¹	<ul style="list-style-type: none"> Used disease-based need model to project a physician oversupply of 70,000 in most specialties by 1990. Small surplus in family practice. Recommended 17% decrease in medical school enrollment, restrictions on international medical graduates and reductions to residency positions. Geographic distribution more of a concern.
(d)	1988	Council on Graduate Medical Education (COGME I) ³²	<ul style="list-style-type: none"> Aggregate oversupply of physicians, with some undersupply of family practice/primary care. Geographic maldistribution of physicians (rural and inner city). Recommended no change to graduate medical education funding.
(e)	1994	Council on Graduate Medical Education (COGME IV) ³³	<ul style="list-style-type: none"> Unbalanced workforce: too many specialists, too few generalists. Geographic maldistribution continuing. By 2000, 50% of residency graduates should be generalists.
(f)	2005	Council on Graduate Medical Education (COGME XVI) ³⁴	<ul style="list-style-type: none"> Potential shortage as physician supply grows more slowly than demand after 2010, largely due to aging workforce and aging population with more health needs. Recommended increase in medical school enrollment and residency slots.

Since the “physician surplus” conclusions of the 1980s, the picture has become more nuanced. Generally speaking, more recent studies indicate that, while the workforce appears to be returning to a “shortage” condition, most of the shortages are in primary care.

²⁹ “Building America’s health.” 1953. Vol. 1. <https://babel.hathitrust.org/cgi/pt?id=mdp.39015031051298;view=1up;seq=17>

³⁰ “Physicians for a growing America.” US Public Health Service. 1959. <https://archive.org/details/physiciansforagr022196mbp>

³¹ Graduate Medical Education National Advisory Committee: Summary Report to the Secretary, Department of Health and Human Services (DHHS), Vol 1, publication No. (HRA) 81-651. Hyattsville, Md, Health Resources Administration, 1980 (<http://eric.ed.gov/?id=ED210990>)

³² Council on Graduate Medical Education: The First Report of the Council, Vol 1. Rockville, Md, DHHS, July 1, 1988. <http://www.hrsa.gov/advisorycommittees/bhpradvisory/cogme/Reports/1streportvoli.pdf>

³³ Council on Graduate Medical Education: The Fourth Report of the Council, Vol 1. Rockville, Md, DHHS, July 1, 1994. <http://www.hrsa.gov/advisorycommittees/bhpradvisory/cogme/Reports/fourthreport.html>

³⁴ Council on Graduate Medical Education. “Physician workforce policy guidelines for the United States, 2000-2020.” Sixteenth report. Washington, DC: Health Resources and Services Administration, January 2005. <http://www.hrsa.gov/advisorycommittees/bhpradvisory/cogme/reports/sixteenthreport.pdf>

Medical education in Wyoming

The history of medical education in Wyoming (see Appendix A for a more detailed timeline) mirrors these national trends. The State first began to send students to the University of Colorado medical school in 1949, around the time the “physician shortage” was beginning to manifest itself.

One year later, Sen. Rudolph “Rudy” Anselmi (D - Sweetwater) and Sen. C.H. Carpenter (R - Natrona) introduced legislation authorizing UW to contract with other institutions to provide medical education. This was passed and enacted as W.S. § 21-347. The bill also contained an \$18,000 appropriation to the University, but was not immediately used.

In 1952, however, Wyoming did begin to participate in the Western Interstate Commission for Higher Education (WICHE) program. WICHE was established as a “compact” system, in that all States who paid into the system through a per-student subsidy would receive in-state tuition at participating medical schools.

In the 1960s and early 1970s, as the “physician shortage” crisis intensified and the federal government began its massive investments in medical education, several studies in Wyoming began fielding various options for State-level involvement. While all agreed that Wyoming needed more doctors, policy recommendations ranged from creating a four-year medical school at the University of Wyoming to extending inter-state collaborations like WICHE.

The seminal report that influenced gubernatorial and legislative action on the residency program, however, was written by Dr. Stephen C. Joseph of the UW Medical Education Planning Committee in 1974. The Joseph Report envisioned a hybrid system of medical education, to include:

- An **undergraduate medical degree program** at the University of Wyoming, with an annual class size of approximately 30 students;
- Affiliations with **community hospitals** and other providers to provide the bulk of medical students’ clinical training (the report specifically excludes the construction of a university hospital or medical center);
- Affiliation with an **out-of-State medical center** to provide students more specialized experience;
- Development of a **family medicine residency** at community hospitals in Wyoming affiliated with the University;
- **Coordination** between the undergraduate, postgraduate and continuing education phases of medical training; and,
- A **separate source of funding** for medical education, “in order to protect the University of Wyoming’s present financial resources, which are required for current needs.”³⁵

Additionally, the Report recommended designing the system along four major principles:

- Medical education in Wyoming should be directly tied to the **healthcare delivery system**;
- **Family practice** and **primary care** should be emphasized;
- Education should encourage a **team approach**; and,
- The use of **technology** should be maximized for distance education.

³⁵ “Medical education for community health care: a plan for Wyoming.” Joseph, Stephen C. Laramie, WY. June, 1974. 6-7.
Wyoming Department of Health | UW Residencies Review | Oct 1, 2016

According to Dr. Joseph, recommending a hybrid system was a relatively straightforward decision. It simply did not make financial or practical sense for the University of Wyoming to attempt to build a large medical center. At the same time, however, while out-of-State programs like WICHE and WWAMI provided excellent educational opportunities, Dr. Joseph observed that physician recruitment and retention to Wyoming was correlated largely with personal ties to the State -- in many cases, who the medical students ended up marrying.³⁶ For that reason, the Joseph report recommended keeping as much of the classroom and clinical education as in-State as possible, while contracting out one or two clinical rotations to out-of-State medical centers.

The Joseph Report was sent to Governor Hathaway in 1974, and the Governor, in turn, submitted the medical recommendations to the Legislature in time for the 1975 Budget Session.

Only the development of the residencies, however, was initially funded that year through an appropriation inserted into the Governor's Office budget. This allowed the Casper site to be established in 1976. The rest of the medical education system conceived in the Joseph Report, however, was ultimately voted down in the Special Session of 1978.

The residencies were therefore implemented as a fragment of an otherwise comprehensive system. And while other pieces of this system were gradually put into place (i.e., the contract with Creighton, and then WWAMI), this history has effects on the current operational challenges of the residency programs, described in Part II of this study.

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³⁶ Phone conversation with Dr. Joseph. Sept. 27, 2016.

The purpose of the UW Family Medicine Residency Programs

Despite being only partly established, the vision articulated in the Joseph Report expresses the core purpose of the residency programs: **to improve the number and distribution of family medicine physicians within Wyoming.**

The emphasis on **increasing the number of physicians** in Wyoming is clear throughout the Joseph Report, and this core purpose is corroborated by UW reports in 1983³⁷ and 1985.³⁸ As part of this emphasis, the Report voices frustration with Wyoming’s experience in the WICHE program from 1953 to 1969.³⁹ Dr. Joseph notes the poor retention (23%) in the number of newly-minted physicians returning to Wyoming to practice, and the increasing cost per retained physician (up to approximately \$400,000 in 2015 dollars), as shown in the table reproduced and augmented below.

Table 2: Wyoming residents assisted in obtaining M.D. by grant-in-aid or WICHE, 1953-69⁴⁰

MD Class Year	Number of students funded	... who received MD	... who practiced in WY	Percent of class practicing in WY	Total stipend cost	... in 2015 dollars ⁴¹	Cost per returned physician (2015 dollars)
1954	7	6	3	43%	\$48,670	\$648,025	\$216,008
1955	5	5	2	40%	\$40,000	\$521,822	\$260,910
1956	7	5	2	29%	\$43,200	\$530,011	\$265,005
1957	6	5	2	33%	\$42,000	\$494,178	\$247,088
1958	6	6	2	33%	\$48,000	\$556,322	\$278,161
1959	7	7	2	29%	\$56,000	\$636,753	\$318,376
1960	5	3	1	20%	\$27,300	\$304,740	\$304,739
1961	4	2	1	25%	\$26,000	\$282,615	\$282,615
1962	3	3	1	33%	\$24,000	\$254,255	\$254,255
1963	3	3	1	33%	\$24,000	\$248,488	\$248,488
1964	9	9	3	33%	\$72,000	\$731,305	\$243,768
1965	1	1	0	0%	\$8,000	\$78,866	-
1966	4	4	0	0%	\$32,000	\$301,087	-
1967	3	3	0	0%	\$24,000	\$214,886	-
1968	6	6	1	17%	\$52,000	\$439,912	\$439,912
1969	8	6	1	13%	\$51,300	\$406,319	\$406,318

³⁷ The 1983 UW report writes that “a 52 percent retention rate of our graduates from the residency programs ... compares rather favorably with the National retention rate of residents locating in their state of residency training.” “Wyoming Family Practice Residency Program: data from the University of Wyoming.” Sept. 1983.

³⁸ The 1985 report notes the purpose of “providing opportunities for medical education for Wyoming residents; attempting to attract a greater number of physicians to the state; encouraging physicians to locate in rural, underserved areas; and encouraging physicians with a family practice background to practice in Wyoming.” “Report on the school of human medicine.” University of Wyoming. Ad Hoc Committee, Board of Trustees. Miracle et. al. 1985.

³⁹ “Medical education for community health care: a plan for Wyoming.” Joseph, Stephen C. Laramie, WY. June, 1974. 10.

⁴⁰ Ibid.

⁴¹ Using state and local implicit price deflator (US Bureau of Economic Analysis - series A829RD3A086NBEA)

A second, related theme throughout the Joseph Report is the concern over the **distribution** of physicians within the State. Along with dissatisfaction with the WICHE experience in total retention noted above, the Report points out that this had worsened in the same time period:

By 1973, the nation’s physician/population ratio had increased to 169 physicians per 100,000 inhabitants, and while Wyoming overall figures had just kept pace with this increase, remaining at 62 percent of the national ratio, no progress in improving the unfavorable position had been made. Further, when we look again at the two groupings of counties, we can see that the position of the more rural, declining population counties worsened to only 49 of the national figure, while the less rural areas with increasing population improved, but less strikingly, to 66 percent of the national ratio.⁴²

How the numbers and distribution of physicians in Wyoming have actually trended between the 1940s and today is the focus of the next sub-section. Before moving on, however, it is important to note an important tertiary purpose of the residency programs: providing **indigent care** to the uninsured.

While not a major theme in previous reports, indigent care first emerges in the 1983 UW report, which notes that “we accept all patients who are referred to us and all those who walk through our doors... regardless of ability to pay” and that 30% of the clients in Cheyenne and over 50% of the clients in Casper were uninsured, illustrated in Table 3, below.⁴³

Table 3: UW FMR payer mix, 1983.

Site	Casper	Cheyenne
Private insurance	34%	53%
Medicare	1%	3%
Medicaid	11%	14%
Uninsured	54%	30%

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⁴² “Medical education for community health care: a plan for Wyoming.” Supplemental Report. Joseph, Stephen C. Laramie, WY. June, 1974. 23

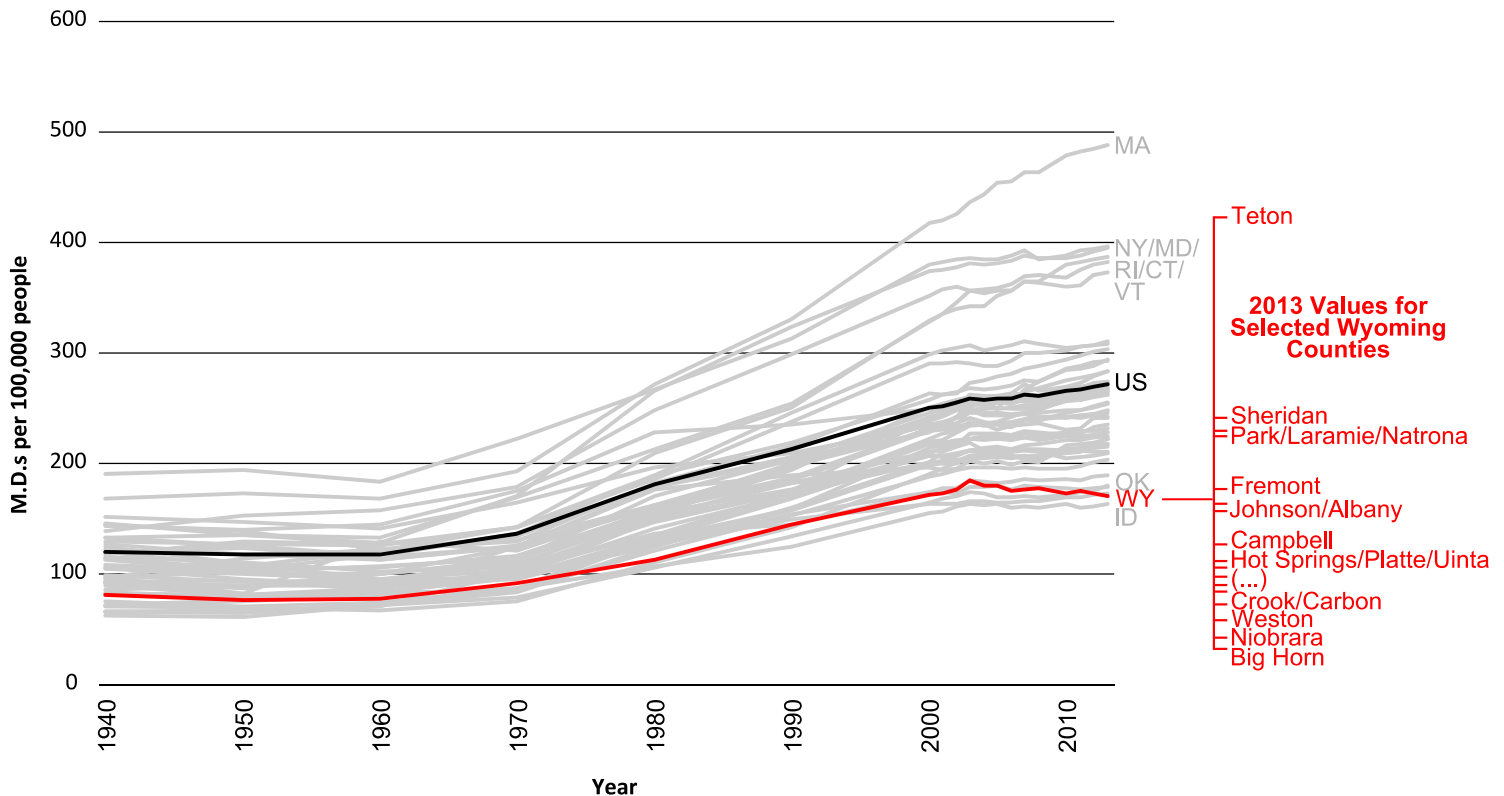
⁴³ “Wyoming Family Practice Residency Program: data from the University of Wyoming.” Sept. 1983.

Provider shortages in Wyoming

Since the establishment of the residency programs, while the ratio of providers to population has increased statewide, disparities between counties have worsened.

Compared with other states, Wyoming today continues to have one of the lowest concentrations of healthcare providers per capita. As shown by the rate of active, non-federal M.D.s per 100,000 people on Figure 4, below, only Idaho has a lower supply.

Figure 4: Total active, non-federal M.D. physicians per 100,000 people, by state in the continental U.S., excluding DC (1940 - 2013).⁴⁴



Note on the figure, however, that this average masks significant variation in physician supply within the State. While Big Horn, Niobrara, and Weston counties have exceptionally low rates, for example, Teton County has more M.D.s per capita than any state but Massachusetts.

These disparities have widened over time. Table 4, on the next page, shows that physician supply rates were actually fairly even across the State in the 1940s and 50s. Since then, M.D. supply has doubled, tripled, and even quadrupled in some counties while remaining flat, or even decreasing, in others.

By this measure, particularly underserved counties include Big Horn, Carbon, Crook, Lincoln, Niobrara, Sweetwater, and Washakie. Relatively well-supplied counties include Teton, Natrona, Laramie, Sheridan, and Park.

⁴⁴ Health Resources and Services Administration, Area Health Resource File (2015), AMA. Note that this indicator excludes federal employees (e.g. military doctors or Public Health Service), as well as osteopathic physicians (D.O.s). It is used here because it is the only consistent indicator of physician supply continuously tracked since 1940.

The total number of M.D.s with an active medical license, of course, is not the best measure of county-wide access to care, for three reasons:

- A certain number of actively-licensed M.D.s do not actually provide care to patients; they might be in teaching, research, or administrative roles.
- A large fraction of active M.D.s are specialists, not primary care providers, where county-level access might be more meaningful.
- Several other provider types besides physicians are available to provide primary care services. These include other physician types (osteopaths, or D.O.s) and lower-level primary care providers, like Physician Assistants (PAs) and Advanced Practice Registered Nurses (APRNs).

Table 4: Average active, non-federal MDs per 100,000⁴⁵

County	Period							
	2013 - 2007	2006 - 2001	2000- 1990	1990 - 1980	1980 - 1970	1970 - 1960	1960 - 1950	1950 - 1940
Albany	187.9	223.3	173.5	133.6	108.1	88.1	74.4	79.0
Big Horn	48.7	61.9	50.1	53.6	68.2	77.3	59.8	49.8
Campbell	129.3	143.0	125.2	100.4	80.4	58.5	65.4	46.3
Carbon	76.4	92.3	89.7	67.4	68.2	81.6	72.4	81.9
Converse	106.0	110.5	60.5	47.6	50.0	56.9	48.8	72.0
Crook	55.7	55.3	35.8	37.7	30.6	21.7	31.9	39.2
Fremont	180.8	202.3	189.9	169.2	118.9	64.2	56.9	56.2
Goshen	94.8	93.9	84.2	82.0	74.6	74.9	81.6	68.5
Hot Springs	123.0	168.5	154.9	95.2	103.8	106.2	86.2	91.8
Johnson	146.9	120.7	106.3	85.9	73.2	54.1	58.8	72.2
Laramie	235.3	227.2	213.3	178.5	143.3	110.0	95.7	97.3
Lincoln	69.3	67.8	81.0	56.5	38.5	56.8	72.2	77.7
Natrona	233.0	226.5	220.8	178.1	134.0	105.2	97.7	94.2
Niobrara	13.6	29.1	40.8	18.5	34.5	74.6	70.6	56.1
Park	230.9	227.2	187.8	127.2	101.3	89.1	87.2	99.2
Platte	104.5	80.8	76.9	49.8	38.0	51.5	66.2	81.8
Sheridan	219.6	180.9	193.4	170.8	126.2	100.5	95.6	94.9
Sublette	94.4	116.3	111.9	86.0	73.2	53.3	79.4	94.3
Sweetwater	80.3	97.1	87.7	74.5	65.1	58.2	65.3	79.9
Teton	409.7	405.6	309.0	276.7	225.4	113.9	71.4	80.0
Uinta	119.2	134.5	111.9	97.8	110.0	117.2	81.1	96.6
Washakie	76.6	113.2	89.9	72.6	76.9	67.5	55.6	60.6
Weston	58.9	82.6	53.3	58.8	59.7	21.1	0.0	0.0

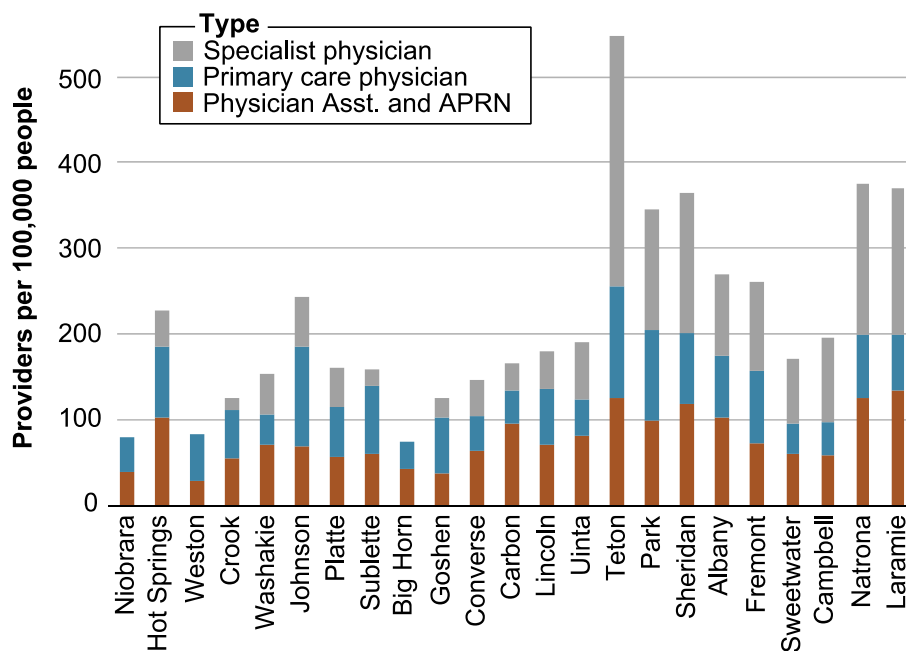
When these adjustments are factored in, discrepancies between counties lessen. Table 5, on the next page, shows the count of these other providers and Figure 5, on the same page, shows the rate of these providers per 100,000 people, by county.

⁴⁵ Area Health Resource File 2015. Health Resources and Service Administration, accessed 5/1/2016. Note that, while many years of data are available from 2000 - 2013, only one year of data is available for the periods before 2000 (e.g. 1940, 1950, 1960); averages are thus less precise. Active non-federal MDs does not include federal (e.g. Public Health Service or military) doctors, nor does it include D.Os (approximately 109 in 2013, compared with 992 MDs)

Table 5: 2013 - Patient care health professionals, by county (HRSA)

County	Physicians in patient care		... of which, are primary care	Physician Assistants	Advance Practice RNs
	MDs	DOs			
Albany	58	5	27	6	32
Big Horn	4	0	4	3	2
Campbell	60	6	19	12	16
Carbon	9	2	6	10	5
Converse	12	0	6	4	5
Crook	5	0	4	2	2
Fremont	71	6	34	10	20
Goshen	12	0	9	0	5
Hot Springs	5	1	4	2	3
Johnson	14	1	10	2	4
Laramie	207	19	63	42	86
Lincoln	15	5	12	6	7
Natrona	180	22	59	54	48
Niobrara	1	0	1	0	1
Park	65	7	31	18	11
Platte	9	0	5	1	4
Sheridan	68	6	25	16	19
Sublette	8	2	8	2	4
Sweetwater	39	11	16	15	12
Teton	86	8	29	5	23
Uinta	19	4	9	4	13
Washakie	7	0	3	1	5
Weston	4	0	4	2	0

Figure 5: Rates of various health care professionals to county population, 2013



PART II: OPERATIONS REVIEW

Summary

The UW Family Medicine Residency (UWFMR) program provides two major services: (1) comprehensive primary care (both on an outpatient and inpatient basis) and (2) training future doctors.

These services cost approximately \$17 million per year. Payment sources include \$9.8 million of State General Funds (SGF) and \$5.4 million in clinic revenue. In addition, there are an estimated \$1.8 million in indirect costs to hospitals.

The UWFMR is less efficient at delivering primary care services than both State and national averages for other clinics. This is partly due to the higher overhead of operating a residency program, as well as the high cost of the State employee benefits package. Its client base is largely women and children, and approximately 22% of the clients are uninsured, which is higher than the background population.⁴⁶

In terms of its core purpose, the residency is more efficient than the national average at training physicians, and a higher proportion of its graduates practice in rural areas or provider shortage areas. However, the quality of the program, while improving since 2011, remains slightly below average. UW clinical faculty are also paid less than their peers in the Washington-Wyoming-Alaska-Montana-Idaho (WWAMI) network.

Additionally, in-State retention rates of 23% are poor when compared with almost all other states. This study therefore estimates the program cost per physician retained in Wyoming at approximately \$1.77 million, an investment representing an effective annual cost of \$87,000 to \$109,000 per year, of which \$57,000 to \$71,000 (65%) is paid by the State.

Inputs and Outputs

Inputs: State General Funds and clinic revenue

In SFY 2015, the cost of the UW residency programs totaled \$15.2 million. \$5.4 million of this was recouped in clinic revenue, meaning that approximately \$9.8 million (64% of total cost) was subsidized by the State General Fund. Table 6, below, breaks down cost and revenue by site and by series. Note that the Casper program is more 'self-sufficient' than the Cheyenne program, in that clinic revenue covered a greater fraction of its costs.

Table 6: Expenditures and revenues, SFY 2015⁴⁷

	Casper	Cheyenne	Total
Revenue	\$3,581,079.30	\$1,854,761.18	\$5,435,840.48
Costs	\$8,292,213.67	\$6,921,214.17	\$15,213,427.84
100-series	\$6,607,638.51	\$5,084,936.43	\$11,692,574.94
200-series	\$1,014,283.57	\$682,903.71	\$1,697,187.28
300-series	\$173,379.25	\$111,965.59	\$285,344.84
400-series		\$3,676.40	\$3,676.40
900-series	\$496,912.34	\$1,037,732.04	\$1,534,644.38
SGF Subsidy	\$4,711,134.37	\$5,066,452.99	\$9,777,587.36
SGF Subsidy (%)	56%	73%	64%

⁴⁶ SAHIE estimated Wyoming's under-65 uninsured population at 69,582 in 2014, which is 14% of that demographic group.

⁴⁷ UW accounting data, SFY 2015.

As shown in Table 7, below, the largest sources of clinic revenue for the residency programs are Medicare, Medicaid, and private insurance, in that order. Each of these pay sources makes up approximately one-third of total revenue; a small remainder comes from self-pay, grants, and the KidCare CHIP program.

Table 7: Clinical revenue sources, both clinics⁴⁸

Pay Source	Est. Total	Percent
Medicare	\$1,764,045.79	32.5%
Medicaid	\$1,580,049.54	29.1%
Private insurance	\$1,554,785.77	28.6%
Self-pay	\$342,090.87	6.3%
Grants	\$153,011.35	2.8%
CHIP	\$41,857.15	0.8%
Total	\$5,435,840.48	

Because self-pay clients pay on a sliding-fee scale according to family size and income, the residencies also provide approximately \$1.2 million worth of uncompensated care, as shown on Table 8, below. Unreimbursed care therefore represents approximately 12% of the total SGF subsidy.

Table 8: Uncompensated care (SFY 2015)

Site	Billed charges	Est. cost ⁴⁹
Casper	\$1,016,496	\$859,956
Cheyenne	\$411,540	\$348,163
Total	\$1,428,036	\$1,208,118

Inputs: Graduate Medical Education payments

In SFY 2016, Medicare began paying the residencies for its share of DGME (approximately \$300,000 per year for both sites) but this is not reflected in the SFY 2015 revenue figures.

Medicare also estimates the cost of IME to the hospitals in Cheyenne and Casper. Due to the complexity of the cost reporting, hospitals may not actually *receive* these payments, but they are the best estimate of the indirect costs of the residency programs. While SFY 2015 data was not available in the hospital cost reports, IME costs are assumed to be similar to SFY 2014, i.e., totaling approximately \$1.9 million. Table 9, below, illustrates the trend in IME over time for Cheyenne Regional Medical Center (CRMC) and Wyoming Medical Center (WMC).

Table 9: Total Medicare Indirect Medical Education (IME) costs to Wyoming hospitals⁵⁰

Fiscal Year	CRMC	WMC	Total IME
2010	\$752,004	\$882,000	\$1,634,004
2011	\$735,904	\$638,670	\$1,374,574
2012	\$730,085	\$966,087	\$1,696,172
2013	\$661,875	\$949,511	\$1,611,386
2014	\$702,880	\$1,175,720	\$1,878,600

Note that residencies do not receive any financial support from the hospitals.

⁴⁸ HRSA UDS, 2015 (both centers), combined with UW accounting data.

⁴⁹ Using an estimated cost-to-charge ratio of 0.846, calculated from Medicare charges vs. costs as reported on Worksheet V

⁵⁰ CMS Healthcare Cost Report Information System (HCRIS), Worksheet E, Part A, Line 29, Column 1

Outputs

The residencies use these dollars to produce three services:

- **Trained providers.** As established in the background section, the primary purpose of the residencies is to train physicians in family practice medicine. The resident training process takes three years; after graduation, residents must take and pass the American Board of Family Medicine exam in order to become board-certified. From 2010 to 2015, the Casper residency produced an average of 7.3 graduates each year (of a potential total of 8), and the Cheyenne program an average of 5.8 graduates, (of a potential total of 6), for an average total of 13.1 graduates per year.

In addition to these graduates, the residencies also train other providers -- physician assistants and nurse practitioners, for example -- but these numbers are not tracked.

- **Primary care - outpatient visits.** As Federally-Qualified Health Centers (FQHCs), the residencies also provide comprehensive primary and preventive care to clients, regardless of ability to pay (e.g. on a sliding-fee scale for those who are uninsured). In SFY 2015, the UW FMR cost report counted 37,949 visits. Adjusted to match UW accounting data for the costs, this total is estimated at 38,447, with Casper residency producing 56% of the visits (21,530) and Cheyenne producing 16,917. These outpatient services included:

- Evaluation, management and counseling by a physician, nurse practitioner (NP), or physician's assistant (PA);
- Pre- and post-natal care and counseling (to include approximately 318 deliveries);⁵¹
- Immunizations and preventive screenings, to include laboratory testing and imaging; and,
- Mental health services.

- **Primary care - off-site visits.** These are the evaluation and management visits by the physician faculty, residents, case managers, and other staff to their patients who are in a hospital or nursing home. These visits are critical to the inpatient-side of resident training, but are not counted as an FQHC output, as most clinics do not perform this function.

In SFY 2015, the Casper faculty and residents conducted 7,642 other visits and the Cheyenne staff 4,785 visits. Additionally, the Casper and Cheyenne sites recorded 5,499 and 670 other outpatient visits beyond the FQHC cost report, respectively.

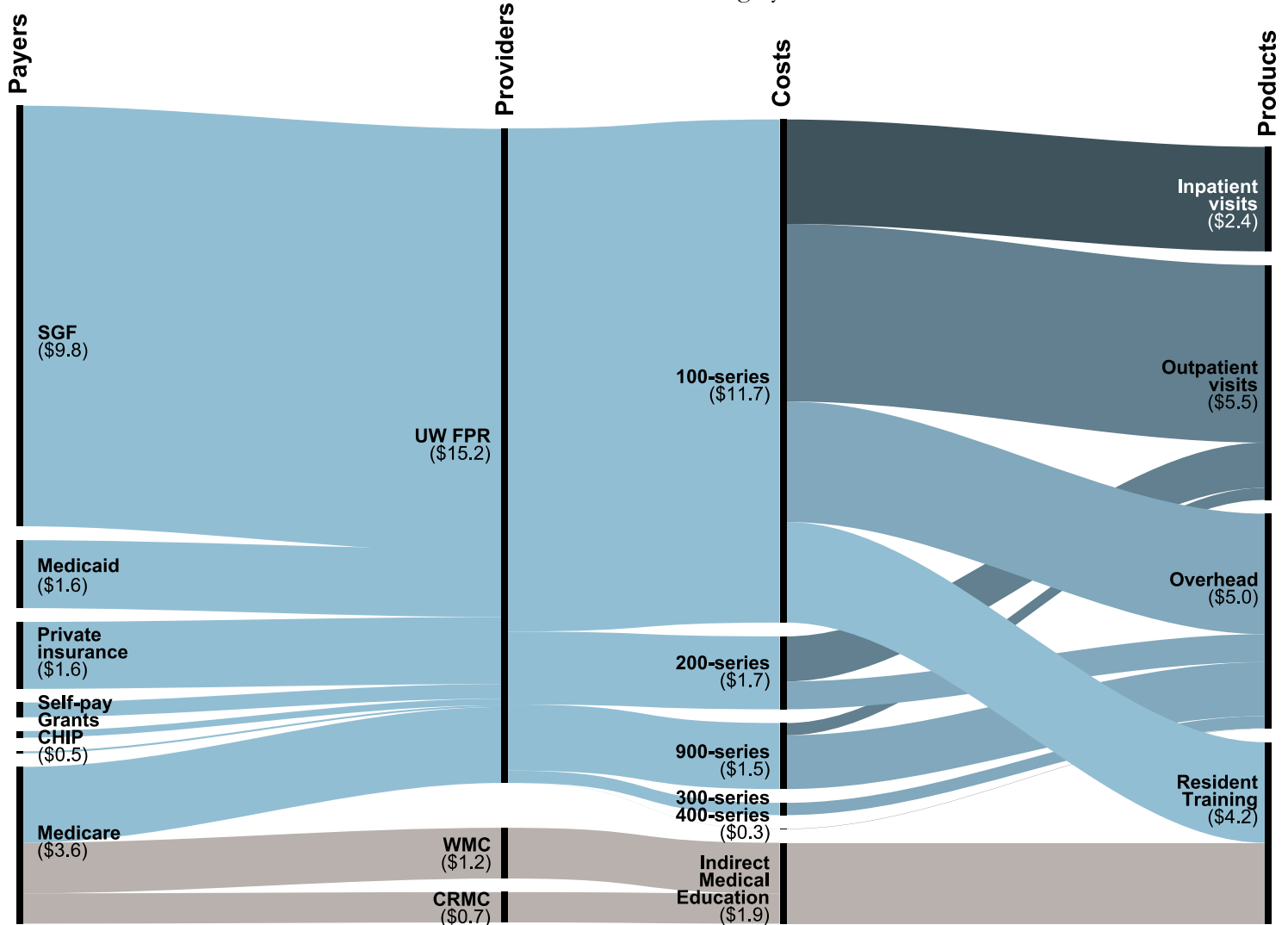
To summarize, Figure 6, on the next page, illustrates the flow of inputs (payments) to outputs (services) in what is known as a Sankey diagram. Reading the diagram from left to right, the funds first flow from various payers to the providers. The funds are then allocated by standard accounting codes:

- **100-series** funds represent personnel costs (e.g. salaries, payroll taxes, benefits)
- **200-series** represent supportive costs, mostly medical supplies and equipment.
- **300- and 400-series** are other support costs, to include IT needs and internal transactions.
- **900-series** represent contracted expenditures (e.g., third-party billing services for the clinics, etc.)

Once identified by expense type, funds flow to the services of the UW FMR program - inpatient visits, outpatient visits, residency training, and overhead. Overhead is re-allocated amongst the other products in a later table. Note that a certain amount of overhead (human resources, legal, fiscal) is performed by the University. This is impossible to estimate accurately, and is therefore not included in this cost allocation.

⁵¹ Health Resources and Services Administration (HRSA) Uniform Data System (UDS) report for 2015 (both centers)

Figure 6: Flow of inputs to outputs, UW Family Medicine Residency Programs.⁵² Indirect IME cost estimates are shown in gray.



Efficiencies

The allocation of inputs to outputs depicted in Figure 6, above, allows an estimate of the cost for each service provided by the UW FMR. This allocation is shown in Table 10, on the next page. In the table, each row is a service (i.e., trained doctors or outpatient visits), and the calculations work left to right to arrive at two measures of unit cost: marginal cost and average cost. Both of these measures are important to evaluate the efficiency of the residency program in different contexts.

- The **marginal cost** is defined here as the directly-allocated (variable) costs of each product divided by the units produced. This measure excludes fixed costs like rent, maintenance, and general administration (overhead).
- The **average cost**, on the other hand, includes overhead. Overhead is allocated proportionally (by cost) between the three services.

⁵² Direct dollar allocations for each “product” were estimated using the SFY 2015 consolidated (Cheyenne and Casper) FQHC cost report to CMS.

Table 10: Allocation of annual costs to outputs (SFY 2015)

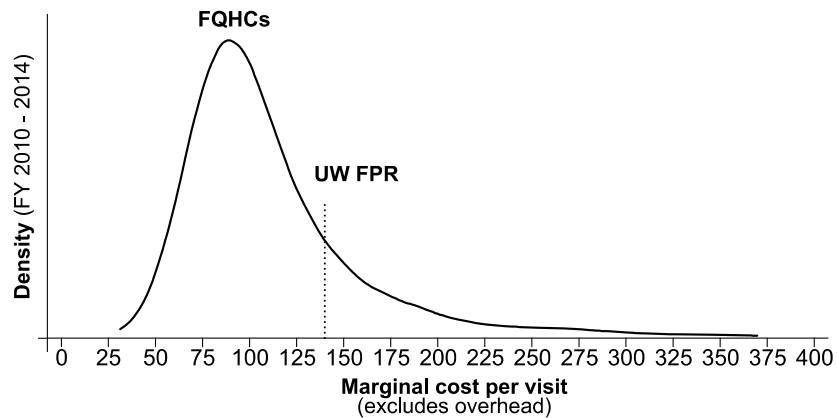
Output	Casper	Cheyenne	Total	Estimated cost	Marginal cost	Overhead allocation	Average cost	% SGF
Trained doctors	7.33	5.83	13.16	\$4,217,467.65	\$320,313.92	22.9%	\$407,024.76	65%
FQHC visits	21,530	16,917	38,447	\$5,457,590.80	\$141.95	53.4%	\$211.24	54%
Other outpatient	5,499	670	18,596	\$2,426,666.88	\$130.50	23.7%	\$194.20	54%
Inpatient visits	6,163	4,409						
SNF visits	1,387	318						
Home visits	92	58						
Overhead costs (facility and administrative)				\$4,990,302.51	Note: SFY 2015 total clinic revenue was \$5,435,840.84. SGF subsidy calculation assumes that this revenue was allocated evenly between outpatient and inpatient.			
Total costs				\$17,092,027.84				
... of which, UW Family Practice Residency costs				\$15,213,427.84				
... of which, est. indirect cost to hospitals (IME)				\$1,878,600.00				

Outpatient visits

How, for example, does the University of Wyoming program compare nationally against other Federally Qualified Health Centers (FQHCs) in delivering outpatient visits? In order to make apples-to-apples comparisons, we use the UW marginal cost of **\$141.95 per visit**, since very few (if any) of other FQHCs also train residents, and it would therefore not be appropriate to include potentially higher administrative and facility costs.

Figure 7, below, illustrates the distribution of marginal cost per outpatient visit for FQHCs nationally (black line) and the UW Family Practice Residency (dashed mark).

Figure 7: Marginal primary care visit cost for FQHCs, FYs 2009 - 2014⁵³



Note that the weighted average marginal cost for all clinics is approximately **\$105 per visit**. This means that the UW residency’s cost per outpatient visit is approximately 35% higher than the average FQHC. This higher per-visit cost is likely due to two major factors:

- (1) **The unique accreditation requirements of the residency program** to have more and higher-qualified faculty physicians on staff. Other clinics, for example, can rely on less-costly provider types (e.g. Physician Assistants and Nurse Practitioners, whose average salaries are half that of a physician) to deliver primary care. This kind of model would obviously not meet accreditation requirements for the residency programs.

⁵³ Data from FQHC/RHC cost reports (FQHCs only) FY 2009 - 2014.

(2) The residency utilizes State employees, which means that staff compensation at all levels likely includes a **larger benefits package** than other private-sector clinics.

Table 11, below, shows this average per-visit cost decomposed into its components. Note the higher physician cost compared with the State and national average for other clinics. Note also, however, that the UW residencies also have higher than average costs for other medical staff (nurses, laboratory technicians, and medical assistants), as well as medical supplies and equipment.

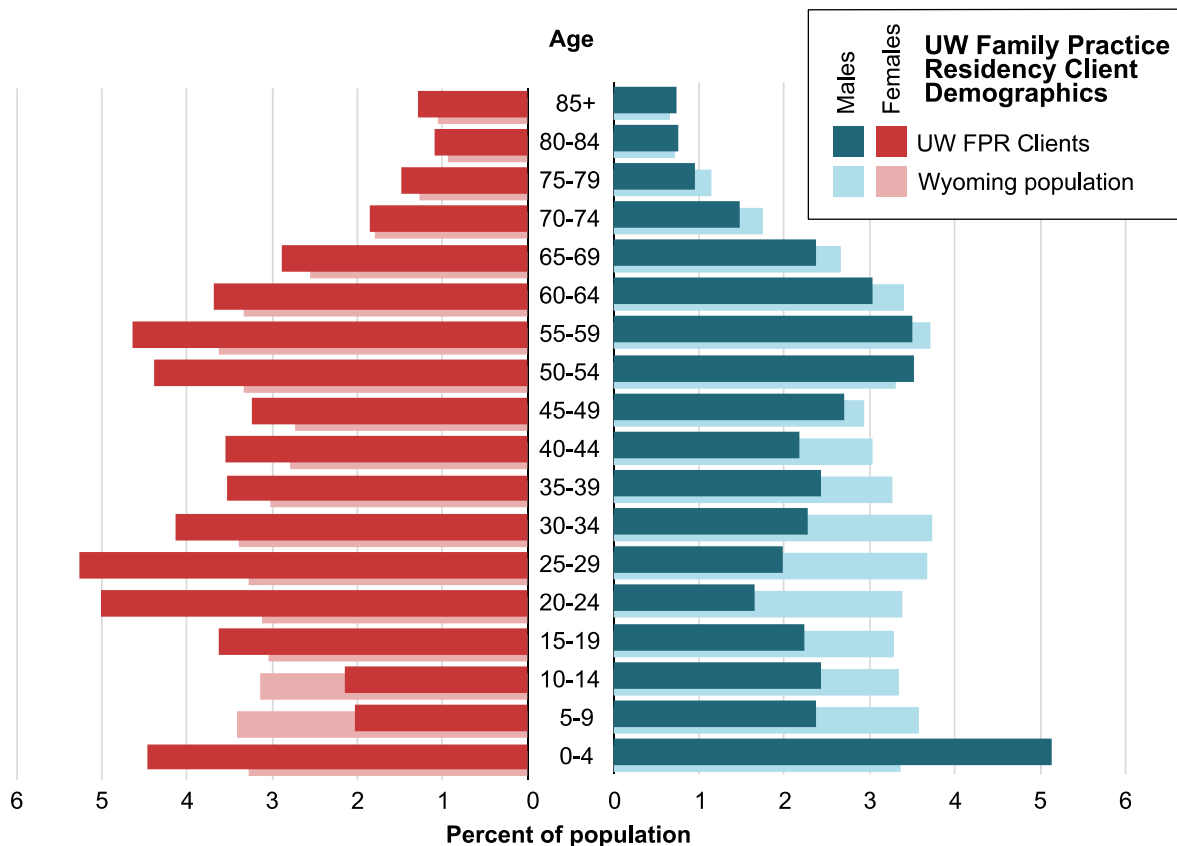
Table 11: Marginal cost breakdown for FQHC outpatient visits

Cost	UW FMR	Wyoming	National
Total marginal cost	\$141.95	\$104.65	\$104.51
... Physician	\$48.65	\$36.77	\$34.87
... Physician Assistant	\$9.78	\$14.45	\$4.73
... Nurse Practitioner	\$5.37	\$3.75	\$9.62
... Other medical staff	\$43.07	\$37.64	\$37.42
... Medical supplies and equipment	\$35.08	\$12.04	\$17.87

Patients served

Publicly-insured women and children are the largest group of clients served by the UW FMR; 60% of patients served at the residency are female. Figure 8, below, illustrates how the UW FMR client mix compares to the general Wyoming population.

Figure 8: Population pyramid of residency patients vs. Wyoming population (SFY 2015)⁵⁴



⁵⁴ Health Resources and Services Administration (HRSA) Uniform Data System (UDS) report for 2015 (both centers)
Wyoming Department of Health | UW Residencies Review | Oct 1, 2016

This client mix is typical for a primary care setting; women generally tend to see the doctor more often. Most studies attribute this to a combination of factors, including:

- Obvious reproductive needs (i.e., evident in the difference between ages 15-39);
- Perceptions of health and the willingness to see a physician; and
- Higher actual rates of morbidity in women than men.⁵⁵

Clinical profile

The demographic mix is corroborated by clinical data reported to the Accreditation Council for Graduate Medical Education (ACGME). Generally speaking, the UW residency program performs more mother/child-related procedures than the national average. Tables 12 and 13, below, show the top five procedures performed and top ten diagnoses of patients seen by residents in the academic years since 2011-12 for all family practice residencies (left tables) and the UW Casper program (right). Similar data was not available for Cheyenne.

Table 12: Top 5 procedures family practice residents must know, rank ordered.⁵⁶ Higher ranks are colored darker green.

National	Academic year				Casper	Academic year			
	11-12	12-13	13-14	14-15		11-12	12-13	13-14	14-15
Pap smear	1	1	1	2	Pap smear	1	1	1	5
EKG interpretation	2	2	2	1	Circumcision	2	2	2	1
Laceration - sutures	3	3	5	5	EKG interpretation	3	3	3	
Abscess - drainage	4	4	3	4	Laceration - sutures	4	4	4	3
Joint injection	5	5	4	3	Vaginal delivery	5	5	5	
					Abscess - drainage				2
					Cast/splint				4

Table 13: Top 10 diagnoses of patients seen by residents, rank ordered⁵⁷

National	Academic year				Casper	Academic year			
	11-12	12-13	13-14	14-15		11-12	12-13	13-14	14-15
Hypertension	1	1	1	1	Pregnancy - normal	1	1	4	2
Type II diabetes	2	2	2	2	Checkup (child)	2	2	2	1
Checkup (child)	3	4	4	4	Upper resp. infect.	3	3	5	6
Upper resp. infect.	4	7	5	7	Hypertension	4	4	1	4
Back pain	5	3	3	3	Gynecological	5	5		
Checkup (general)	6	5	7	6	Back pain	6	6		7
Depression	7	6	6	5	Type II diabetes	7	7		8
Hyperlipidemia	8	8	8	8	Depression	8	8	6	3
Pregnancy-normal	9	9	10	10	Sore throat	9	9	10	
Abdominal pain	10		9	9	COPD	10	10		9
Asthma		10			Checkup (general)			3	10
					Viral infection			7	
					Anxiety			8	5
					Tobacco use			9	

⁵⁵ <http://www.jfponline.com/home/article/gender-differences-in-the-utilization-of-health-care-services/33ae9b4709dda1fdca71aa66c442fec3.html>

⁵⁶ National Data Reports, Residency Review Committee for Family Medicine.

⁵⁷ Ibid.

Note that, for the Casper program, deliveries, circumcisions and pap smears are in the top five procedures, and the top two diagnoses are also related to mothers and children. This is in contrast with hypertension and diabetes consistently being in the two diagnoses nationally.

Insurance Status

As shown in Table 14, below, approximately 75-80% of patients were insured by private or public pay sources.

Table 14: Clients by insurance coverage, both residencies⁵⁸

Coverage	Clients	Percent
Uninsured	2,695	22%
Medicaid/CHIP	2,505	20%
Medicare	2,438	20%
Private Insurance	4,768	38%
Total	12,406	

As previously noted in Table 8, uninsured clients are seen on a self-pay, sliding-fee schedule. Approximately \$1.2 million of uncompensated care is delivered to these individuals. Out of the \$7.8 million in costs for outpatient and inpatient visits outlined in Table 10, this represents an uncompensated care percentage of approximately 15.3%.

Location

Unsurprisingly, the bulk of clients at the residencies come from the surrounding area. Clients by 3-digit ZIP code are shown in Table 15, below.

Table 15: Clients by location⁵⁹

3-digit ZIP	Clients	Towns in ZIP
691	50	Bushnell, Kimball (Nebraska)
807	27	Hereford, Grover (Colorado)
820	4,731	Cheyenne, Laramie, Rock River, Burns, Pine Bluffs
822	20	Wheatland, Torrington, Lusk, Glendo
825	15	Riverton, Lander
826	7,563	Casper, Douglas, Kaycee, Shoshoni

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⁵⁸ HRSA UDS, 2015.

⁵⁹ HRSA UDS, 2015.

Resident training - cost

There is little empirical data as to what a residency “should” cost. The case of the UW residency is made more difficult in the sense that it is one of the few residencies -- if not the only residency in the nation -- which operates out of an FQHC rather than a hospital.

In the last decade, a handful of studies have attempted to estimate average cost per resident per year in post-graduate training settings.⁶⁰ The estimates range from \$130,000 to \$210,000 per resident per year, but use a variety of cost models and assumptions, and come with significant caveats. As noted in the background section, total per-resident cost includes **direct costs** (paying residents and for any residency-related overhead, paying the faculty for the time they spend teaching residents, etc.) and more intangible **indirect costs** (i.e., the residency increasing the medical costs of each case due to additional training time and resources).

In the residency cost breakdown presented in Table 10, both the direct (per cost report and UW accounting data) and indirect costs (Medicare IME estimates) are counted, but clinical visits and revenue are excluded. Under these assumptions, an estimate of \$140,000 to \$180,000 represents the most comparable benchmark for national average cost per resident per year.⁶¹ For the UW FMR, the \$407,000 cost estimate per graduate divided by the three years of training works out to approximately **\$135,000 per resident per year**.

By these standards, the UW residency program is **more efficient** than the national average at producing trained physicians.

It should be noted here that the UW FMR faculty are also paid less than other family medicine residencies. Specifically, WWAMI survey data indicate that UW FMR faculty salaries are approximately 5-6% less than regional (ID, MT, and eastern WA) residency averages, and 11-12% less than all WWAMI-affiliated residency averages. This is shown in Table 16, below.

Table 16: WWAMI-affiliated Family Medicine Residency salary survey data (2016)

Position	UW FMR	All (Mean)	Difference	Regional (Median)	Difference
Director	\$221,184	\$241,265	-8.32%	\$226,000	-2.13%
Associate Director	\$192,864	\$210,848	-8.53%	\$191,432	0.75%
Senior faculty	\$167,337 ⁶²	\$198,468	-11.28%	\$185,714	-5.78%
Mid-career faculty		\$187,340		\$175,854	
Junior faculty		\$180,015		\$171,250	
Resident - PG1	\$52,704	\$53,812	-2.06%	\$52,900	-0.37%
Resident - PG2	\$54,468	\$56,173	-3.04%	\$55,014	-0.99%
Resident - PG3	\$56,352	\$58,883	-4.30%	\$57,526	-2.04%

⁶⁰ These studies include: Steinmann, Alwin. “Threats to Graduate Medical Education funding and the need for a rational approach.” *Annals of Internal Medicine*. 2011. 462. (\$130K) / Regenstein, et al. “The cost of residency training in Teaching Health Centers.” *New England Journal of Medicine*. June 29th, 2016 (\$157K) / Wynn et. al. “Does it cost more to train residents or replace them?” *RAND Research Report RR-324-MEDPAC*. 2013. (\$140-162K) / Ben-Ari et. al. “The costs of training internal medicine residents in the United States.” *American Journal of Medicine*. Oct. 2014, Vol. 127. ([http://www.amjmed.com/article/S0002-9343\(14\)00596-8/pdf](http://www.amjmed.com/article/S0002-9343(14)00596-8/pdf)) (\$181 - 210K)

⁶¹ Both the RAND and Regenstein studies specifically offset clinical revenue generated by the residents in their cost measure, for example, which is more similar to the UW FMR cost assumptions.

⁶² The UW FMR program reports “full-time” vs. “part-time” faculty members instead of these categories. This number is compared against the Senior - Junior average for all WWAMI and regional WWAMI residencies to arrive at the percentage difference.

Resident training - quality

Generally speaking, the quality of the residency programs has improved since 2011, but is lower than the national average. This is evident in accreditation correspondence, where kudos for general improvements have come with the lifting of previous citations for poor performance.⁶³

One primary measure of quality is how many graduating residents take and pass the American Board of Family Medicine certification exam; this represents the capstone to becoming “board certified” in family medicine. Table 17, below, shows the most recent five-year trend for board pass rates.

Table 17: American Board of Family Medicine - Certification Exam Pass Rates

Year	Casper				Cheyenne				Combined Pass (%)	National Pass (%)
	Elig.	Taken	Passed	Pass (%)	Elig.	Taken	Passed	Pass (%)		
2011	6	3	3	100%	6	6	3	50%	67%	81%
2012	8	6	5	83%	6	6	5	83%	83%	83%
2013	7	7	7	100%	6	6	6	100%	100%	82%
2014	8	8	8	100%	5	5	3	60%	85%	90%
2015	8	8	7	88%	6	6	6	100%	93%	91%
Avg.	37	32	30	94%	29	29	23	79%	87%	85%

A second measure of quality is the average score on the exam itself. Table 18, below, shows the average exam scores of Casper and Cheyenne graduates compared with the national average. Above-average scores are highlighted in blue.

Table 18: Family Medicine Certification Exam - Average Scores

Year	Casper	Cheyenne	National
2011	487	418	478
2012	435	500	483
2013	461	425	485
2014	509	416	506
2015	419	433	505
Average	460	439	492

The pass rates, the accreditation correspondence, and the average exam scores all indicate that, while the quality of the residency programs has increased since 2011, it remains at or slightly below the national average.

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⁶³ Correspondence from the Accreditation Council for Graduate Medical Education (ACGME) to Cheyenne dated 8/5/2011 had 11 quality citations. These were lifted in correspondence dated 7/1/2016. Similarly, correspondence from ACGME to Casper dated 8/5/2011 had 10 citations. All were lifted in correspondence dated 3/4/2016.

Resident training - Retention of graduates in Wyoming

As noted in the background section, the core purpose of the UW Family Practice Residency program is to increase the number and improve the distribution of family medicine physicians in Wyoming. As such, this study estimates in-State retention of UW FMR graduates over a thirty year period to assess performance.⁶⁴

Over the average 30-year career of a physician, this study estimates **total in-State retention at 23%**. That is, given a potential 30-year career after graduation, only 23% of graduate’s potential “doctor-years” are likely to be spent in-State.

When compared with other states, this is relatively poor; Wyoming ranks 3rd from the bottom in terms of family medicine physicians practicing in the same state as their residency (see Table 20 on subsequent pages).

And, given the overall per-graduate cost of \$407,000 in Table 10 in the previous section, low retention means that the average cost of the program **per doctor retained in-State** grows to \$1.77 million. Since 65% of this cost is paid by the State General Fund, this is an investment of approximately \$1.1 million per doctor-year. Over 30 years, at real discount rates between 3 to 5%, the same investment can also be thought of as an annual cost of between \$57,000 and \$71,000.

This is an imperfect estimate. The detailed records of physicians’ practice locations over time required to calculate retention more precisely do not exist. This study arrived at a ‘best guess’ using two datasets:

- Reported locations of UW FMR graduates. While this data is likely accurate for current locations, it does not capture the time currently out-of-State or retired physicians might have spent in Wyoming prior to leaving.
- Wyoming Board of Medicine data for all physician licenses, merged with the UW FMR data based on name, credential, and graduation year.⁶⁵ Practice location data only goes back to 2011, so initial medical license date and expiration date were used to calculate a continuous timespan for physicians maintaining an active license in Wyoming.

This makes the potentially problematic assumption that there are no ‘gaps’ in licensure; i.e., that licensure is continuous between initial licensure and expiration.

More problematic, however, is that this estimate does not directly measure in-State retention; many out-of-State physicians maintain an active Wyoming medical license. To compensate for these deficiencies, this study examines the ‘trajectory’ of active Wyoming medical licensure for various cohorts of graduating residents, but adjusts the trajectory downward to correct for estimated actual in-State practice.

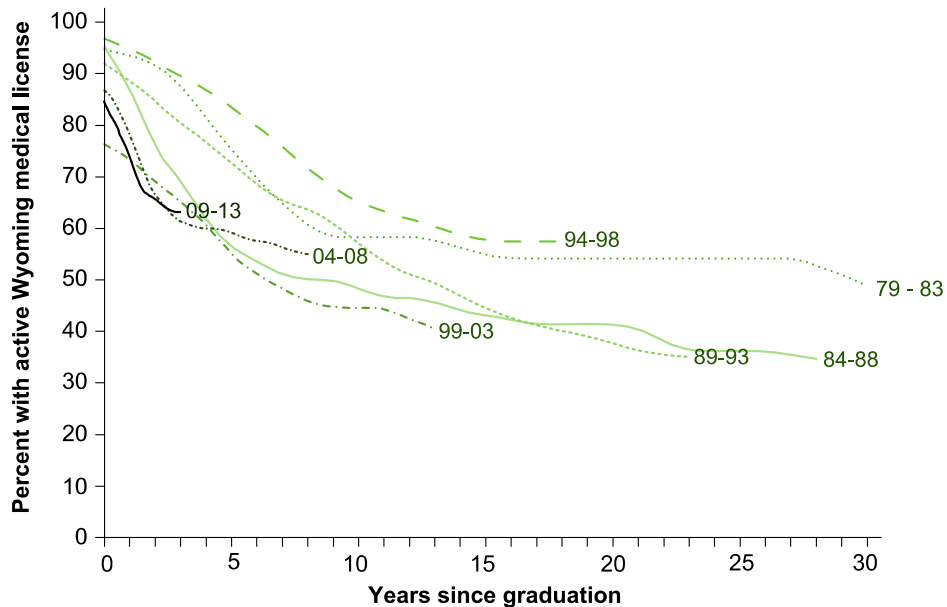
Figure 9, on the next page, illustrates the licensure trajectories of UW FMR graduates. The graduates are divided up into five-year cohorts. Each line represents the average fraction of physicians in that cohort who maintained an active Wyoming license in the indicated time since graduation. Where earlier graduation years (i.e. 1979-83) contributed up to 30 years of data, more recent graduates have shorter trajectories. Note further that:

⁶⁴ After graduation, the average career is estimated at 35 years, but reporting issues likely inflate this number by ~ 6%. Kletke. Physician workforce data: when the best is not good enough. Health Services Research. Oct, 2004. (<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1361068/>)

⁶⁵ Fuzzy-logic string matching was used to allow a higher match probability between names like “Joe Smith” (M.D., class of 1983) and “Joseph Smith” (M.D., class of 1983). Approximately 90% of the UW FMR dataset was successfully matched with a probable Wyoming physician license.

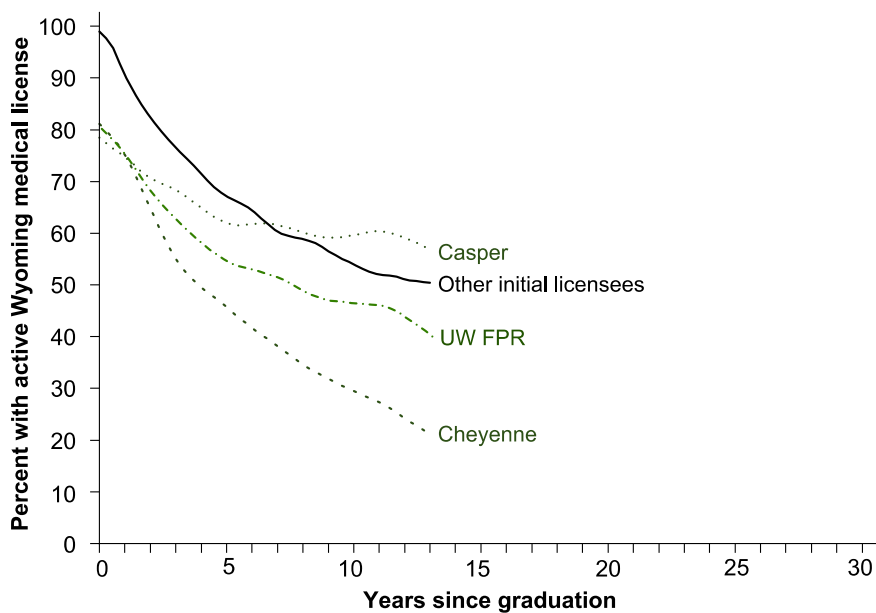
- With the exception of a cohort in 1994-98, overall retention (by this measure) has fallen since the early years of the UW FMR program.
- While initial retention is lower in recent years, trajectories since 1999 seem to be stable.

Figure 9: Percent of UW FMR graduates maintaining an active Wyoming medical license, by 5-year cohort (e.g. “79 - 83” refers to graduates between 1979 and 1983)



Because of the similar trajectories between 1999 and 2013, Figure 10, below, aggregates these cohorts together to compare the retention of Wyoming medical licenses by residency site (Casper and Cheyenne), as well as for other initial licensees (i.e., physicians who move to Wyoming mid-career) during this period.

Figure 10: Percent of initial licensees retaining an active Wyoming license (1999 - 2013)



Note on the figure that:

- As measured by this indicator, Casper appears to retain more residents than does Cheyenne.
- While both residencies have low initial retention, those graduates that do stay in-State tend to maintain Wyoming licenses longer than other sources. This is likely because the residents are the youngest possible doctors receiving Wyoming licenses, and therefore have longer careers than other physicians.

In Figure 11, below, the midpoint of the UW FMR trajectory since 1999 is adjusted downward towards the current actual in-State retention rate for those cohorts (27% -- calculated from Table 19, on the next page). The remainder of the trajectory is assumed to follow the same slope as the 1984-88 cohort.

Overall in-State retention over a projected 30-year career is then estimated as the shaded area under the curve relative to the total box indicated by the dashed line (23%). If every graduate made their career in Wyoming, the total potential available doctor-years would be 30 (30 x 1.0). However, the actual number of doctor years, 6.9 (the shaded area), is a result of attrition, most steeply at graduation and then tapering off as graduates either leave the state or retire.

Figure 11: Calculation of 23% estimated in-State retention over a 30-year career

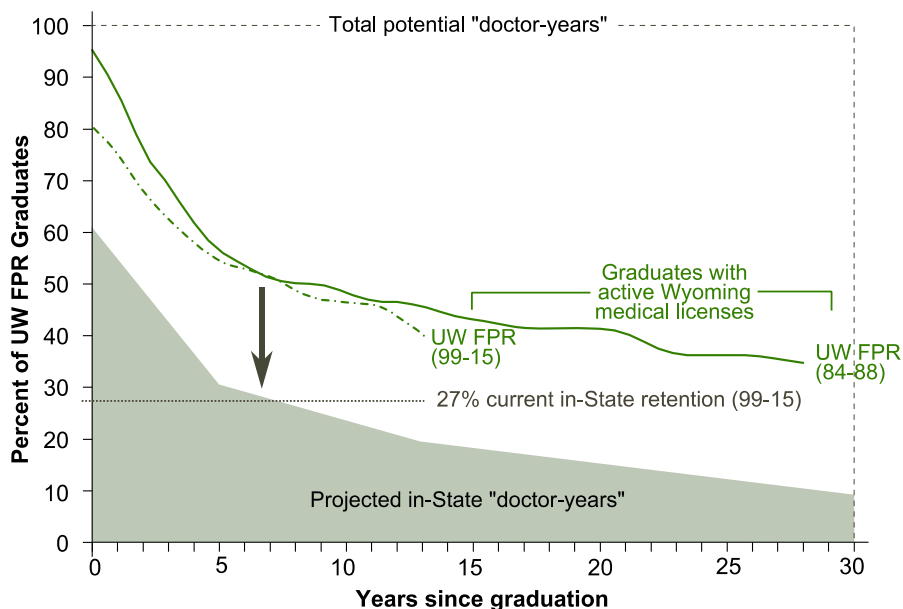


Table 19, on the next page, shows the number of graduates by site, by graduation year, as well as the number that are still currently practicing in Wyoming. While the overall total in-State (106) divided by the total number of graduates (445) equals approximately 24%, this is a coincidence:

- It is both an overestimate, due to higher retention in previous graduating cohorts (see Figure 9), and;
- It is also an underestimate, due to not counting in-State “doctor-years” from graduates who might have left the State.

Table 19: Graduates and current retention, by graduation year and site

Grad Year	Graduates			In WY (2016)
	Casper	Cheyenne	Total	
1979	2	0	2	1
1980	2	0	2	0
1981	4	0	4	0
1982	5	5	10	2
1983	7	8	15	2
1984	6	6	12	1
1985	8	6	14	3
1986	7	5	12	1
1987	7	6	13	2
1988	7	6	13	3
1989	8	6	14	2
1990	8	5	13	3
1991	8	8	16	0
1992	8	4	12	2
1993	7	6	13	1
1994	8	6	14	4
1995	4	5	9	3
1996	9	6	15	7
1997	8	6	14	7
1998	8	6	14	4
1999	8	6	14	5
2000	7	6	13	2
2001	6	6	12	1
2002	8	6	14	8
2003	6	6	12	2
2004	8	6	14	6
2005	4	5	9	2
2006	8	5	13	3
2007	6	5	11	1
2008	5	5	10	3
2009	7	6	13	2
2010	7	6	13	3
2011	6	6	12	1
2012	8	6	14	6
2013	7	6	13	5
2014	9	5	14	1
2015	7	6	13	7
Total	248	197	445	106

When in-State retention is compared with other family practice residency programs, Wyoming fairs relatively poorly. Table 20, below, shows how the State compares nationally. Note that:

- Wyoming ranks just above Rhode Island and D.C., whose in-State retention is likely lower simply because of their small area (i.e., many DC graduates might be practicing in the DC suburbs in Maryland or Virginia). States immediately above Wyoming also have small land areas.
- Other rural and frontier states in the region (highlighted in blue) have higher retention rates, in some cases, almost double that of Wyoming.

Table 20: Total number of family medicine graduates (1970 - 2006) and proportion of graduates practicing in the same state as their family practice residency.⁶⁶

State	Graduates	% in State	State	Graduates	% in State
CA	6,161	74.8	UT	572	52.7
TX	4,678	74.6	KS	818	52.5
MS	353	74.4	AL	1,090	52.2
HI	68	72.1	NV	164	51.8
AR	912	68.9	AZ	906	51.7
MT	54	68.5	ID	266	51.5
LA	808	68.0	OK	870	51.2
MN	1,330	66.7	NE	944	51.0
FL	1,928	65.5	CO	1,441	50.7
IN	1,924	64.6	VT	137	50.4
AK	74	63.5	MO	1,000	48.6
NH	62	62.9	NY	3,738	47.7
WA	1,547	61.2	SC	1,845	47.5
KY	836	60.8	ME	565	47.3
PR	357	60.3	PA	3,724	47.0
GA	1,398	59.8	IA	1,351	46.3
OH	3,058	57.4	SD	311	46.2
US Total	64,972	56.9	MD	698	44.2
WI	1,839	56.3	WV	771	42.2
NM	365	56.2	NJ	1,594	39.8
TN	1,234	56.1	ND	405	38.3
IL	3,326	55.6	CT	511	36.4
NC	1,975	55.5	DE	313	36.1
VA	1,990	55.3	WY	315	27.0
MI	2,773	54.8	RI	325	22.4
MA	669	53.8	DC	213	15.3
OR	366	53.1			

Data sorted by percent remaining in state. States in same region as Wyoming are highlighted in blue.

⁶⁶ Fagan, et. al. "Family medicine graduate proximity to their site of training: policy options for improving the distribution of primary care access." *Family Medicine*. Feb. 2015. Vol 47. No 2.

Resident training - Contribution to primary care physician supply

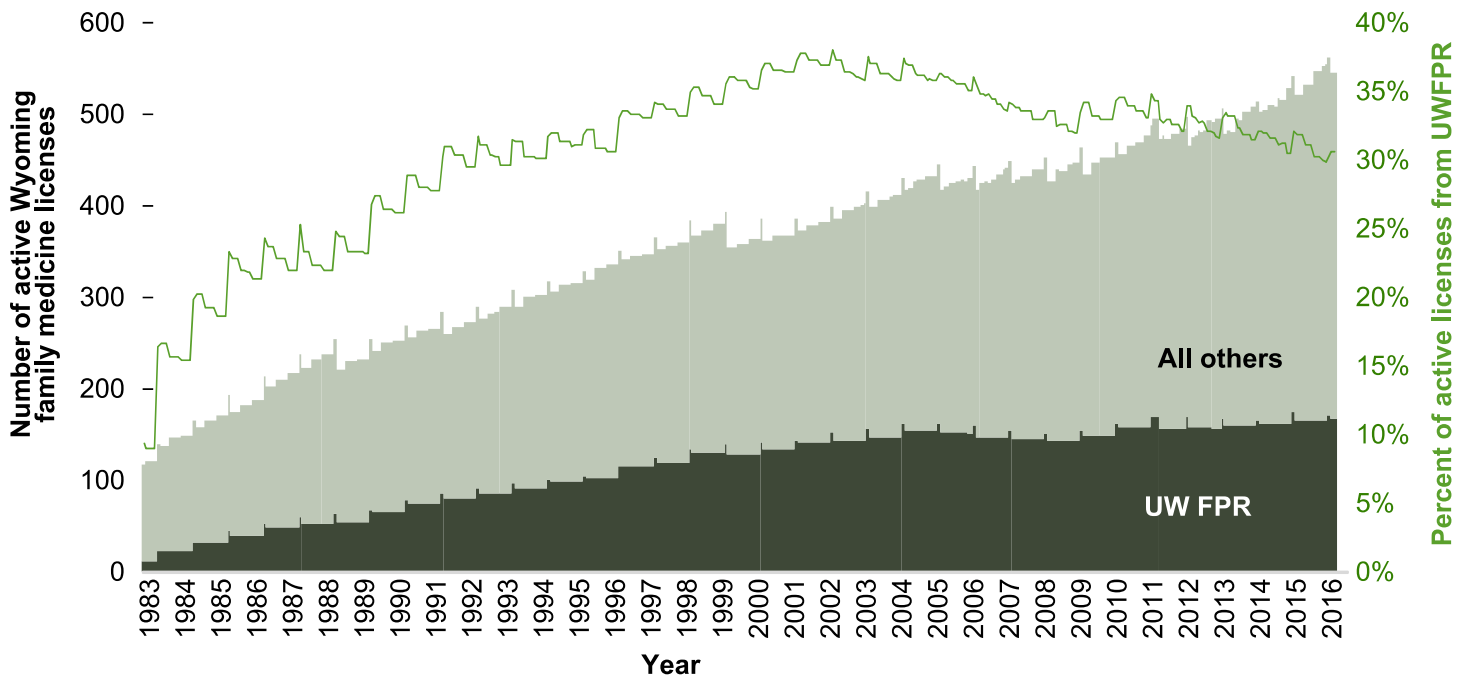
Another way of looking at retention is examining what percent of family medicine physicians in Wyoming came from the residency programs; anecdotally, the residencies have contributed up to 40% of these physicians in the State.

This study considers the family medicine specialty independently from other primary care specialties because of the added value these generalists bring in being able to provide primary care across the entire spectrum of patients, from pediatrics to OB/GYN to geriatrics.

Using the same Wyoming Board of Medicine data in previous analyses, Figure 12 shows the estimated number of UW FMR graduates with active Wyoming licenses (dark green) stacked under the number of other active family medicine licenses (light green).

The line graph shows the percent of all active family medicine licenses attributable to the UW FMR residency. The jaggedness of the line graph demonstrates the steep increase each year as a new class graduates, and the subsequent attrition over the next 12 months as individuals leave the State. Note that, over time, the total percentage of active primary care licenses attributable to the UW FMR has fallen from a high of almost 40% in the early 2000s to approximately 30% in 2016.

Figure 12: Number of primary care active Wyoming medical licenses, and percent belonging to UW FMR graduates (1985 - 2016)



Resident training - Distribution across Wyoming

As noted in the background section, a secondary purpose of the UW FMR residency program is to ensure a more even distribution of family medicine physicians across the State, particularly in underserved counties.

When county population is accounted for, the 106 graduates that are still in-State today are more-or-less evenly distributed across the State. This is shown in Table 21, below.

While it is impossible to estimate what this distribution would have looked like in the absence of the residencies, the fact that all family medicine doctors in Thermopolis, for example, are graduates of the program should be noted as anecdotal evidence of this contribution.

Table 21: Current practice locations of in-State graduates

City	No.	County	No.	Pop. (2014)	Rate per 100,000 population
Laramie	2	Albany	2	37,811	5.3
Lovell	1	Big Horn	1	11,930	8.4
Gillette	3	Campbell	4	48,320	8.3
Wright	1				
Rawlins	3	Carbon	3	15,854	18.9
Douglas	3	Converse	3	14,097	21.3
Fort Washakie	1	Fremont	8	40,703	19.7
Lander	4				
Riverton	3				
Torrington	3	Goshen	3	13,514	22.2
Thermopolis	3	Hot Springs	3	4,816	62.3
Buffalo	4	Johnson	4	8,573	46.7
Cheyenne	24	Laramie	24	96,389	24.9
Afton	1	Lincoln	3	18,567	16.2
Kemmerer	2				
Casper	33	Natrona	33	81,624	40.4
Cody	3	Park	4	28,989	13.8
Powell	1				
Sheridan	1	Sheridan	1	30,032	3.3
Marbleton	1	Sublette	1	10,057	9.9
Green River	2	Sweetwater	6	45,010	13.3
Rock Springs	4				
Worland	3	Washakie	3	8,322	36.0

The data indicates no current graduates in the following counties: Crook, Niobrara, Platte, Teton, Uinta, or Weston.

Resident training - Retention in rural or underserved areas

Considered more broadly (i.e., outside Wyoming), it is also true that the UW FMR program graduates tend to serve in more rural and underserved areas than graduates from other residencies. Data from the Graham Center⁶⁷ shows that, compared with a national average of 12.7%, 23.8% of UW graduates practice in a rural setting. Additionally, 38.4% of graduates practice in a Health Professional Shortage Area (HPSA), compared with a national average of 27.5%.

Root causes of retention and funding problems

The two largest problems with the residency programs noted in this section are **poor resident retention** and **lack of Medicare GME** funding. There are, unfortunately, no good answers as to why these problems exist -- and therefore no clear policy prescriptions for fixing them.

The circumstances surrounding the establishment of the residency programs in the mid- to late-1970s, however, are partly to blame. As Part I of this study illustrates, the residency programs were initially conceived of as part of a broader medical education system -- linked to an undergraduate medical school and affiliated community teaching hospital. Due to disagreements on the role of the State in funding medical education, this comprehensive plan was not implemented.

And while pieces of this vision (i.e., the agreements with Creighton University, and then the WWAMI program) were developed later, the lack of coordination at the outset is the “original sin” behind the two major problems illustrated here.

In the case of Medicare GME, for example, if the residencies had been fully-integrated with a community teaching hospital in the first place -- as recommended by the Joseph Report -- there is a good chance that many of the costs of the residency program could have been paid for through direct and indirect GME, as is the case with other residency programs in the nation.

While some direct GME funding is currently being received on a cost-basis as part of its FQHC designation, and there are options to increase this slightly through Medicaid, there is simply no substitute in the current system for receiving Medicare IME on a hospital scale.

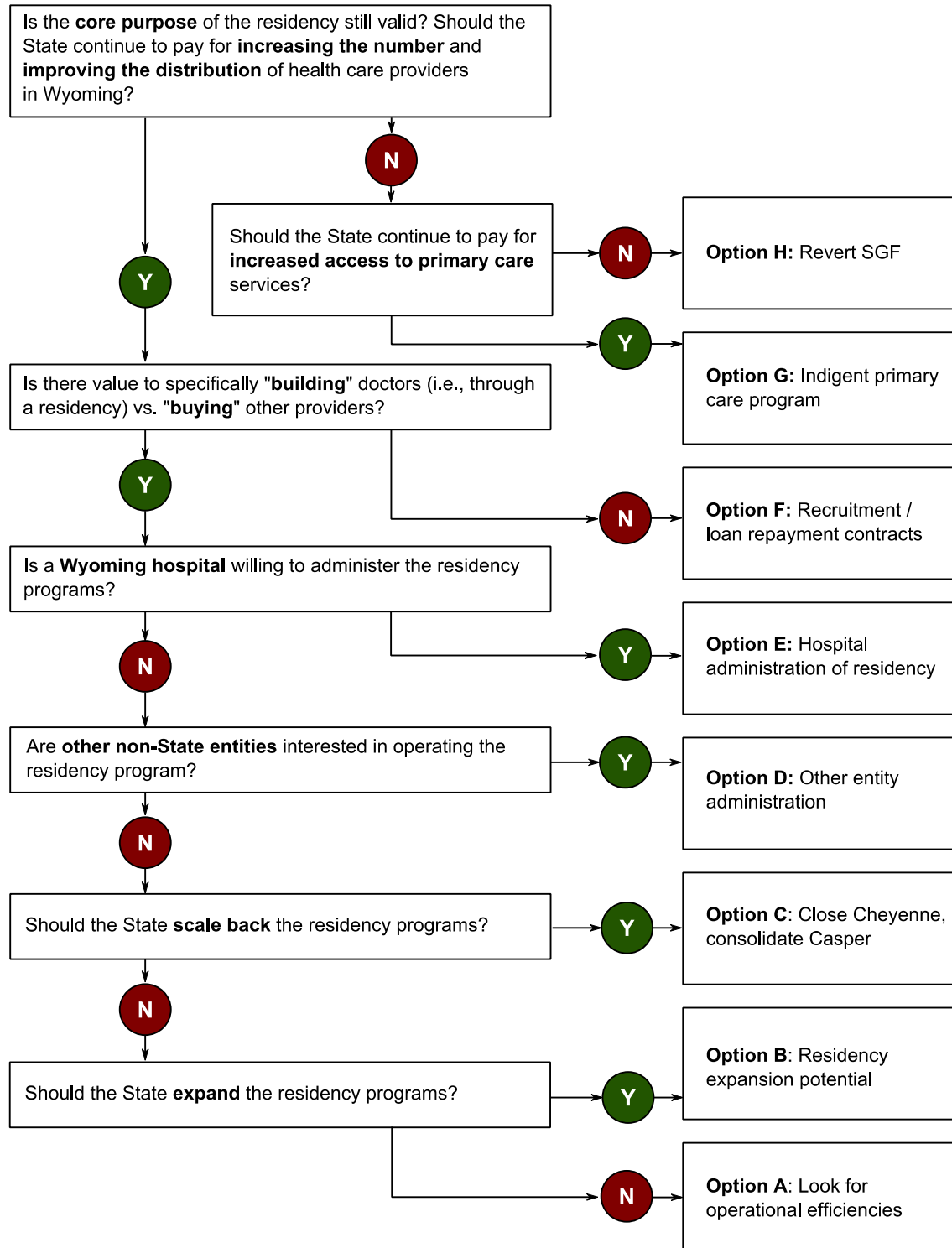
The retention problem is more complex, but again, the lack of coordination at the founding of the residency programs may have played a role. Anecdotally, few WWAMI medical school graduates return to the UW program for their residency. Other rural states in Table 20, by contrast, might have a more integrated pipeline between undergraduate and graduate medical education.

Unfortunately, the historically piecemeal implementation of medical education in Wyoming makes solving these retention and funding challenges difficult. And, as the next section articulates, there are no easy solutions.

⁶⁷ Graham Center. GME Outcomes data table. (<http://www.graham-center.org/rgc/maps-data-tools/interactive/gme-outcomes.html>). Note that this data includes all residencies, not just family medicine residencies.

PART III: ALTERNATIVE OPTIONS

The Department believes that, before any options are investigated or pursued, that the Wyoming Legislature must **re-examine the core purpose of the UW Family Medicine Residency program**. Is “building” physicians, for example, still the proper role of the State? Or would “buying” them be more appropriate? Or merely providing primary care? Instead of providing specific recommendations, this study therefore structures a **range of options** (described in subsequent pages) along a decision tree, visualized below.



Considerations

As established in Part I of this study, the original core purpose of the UW Family Residency program was to:

- Increase the **overall number** of physicians practicing in Wyoming; and,
- Even out the **distribution** of physicians among counties.

In later years, a tertiary purpose evolved:

- Provide **indigent care** to the uninsured.

The first branch of the decision tree addresses the core purpose directly. If it is no longer the State's role to increase the number of physicians in Wyoming, for example, the residency should be spun off or eliminated and the funds reverted or spent on a primary care program (Options H and G). Beyond the core purpose, however, are other pertinent questions that affect the range of options.

For example, if it is the role of the State to increase the number of distribution of physicians within Wyoming, is it important that the state "build" doctors vs. "buy" them? Further, what is the State's willingness to pay to achieve those goals? Does the existing program cost to the State of \$51,000 to \$71,000 per physician per year meet the State's willingness to pay threshold (see page 31)? Do viable alternatives exist to achieve the same goals in a more effective and efficient manner?

Alternative Options

Each of the alternative options on the decision tree is briefly outlined below, in the order they appear on the tree (i.e., not in order of degree of change or preference).

Option H: Close the program and revert State General Funds

If the Legislature determines that it is not the role of the State to increase the number and distribution of doctors in Wyoming, nor to increase access to care through an indigent care program, the UW FMR program should be closed and funds reverted. As shown in Table 6 of Part II of this study, estimated annual savings would be approximately \$9.8 million SGF.

Option G: Close the program, use funds to establish an Indigent Primary Care Program

If the core purpose is no longer valid, but the State continues to have an interest in increasing access to primary care generally, a more efficient demand-side method of providing that access would be a limited healthcare insurance program that could pay for primary care, diagnostic and pharmacy services to uninsured Wyoming adults below 100% of the Federal Poverty Level.

These services could be paid on a fee-for-service basis, capitated or bundled. If bundled -- i.e., by contracting with FQHCs and clinics that maintain a 340(b) pharmacy or work with the prescription drug donation program -- it might be possible for enrolled primary care providers to realize savings on the bundle by controlling specialist referrals, prescriptions and lab work.

Using a rough cost estimate from Wyoming Medicaid per-member per-month (PMPM) costs for a low-income adult analog population in a fee-for-service environment (see Table 22 on the next page), the estimated monthly capitation payment would be approximately \$173. An additional 4% administrative cost is assumed.

Under these assumptions, the \$9.8 million in SGF currently funding the residency programs could cover a population of approximately 4,500 low-income adults with primary care, specialist physician, diagnostic laboratory and radiology, and pharmacy care. This represents approximately 30% of the estimated 15,000 low-income uninsured adult population in the State.

Table 22: Wyoming Medicaid low-income family care adult per-member per-month estimates (SFY 15)

Service	PMPM
Primary care (physicians/PA/NP)	\$63.03
Internal medicine (specialists)	\$17.16
Prescription drug	\$71.71
Federally-qualified Health Center	\$7.41
Rural Health Clinic	\$1.76
Laboratory	\$4.84
Diagnostic radiology	\$6.74
Total PMPM	\$172.65

This estimate, of course, is rough. Along with more detailed actuarial analysis, several policy complications (e.g. who of the 30% get covered?) would also need to be resolved.

Option F: Health provider recruitment/ loan repayment contracts

If the Legislature determines that the core purpose is valid, but that “building doctors” is not as central as “buying providers” generally, better outcomes might be achieved through closing the residency program and funding a primary care provider loan repayment or grant program.

This would allow the State to ensure retention on a short-term basis (through contracts), and more precisely direct providers to the counties of greatest need (i.e., Big Horn, Carbon, etc. as shown in Part I of this study).

It would also allow the State more flexibility in the type of providers being recruited; the State could “buy” Advance Practice Registered Nurses or Physician Assistants, for example. It could also expand the use of telemedicine or invest in other public health efforts.⁶⁸

A related option may be working with the National Health Service Corps (NHSC) to develop more sites in underserved counties for these federally-funded providers.

Some States have pursued even more radical options. In a move opposed by the American Medical Association, for example, the Missouri Legislature in 2014 passed a law to allow unmatched medical students to act as “assistant physicians” (not to be confused with Physician Assistants) for up to two years in order to increase access to primary care in rural areas.⁶⁹ As of yet, no “assistant physician” licenses have been issued, though proposed rules were only promulgated in August of 2016.⁷⁰

However the program is pursued, the average annual per-provider per-year cost would need to range between \$57,000 to \$71,000 in order for the program to be as cost-effective as the status quo. With \$9.8 million in annual funding, the break-even incentive payments could fund a steady-state level of 135 - 170 providers.

The primary disadvantage of this option is that Wyoming would be ‘poaching’ providers from other states, instead of growing its own and contributing to nationwide supply. And, as with other options, there are unresolved policy questions. How would the State determine that a new applicant is truly a new recruitment, for example, instead of just paying someone who would have come to Wyoming anyway?

⁶⁸ Bodenheimer, T.S., & Smith, M.D. 2013. “Primary Care: Proposed Solutions To The Physician Shortage Without Training More Physicians.” *Health Affairs*. 32, 11. pp. 1881-1886. Retrieved from: <http://content.healthaffairs.org/content/32/11/1881.full>

⁶⁹ Lieb, D.A. 16 December 2015. “New laws to ease doctor shortage see long delays, criticism.” *Associated Press*. Retrieved from: <http://www.therolladailynews.com/article/20151216/NEWS/151219203>

⁷⁰ <https://www.sos.mo.gov/CMSImages/AdRules/moreg/current/v41n15Aug1/v41n15b.pdf>

Option E: Hospital administration of residency

If a larger Wyoming teaching hospital is interested in managing the residency program, the best way to reduce the cost to the State for “building” doctors would be to transfer the administration (and, significantly, the reportable costs) of the program to that hospital.

The process of increasing Medicare GME is not straightforward. Along with the complexity of the cost reporting itself, there are statutory restrictions on resident counts and the ability to transfer slots or expand programs. However, if these complexities can be navigated, hospital administration of the program would allow the residency program to receive significantly more Medicare GME (via Indirect Medical Education payments) than it currently receives under its cost-basis FQHC payment structure.

Implementing a Medicaid GME program for teaching hospitals might be a way to encourage this shift in ownership.

Option D: Other entity administration

If no hospital within the State is willing to administer the program, Wyoming could look out-of-State for opportunities to partner with other residency programs. This is ultimately similar to Option E, however, in that any significant federal funds would come in the form of increased Medicare IME payments to a teaching hospital, and this would also have to pass the same statutory and regulatory hurdles.

Option C: Residency consolidation: close Cheyenne

If the Legislature wishes to consolidate or scale-back the program, Part II indicates that the Casper site is performing at a higher level on all indicators, from revenue to graduation rates to retention. This option therefore would close the Cheyenne site and either augment or maintain the Casper site.

Option B: Residency expansion potential

If the Legislature wishes to expand the program, there are options to do so in the absence of PPS hospital participation. Both in-State FQHCs and Critical Access Hospitals, for example, can claim direct GME reimbursement on a cost-basis from Medicare. If desired, Wyoming Medicaid could also build a GME program built into FQHC or CAH reimbursement rates and receive some (likely small) amount of federal matching funds.

Option A: Operational efficiencies

This is the status quo option. If the Legislature believes the core purpose is still valid and the UWFM meets the State’s willingness-to-pay threshold to achieve that purpose, then the program should look for operational efficiencies within the existing UWFM budget through quality improvement and process improvement activities.

APPENDIX A: TIMELINE - MEDICAL EDUCATION IN WYOMING

Year	Event	Notes
1949	First formal medical education agreement	<ul style="list-style-type: none"> Wyoming sends first medical students to University of Colorado Medical School.
1950	SEA0007	<ul style="list-style-type: none"> Sen. Anselmi (Sweetwater) introduces legislation authorizing UW to contract with other institutions to provide medical education. Passed and enacted as W.S. § 21-347 with an \$18,000 appropriation, never implemented.
1952	Western Interstate Commission for Higher Education (WICHE) established.	<ul style="list-style-type: none"> “Compact” system; Wyoming students receive equal consideration for application and pay in-state tuition at participating medical schools, in exchange for state subsidy.
1960	WICHE medical workforce study ⁷¹	<ul style="list-style-type: none"> For Wyoming, the study estimated an additional 344 physicians would be required by 1975 in order to maintain 1955 physician-population ratio.
1962	Preliminary UW medical education study (Clarke report) ⁷²	<ul style="list-style-type: none"> Study noted that WICHE arrangements for medical education will not be adequate for Wyoming students by 1970. Recommended creating a two-year medical school.
1964	WICHE study (Faulkner report) on medical education ⁷³	<ul style="list-style-type: none"> Physician shortage is largely in rural areas of the state. Medical education is a major bottleneck, but resources are not sufficient for Wyoming to establish its own medical school. Recommended coordination with other Western states.
1970	Wyoming Higher Education Council report ⁷⁴	<ul style="list-style-type: none"> Recommended that Wyoming not fund its own medical school, but rather look towards collaborating with surrounding states.
1972	Wyoming Medical Society study ⁷⁵	<ul style="list-style-type: none"> Continued shortage of physicians; need a 30% increase to reach national average. Objective of medical education should be increasing the quantity and distribution of physicians and other medical personnel. State resources are sufficient to invest in medical education. The Legislature should authorize a four-year medical education program, admitting first class of 24 students in 1975.
1973	HEA0077	<ul style="list-style-type: none"> Legislature authorizes \$100K for comprehensive study of medical education; UW appoints Dr. Stephen Joseph as Director of Medical Education Planning

⁷¹ “The West’s Medical Manpower Needs.” Western Interstate Commission for Higher Education (WICHE). 1960.

⁷² “A preliminary study on establishing a two-year medical school at the University of Wyoming.” UW Medical Education Committee. 1962.

⁷³ “Opportunity for medical education in Idaho, Montana, Nevada and Wyoming.” Faulkner, James and Barrett, Francis. Western Interstate Commission for Higher Education. 1964.

⁷⁴ “Higher education in Wyoming.” Newburn and Hall. Wyoming Higher Education Council. 1970.

⁷⁵ “Medical education for Wyoming: imperative for improved health care.” Academy for Educational Development (AED). Nov. 1972.

1974	Dr. Joseph Report ⁷⁶	<ul style="list-style-type: none"> Recommended development of comprehensive medical education system (M.D. degree / graduate residency program / continuing medical education).
1974	Medical Education Steering Committee	<ul style="list-style-type: none"> Appointed by Gov. Hathaway. Submits package of recommendations to 1975 Legislature in line with Joseph Report, including establishment of residency programs and planning and development of a four-year medical school.
1975	Chapter 62, Wyoming Session Laws	<ul style="list-style-type: none"> \$395,983 SGF appropriation for Family Medicine Residency Program, part of a larger \$1.8M total appropriation for medical education. Budget in the Governor's Office.
1976	Casper residency established	<ul style="list-style-type: none"> Established as 8/8/8 residency (8 residents per year) Appropriation for medical education increases to \$4.4M. Legislature approves undergraduate medical contract program at Creighton (20 slots) and University of Utah (10 slots), in addition to the WICHE program.
1977	Casper residency accredited	
1978	Special session	<ul style="list-style-type: none"> Legislature rejects creation of four-year medical school at UW, but maintains support for residency program and contract education. Total appropriation increases to \$8M.
1980	Cheyenne residency established	<ul style="list-style-type: none"> Established as a 6/6/6 residency (6 residents per year). Legislature moves medical education budget to UW College of Human Medicine. Appropriation increases to \$13.8M
1982	Cheyenne residency accredited	
1983	UW FMR Legislative report ⁷⁷	<ul style="list-style-type: none"> Initial progress report on residencies. Indigent care first emerges as a major theme. Reported 30% of Cheyenne patients uninsured; 54% uninsured at Casper.
1984	Budget Bill, Section 201(a)	<ul style="list-style-type: none"> Creates committee to review the residencies and the potential for supplemental funding.
1985	Joint Senate Education, Health and Welfare and House Education Interim Committee report ⁷⁸	<ul style="list-style-type: none"> While noting quality of the program, first largely critical report. Estimated net cost of the residencies at \$1.4M for Cheyenne and \$1.2 for Casper, "in excess of 1,000% over estimates originally given to the Legislature [in the 1972 Wyoming Medical Society report]" Lack of affiliation with hospital means that funding limited to clinic revenue and SGF only. Facilities are "attractive, well maintained and elaborately equipped ... [with] what appears to be grossly extravagant audio-visual departments well in excess of the educational needs of the programs." Graduate retention rate of 42% is below expectations. Estimated \$500,000 cost per retained graduate. Physician surplus, citing 1980 GMENAC report. No longer need to recruit physicians to Wyoming.

⁷⁶ "Medical education for community health care: a plan for Wyoming." Joseph, Stephen C. Laramie, WY. June, 1974.

⁷⁷ "Wyoming Family Practice Residency Program: data from the University of Wyoming." Sept. 1983.

⁷⁸ "Report on the Wyoming Family Practice Residency Program." Submitted by: Joint Senate Education, Health and Welfare and House Education Interim Committee. 1984.

1985	UW internal report on the School of Human Medicine. ⁷⁹	<ul style="list-style-type: none"> ▪ Concluded that there are no alternative funding sources for the UWFMR programs, beyond State and clinical revenue. ▪ An estimated \$400K of Federal GME might be possible if hospitals were involved in funding the residencies.
1988	UW-WMC affiliation agreement ⁸⁰	<ul style="list-style-type: none"> ▪ Attempt by UW to share funding/GME revenue received by WMC, with intent to replicate with CRMC if successful. ▪ Not implemented.
2000	Casper affiliation agreement with the Community Health Center of Central Wyoming (CHCCW)	<ul style="list-style-type: none"> ▪ CHCCW would run clinic operations, residencies would be in charge of teaching. ▪ Agreement would permit enhanced Medicare and Medicaid revenue.
2002-2003	Operational crisis	<ul style="list-style-type: none"> ▪ Critical consultant report on accreditation, oversight. ▪ Resignation of Cheyenne director, low staffing levels, difficulty filling residency slots, reduction of unreimbursed care delivery.⁸¹
2004	Special Session HB 1008	<ul style="list-style-type: none"> ▪ Required review of UW FMR. ▪ UW requested one-time equipment and furnishings upgrade. ▪ UW explores additional GME opportunities through FQHC and through hospital administration.⁸²
2005	UW report to JAC ⁸³	<ul style="list-style-type: none"> ▪ Notes that the program in Cheyenne has had difficulty filling residency slots, due largely to low salaries for faculty and family medicine physicians generally. ▪ Notes that a 2004 Residency Assistance Program report considered both programs underfunded, but that no other funding streams (e.g. GME) would be available, and that the “residencies will not be self-sustaining.”
2005	Budget consolidation	<ul style="list-style-type: none"> ▪ New agency (167) created to separate out medical education costs from UW block grant.
2011	CCHW affiliation agreement dissolves	<ul style="list-style-type: none"> ▪ UW allocates \$2.3M in one-time funds to support transition to independent operations ▪ ACGME notes 11 citations for Cheyenne and 10 citations for Casper.
2013	Latest UW residency report ⁸⁴	<ul style="list-style-type: none"> ▪ Recommended various options for alternative funding streams, to include FQHC designation.
2014	FQHC “look-alike” designation	<ul style="list-style-type: none"> ▪ FQHC “look alike” designation allows improved payments from Medicare and Medicaid, as well as a small portion of Direct GME.

⁷⁹ “Report on the school of human medicine.” University of Wyoming. Ad Hoc Committee, Board of Trustees. Miracle et. al. 1985 (?)

⁸⁰ 1988 Affiliation Agreement for Service. Wyoming Medical Center Grant Proposal. March, 1988.

⁸¹ Timeline from Jan 17-18, 2013 UW Board of Trustee’s Report.

⁸² UW Board of Trustees. Minutes. Sept. 23-25, 2004.

⁸³ UW. “Report on Medical Education.” Dec. 1, 2004.

⁸⁴ https://www.uwyo.edu/acadaffairs/plans/rep_uw_famresidprog.pdf