

Title: **Multidimensional pre-post evaluation of two academic alternate relationship plans for Internal Medicine: A lever for health care transformation**

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the initial draft of the manuscript. John Conly, Maria Bacchus and Jon Meddings initiated the concept for this article, arranged for the provision of the full evaluation data of the Academic Alternate Relationship Plans from their respective sites from Alberta Health and Wellness and were responsible for the final interpretation and disposition of the contents. All of the authors reviewed and revised the manuscript for critical content and approved the final version to be published. John Conly will act as guarantor for the manuscript.

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Abstract

Introduction: Given significant clinical and academic challenges, the Departments of Medicine at the Universities of Alberta and Calgary and the Capital and Calgary Health Regions respectively, implemented Academic Alternate Relationship Plans (AARP) compensating physicians on a contractual vs. fee-for-service basis.

Methods: A before-after analysis of pre and post AARP implementation survey data was conducted . Evaluation methodologies were planned conjointly by the Departments using the same external evaluator, similar data sources and methodologies. Differences between pre and post AARP indicators were examined using a Poisson distribution.

Results: There was a significant increase ($p < 0.05$) in recruitment with increases of 28 (31.1%) and 29.5 (38 %) FTE for Edmonton and Calgary respectively, compared to historical trends of which would have been 1-5% in Edmonton and 4.3% in Calgary. In Edmonton, clinical service episodes increased by 23% excluding those provided by alternate care providers. In Calgary, clinical service episodes including inpatient and outpatient encounters, visits to alternate care providers and telehealth contacts, increased by 50%. Pre and post AARP, combined clinical and classroom teaching hours in Edmonton increased by 22%. and by 25% in Calgary. Research performance also improved on most measures of output and productivity.

Interpretation: The implementation of an AARP in Internal Medicine in both Edmonton and Calgary impacted recruitment and retention goals, and strengthened the ability to deliver on the clinical, research and education missions of the Departments. This provincial experience supports the use of alternate physician remuneration models as an enabler to health care reform.

Introduction

Since the mid-1990s provincial and federal agencies have examined ways to reform the delivery of health services. Several national and provincial reports, including the Romanow¹, Kirby², and Mazankowski³ reports, suggested the need to reframe and refocus the health system to ensure access, quality and sustainability. These reports recommended alternate mechanisms to remunerate the physician workforce in an effort to encourage different modalities of care delivery.

This article describes how the implementation of departmental Academic Alternate Relationship Plans (AARP) has been a fundamental enabler of change to improve patient outcomes, health care provider satisfaction, and health system sustainability. An AARP compensates physicians on a contractual instead of a fee for service basis. The Department of Medicine, within the Faculty of Medicine and Dentistry at the University of Alberta implemented an Alternate Funding Plan (subsequently renamed an Academic Alternate Relationship Plan) in July 2002. In Calgary, the Department of Medicine AARP commenced in August 2004. The divisions represented in the AARP for both sites included: Cardiology, Dermatology, Endocrinology and Metabolism, Gastroenterology, General Internal Medicine, Geriatric Medicine, Hematology, Infectious Disease, Nephrology, Respiratory Medicine, and Rheumatology. In Edmonton, Neurology is also included.

Prior to the inception of the AARP, both health systems and Departments of Medicine were experiencing similar challenges, including significant population growth, access difficulties for specialist services⁴, existing and forecasted workforce deficits to meet clinical and academic demands⁵, concerns regarding physician burnout⁶, and the need for innovative health care service delivery models⁷.

Given this background, the implementation of AARPs was seen as a critical strategy to support innovation in clinical care, to improve access, to place a higher value and provide support for medical research and education, and to enable workforce sustainability and administrative leadership. Final evaluations were completed in 2005 and 2007 for Edmonton and Calgary, respectively. We report here the Alberta Internal Medicine AARP experience based on these evaluations. ...

Methods

A before-after analysis of pre and post AARP implementation survey data was employed comparing data from multiple sources. Evaluation of the programs in both Edmonton and Calgary was conducted by the same external evaluator, BearingPoint Consulting, using the same methodology. The evaluation process was planned through consultation with the Academic Medicine Unit, Alberta Health and Wellness, the senior leadership of the respective Departments, and the respective AARP Management Committees. A framework was developed to analyze inputs, processes, outputs and impact (Figure 1). It was structured to provide measurement in seven key areas including: access, quality of health care, health care delivery innovation, staff retention and recruitment, quality of medical education and training, research excellence, and governance and management. Specific indicators were developed to track progress in each key area of the activities in the traditional CARE pillars: clinical care, administration, research and education.

Multiple sources of data (Table 1) were used to inform the evaluations including: analysis of shadow billing; financial databases; wait times; clinical (inpatient and outpatient) and job description databases; analyses of Department of Medicine databases; surveys of patients, referring physicians, and member physicians; and interviews with key stakeholders⁸. Descriptive epidemiologic analyses were used for the pre and post implementation data and comparisons of observed and expected events were analyzed using Poisson distribution, with a p value of <0.05 considered significant.

Results

In some instances evaluation indicators varied slightly between Edmonton and Calgary depending on available data. However similar conclusions can be drawn across both sites.

Clinical Impact: Access, Quality, Innovation

Access to specialist medical care was measured using a number of dimensions. In Edmonton, the greatest increase in job description was observed in the clinical portfolio: from 30.5 FTEs (Full Time

Equivalents) in 2001 to 41.4 FTEs in 2004, an increase of 35%. Clinical service volumes based on shadow billing data increased by 23% (Table 2). This number excluded episodes provided by alternate care providers (e.g. nurse practitioners) supervised by AARP funded physicians. The data also excluded services where a shadow billing event did not occur, an event that was perceived to be common either due to issues in the billing department or secondary to the impression that physician remuneration was no longer dependent upon submitting a billing invoice. The number of service episodes per clinical FTE declined by 9.6%. This relative decline may reflect limitations of the underlying data as described above. In addition to these considerations the denominator of this ratio was planned FTEs from job descriptions and not actual FTEs. Some physicians may have actually spent more time in clinical activities pre-AARP than their job description as there was a financial incentive to do so. Physicians who were on a leave of absence or sabbatical were included in this analysis as there was no way to remove this source within the dataset. Furthermore, a decrease in the number of patient service episodes per FTE can also be viewed as a positive intended impact. If the intent is to promote more appropriate utilization of specialist service for the most complex patients, and develop primary care or alternate care provider capacity to deal with less complex patients, then the trend should be toward fewer patient care episodes per clinical FTE. In support of this, acuity of the outpatient population increased by 8.3%⁹. From a patient perspective, 91% (n=808) of patients seeing an AARP specialist in an outpatient clinic somewhat (24.6%) or strongly (66.3%) agreed that the timing to receipt of care/service was acceptable.

In Calgary, clinical workload, measured by inpatient and outpatient physician encounters, visits to alternate care providers and telehealth contacts, increased by 50% from 2003/04 and encounters per total FTE increased by 8% (Table 3). In addition a physician survey conducted of AARP members¹⁰ (n=135) supported the notion that the AARP had a positive impact on clinical activities where 63%, 64%, and 56% of physicians indicated that the AARP had a somewhat or significantly positive effect on:

the ability to spend more time with complex patients, develop, test and implement innovations, and implement interdisciplinary care models, respectively.

Separate innovation funding, linked to the implementation of the AARP in both Edmonton and Calgary was also an enabler of change (Table 4). Strategies included: enhancing linkages with primary care physicians, centralizing referral and triage processes, developing models of care supported by alternate care providers working to full scope of practice, application of clinical practice guidelines, and enhancing or creating new specialty clinics.

Recruitment and Retention

One of the primary objectives of the AARP was to meet recruitment and retention targets and ensure the ability to meet clinical and academic demands. Increases in recruitment specifically related to the AARPs are illustrated in Table 2 and 3. Increases in recruitment were 31.1 % and 38 %, respectively, for Edmonton and Calgary overall. This is a significant increase compared to historical trends which would have been 1-5% in Edmonton and 4.3% in Calgary. In Calgary approximately 54% of the total Regional Department of Medicine and over 95% of the full time academic specialists were a part of the AARP. In Edmonton there is not a Regional Department of Medicine, but over 90% of the members of the Department of Medicine at the University of Alberta Hospital site are members of the AARP and an increasing number located at other sites have joined the AARP. Furthermore, some specialties are more encompassed within the AARP, including: Endocrinology and Metabolism, Geriatric Medicine, Hematology, Infectious Disease, Rheumatology and Respiratory Medicine. Fee for service remuneration is typically more attractive to procedure based specialties such as Cardiology, Gastroenterology, Nephrology and Dermatology.

The AARP also had a positive impact on the careers of individuals responding to the Calgary member survey (n=135)¹¹. Satisfaction was particularly high with personal career factors related to compensation, quality of professional life, the ability to develop and participate in innovations, and the

ability to pursue an academic career, with 80% of respondents somewhat or significantly satisfied with their jobs followed closely by career satisfaction at 78%.

Medical Education and Training

The AARP was intended to support increased undergraduate enrolment and expanded residency programs. The AARP has allowed members to protect time for education and to be reimbursed for this activity (Table 5). Combined clinical and classroom teaching hours in Edmonton increased by 22% pre and post AARP. In Calgary, teaching hours increased by 25%, compared to the pre AARP era. In both Edmonton and Calgary AARP members gave their highest rating for the positive impact of the AARP on teaching in a clinical setting. In Edmonton, 68% of respondents (n=25) indicated the AARP had a somewhat or significantly positive impact on clinical teaching¹². In Calgary, both new and existing physicians had the highest ratings for the AARP impact on clinical teaching with a mean score of 3.81 out of 5.

Quantitatively, it was also apparent that following the introduction of an AARP the number of teaching hours increased at a greater rate than the number of recruits. Normalizing the data per educational FTE demonstrates this and in each year following the introduction of the AARP a 5-10% increase in reported teaching hours/educational FTE was observed (Table 5).

Research

The AARP was positioned to protect time for physicians to pursue research activities. Research performance improved on most measures of output and productivity (Table 6). In Edmonton, the AARP supported recruitment of physicians who have an interest in research with an overall increase of 39% in research FTEs. Overall the increase in peer reviewed operating funds/research FTE has increased by 32%. There are more research FTEs with an AARP in place and they were more effective in obtaining operating support and external salary support (which increased by 24%). The positive outcomes of this

funding in terms of increased productivity were not observed over this time frame. In Edmonton, the number of graduate or research trainees students per research FTE increased by 11%.

In Calgary, the percent of member's time dedicated to research has increased from 15% in 2003 to 21% in 2006. Protected research capacity has increased by 6.7 FTEs since the inception of the ARP. Funding to AARP principle investigators increased by 28% and offset a 52% decrease in funding to non-AARP members. Research funding increased by 8% from \$18.8M in 2004/05 to \$20.2M in 2006/07.

For both Edmonton and Calgary, sources of funding and consequently the mix of types of research projects have evolved during the AARP. Industry funding has declined and funding from AHFMR and CIHR has remained constant or grown. The major growth has been driven by research funds from societies, associations, and foundations, other granting agencies, and a variety of hospital and university sources across Canada. The number of papers per research FTE did not increase (data not shown) but was not unexpected given the lag period of the scientific publication process.

Administration and Leadership

One of the explicit goals of the AARP was to encourage members to assume positions of leadership in the medical community and in partnership with health care administration. Physician involvement in health care innovation is critical to successful change, and the AARP protected physician time to assume leadership roles. In Edmonton the AARP has supported the inception of a number of administrative innovations including a transcription pool, information management steering committee, and centralized divisional administration. In addition administrative economies of scale have been achieved by the increased membership in the AARP and subsequently larger size of the Department of Medicine. In Calgary, the 2007 membership survey indicates that only 15.7% of physician time is spent in administrative activities compared to 21.3% in 2003.

Interpretation

There is considerable literature regarding the effect of physician payment models on the efficiency and quality of care. For example, studies have examined remuneration effect on volume of patient visits^{13 14} antibiotic prescription rates¹⁵, and patient trust¹⁶. One review suggests that “little data are available to support the claim that one system- capitation, salary or contract’ is more effective and efficient than fee-for service or that it delivers better value for money quality of care”¹⁷. Alberta has the highest fee for service rates and the lowest use of Alternate Relationship Plans in Canada. In 2005–2006, the proportion of payments made through alternative clinical payment programs varied considerably across jurisdictions, ranging from 12.3% in Alberta to 42.8% in Nova Scotia and 96.1% in the Northwest Territories¹⁸.

However, in terms of our Department of Medicine AARPs our experiences differ. We observed a significant increase in our ability to recruit following the introduction of an AARP, coupled with an increased ability to provide clinical care, improved access, introduction of innovation in health service delivery, an increase in the efficiency of teaching, teaching per educational FTE, and an increase in research effectiveness per research FTE. Overall, the movement to an AARP resulted in a measurable improvement in academic outputs and was considered a great enabler to health care transformation. Although not reviewed by an external auditor it is apparent from the Edmonton experience that these improvements persist beyond the 3 year mark and evidence of increased productivity in the research field has now become manifest.

Implementing an AARP was not without its challenges and the most significant was creating a comprehensive AARP funding philosophy. The impact of the AARP was the result of attention to all aspects: increasing recruitment, clinical, academic, and research activities. The AARP made explicit a tension that exists between autonomy of the individual, and the accountability to the system. Achieving the most appropriate balance between autonomy and accountability will continue to evolve and underscores the need for measurement and evaluation. Due to a perceived economic disadvantage,

participation of procedural, high billing specialties was initially lower in the AARPs. However participation has increased over time as new graduates join the workforce. Finally, the preservation of a partnership model that balances the interests of the university, the health region, the medical association and the government is important and requires ongoing attention.

There are limitations to our study. Evaluation of a construct like an Academic Alternate Relationship Plan is complex as there are many variables impacting intended outcomes. Some differences existed between the two sites with respect to the data collected but we sought to standardize data to reduce any bias from differing collection methodologies. Pre and post measurement required extensive collaboration between the evaluator, to ensure the intervention and outcomes were fully understood, and to utilize existing data sources. In light of this, we cannot rule out the possibility of bias in the collection and analysis of data. Finally, the time periods evaluated were relatively short and changes to the data might be incorrectly attributed to the AARP intervention.

This provincial experience supports that a comprehensive strategy for a successful AARP involves attention to clinical innovation, academic and research excellence, and workforce and administrative leadership. The opportunities for continued innovation are significant and impacted by many factors, including physician remuneration. It is fair to say that we believe that the introduction of AARP's has been the single largest contributor to the academic and clinical success of our departments.

Figure 1: Framework of inputs, processes, outputs and impact¹⁹

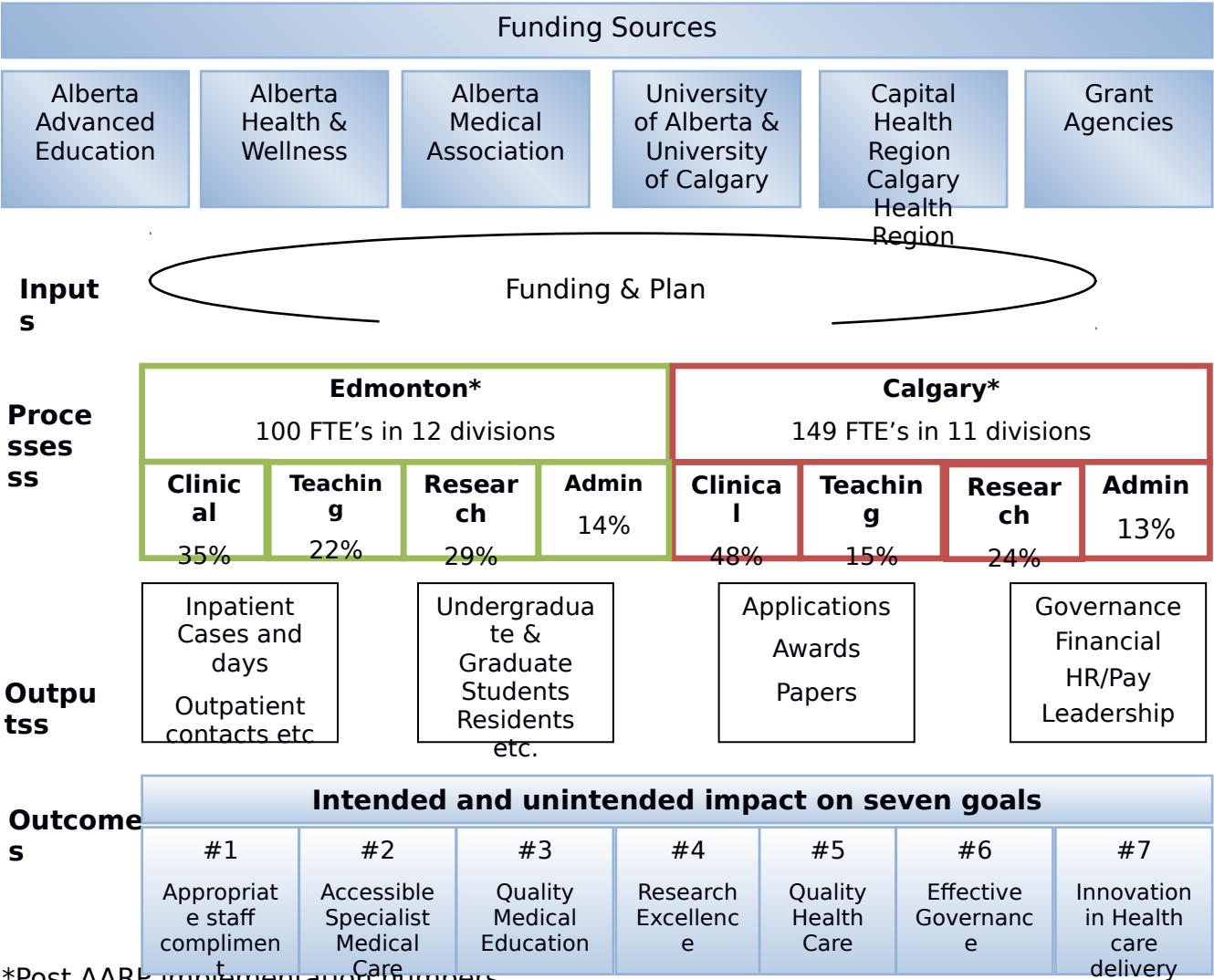


Table 1: Key evaluation questions and sources of information

	Key Evaluation Questions	Source of Information
Inputs	What are the expectations of key stakeholders?	Stakeholder interviews AARP proposal Conditional Grant Accountability Framework
	How were the AARP funds used? Which staff in which divisions? AARP management & administration Comparison of actual to budget? Year over year spending per FTE?	Department of Medicine financial reports
Process	Where was time spent (clinical, teaching, research, administration)? How does this compare to the job description? Did the activity capacities change? Did the mix of activities change? What innovations were designed into activities?	Job descriptions Innovation evaluation report
	How is the program governed and managed? What structures and practices are in place to govern and manage the AARP? What project management structures and processes were used?	Organizational structures, terms of reference AARP Management
Outputs	What volume of outputs were produced in each activity area? What was the year by year change? In volume ? In Mix? In Acuity?	Shadow billing system Regional Inpatient(IP) and Outpatient(OP) abstracts
	How efficiently were the services provided What year by year trend did we see in: Unit of output per unit of input? Cost per unit of output?	Ratio of results
Outcome	Impact on appropriate staff complement: What was the impact on recruitment? Were AARP members satisfied?	Actual to plan Member survey
	Impact on access to specialist medical care: How was clinical capacity increased? Did clinical service volumes increase? What new programs were implemented?	Department of Medicine FTEs, budget data, FTEs IP, OP and telehealth statistics Innovation evaluation report
	Impact on quality medical education and training Impact on various indicators	Individual service reports
	Impact on research excellence Impact on various indicators	Individual service reports
	Impact on quality health care: How long did patients have to wait? Were referring physicians satisfied? Were patients satisfied?	Innovation evaluation report Referring physician survey H-CAHPS (Hospital Consumer Assessment of Healthcare Providers and Systems) surveys

Table 2: Edmonton AARP physician clinical workload ²⁰

Edmonton	Pre- AARP		AARP years			Change		Significance
Indicator	2000	2001	2002	2003	2004	#	%	P level
FTEs/job description:								
Clinical teaching	23.4	23.6	28	31.3	33.4	9.8	41.5	0.04
Clinical non-teaching	17.6	18.7	21.2	23.8	24.7	6.0	32.1	
Shadow Billing (IP & OP)								
Service episodes	180,721	181,216	191,677	213,570	222,496	41,280	22.8	<0.0001
Service episodes/ FTE	6,158	5,951	5,448	5,410	5,381	-570	-9.6	<0.0001
Unique patients served	42,542	41,987	42,893	43,643	47,176	5,189	12.4	<0.0001
Inpatient Trend (CH Clinical abstract)								
Inpatient cases	4,239	4,200	4,271	4,357	4,578	378	9.0	0.003
Average Resource Intensity Weight	1.56	1.52	1.58	1.54	1.49	-0.09	-5.7	
Outpatient Trend								
Multi-divisional clinic visits	57,800	60,623	66,462	69,272	74,417	13,794	22.8	<0.0001
Medicine clinic outpatient days	36,969	32,585	34,606	34,848	32,040	-545	-1.7	
Average relative value index (RVI)	0.81	0.76	0.72	0.73	0.78	0.06	8.3	
Outreach								
Remote Telehealth (Clinical)				18	652	652		
Outreach Clinics			224	227	194	-30		

Table 3: Calgary AARP physician clinical workload ²¹

Calgary	Pre AARP		AARP Years		Change		Significance
Variable	2003/04	2004/05	2005/06	2006/07	#	%	P Level
Encounters							
Inpatient encounters ¹	24,635	23,780	24,658	28,806	4,171	17	<0.0001
Outpatient encounters ²	49,134	57,950	63,293	69,840	20,706	42	<0.0001
Alternate Care Provider Visits ³			8,962	7,978	7,978		
Telehealth contacts ⁴	272	426	2,101	4,190	3,918	1,441	<0.0001
Total	74,041	82,156	99,015	110,815	36,774	50	
Actual FTE's							
Total FTEs	108	119.2	126.6	149	41	38	<0.0001
%Time Spent in clinical	0.42	0.44	0.46	0.48	0.06	14	
Clinical FTEs	45.4	52.3	57.7	71.3	26	57	
Ratios							
Encounters per total FTE	686	689	782	744	58	8	
Encounters per clinical FTE	1,632	1,571	1,715	1,554	-79	-5	

¹ Count of all physician types adjusted by Resource Intensity Weight

² Face to face contact with physician

³ Additional outpatient face-to face- contacts with alternate care providers using 2004/05 as base year

⁴ Telehealth hours with patient present multiplied by 4 to convert to typical 15 minute visit

* Historical mean increase over previous 6 years was 4.1 FTEs/annum

Table 4: AARP Innovation projects outcomes evaluation

Project	Results
Atrial Fibrillation Clinic²² Calgary*	Reduced wait time to see a physician specialist from 220 days in 2005 to 30 days 2006 Sample 68 patients with pre/post clinic data: reduced emergency visits by 82%; reduced hospital admissions by 56%; Hospital length of stay averaged 5 days pre clinic and 1.8 days post clinic
Cardiac Function Clinic Calgary*	Sample of 103 patients pre/post clinic data: reduced emergency visits by 83%; reduced hospital admissions by 69% ; reduced hospital length of stay by 856 days
Endocrinology Triage Edmonton	Since its implementation, decreased wait times for urgent & priority referrals to less than two weeks and generally the same week as the person on call will accommodate these.
GI Central Intake Calgary*	Resulted in decrease in wait time of 8% in spite of a 153% increase in referrals
Nephrology Central Intake Calgary*	Central intake resulted in launch of urgent assessment clinic and reduction in wait times between 25% and 50% depending on urgency
Pulmonary Hypertension Program Edmonton	Wait time for diagnostic testing and consultation reduced by 70%. 20% of patients access more than one member of interdisciplinary team
Respiratory: Induced Sputum Analysis Chronic Cough²³²⁴ Calgary*	65/122 patients with evidence of sputum eosinophilia and subsequent change in management resulted in reduced emergency visits by 67%, and reduced hospital admissions by 75%
Rheumatology Central Intake Calgary*	Decreased wait times between 15% and 37% depending on patient urgency

*Calgary ARP Innovation project outcome data²⁵

Table 5: Impact of AARP on education

	Edmonton			Calgary		
Indicator	2001	2004	Increase	2004/2005	2006/2007	Increase
FTEs Classroom Teaching	8	8.7	9%	7.2	8.9	25%
FTEs Clinical Teaching	23.6	33.4	42%	19	23.7	25%
Total UGME Students	461	527	14%	320	349	9%
Total PGME Residents	199	233	17%	83	95	18%
Teaching Hours/ Educational FTE†	1474	1804	22%	983	1031	5%

† - represents total of lectures, small group and other teaching for undergraduate and postgraduate teaching for Calgary

Table 6: Impact of AARP on research²⁶

	Edmonton			Calgary		
Indicator	2001	2004	Change	2004/2005	2006/2007	Change
Research FTEs	23.3	32.3	39%	28	34.7	24%
Grant Agency Funding/ Research FTE (thousand \$)	\$235	\$310	32%	N/A	N/A	N/A
Salary Support/ Research FTE (thousand \$)	\$51.1	\$63.6	24%	\$55.8	\$56.1	1%
Graduate Students/ Research FTE	1.12	1.24	0.11	4.0*	5.18*	30%

* research trainees (excluding residents)

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