

Developing a Sustainable Research Culture in an Independent Academic Medical Center

Jeffrey N. Joyce

Kansas City University of Medicine & Biosciences

Abstract: *Independent academic medical centers (IAMC) are challenged to develop and support a research enterprise and maintain primary goals of healthcare delivery and financial solvency. Strategies for promoting translational research have been shown to be effective at institutions in the top level of federal funding, but not for smaller IAMCs. The research program developed at Maricopa Integrated Health System (MIHS), an IAMC, focused on identifying research enterprise drivers which have an impact on core missions for MIHS and encompassed three domains: (1) Commercial ventures; (2) Clinical practice; and (3) Civic and Community relationships. Specific mechanisms were implemented to promote research, which had an impact on each enterprise driver. Case examples in 2 clinical arenas are described in detail, Pediatrics and Obstetrics/Gynecology, to demonstrate how the strategies were applied to increase translational research and influence the research enterprise drivers. These strategies included: reducing barriers within MIHS and with partner institutions, increasing revenue generated from grants and contracts, providing grant development support, and developing sustainable collaborations with partner institutions. The value in identifying and utilizing external resources is reciprocal as ongoing research collaborations have resulted in more contract and grant awards for both MIHS and partner institutions.*

Keywords: *translational, clinical, administration, health care, medical center, university*

Introduction

Traditional academic medical centers (AMCs), with a teaching hospital associated with a medical school, have been the home for clinical and translational research for several decades. However, independent academic medical centers (IAMC) which are free-standing hospitals providing residency training are increasingly engaged in translational research. As proposed by Melese (2006, page 2) "AMCs accept a remarkable challenge: to integrate and achieve with excellence four core missions: delivery of healthcare; education and training of future generations of clinicians and investigators; discovery of new knowledge through incisive, decisive research; and the export of knowledge through effective interactions with industry and government. Each mission is critical, and each must be interactive with and respectful of the others". While the addition of the Teaching and Research components is essential to the overall mission of AMCs and IAMCs, these two components also have an impact on their financial and credit profiles. It has been evident for many years that clinical research activities are secondary to the delivery of healthcare in IAMCs, and administrative structures and policies do not support development of the research enterprise (Campbell, Weissman Moy, & Blumenthal, 2001; Oinonen, Crowley, Moskowitz, & Vlasses, 2001). As a consequence these counter balancing needs and values that challenge the ability of IAMCs to grow their

research enterprise. It is recognized, therefore, that new strategies are needed in “maintaining academic medicine’s integrity and effectiveness in pursuing its vital research mission” (Cohen & Siegel, 2005).

Academic medical centers and teaching hospitals are indispensable to promoting translational research, because of the preponderance of clinical research conducted in these institutions (Dickleret, Korn, D., & Gabbe, 2006; Goldhamer et al., 2009). The clinical research enterprise has been stimulated in academic medical centers through a number of formal and informal mechanisms, but evidence of effectiveness of these mechanisms has been limited to recognition of institutions that rank in the top level of National Institutes of Health (NIH) funding. Even within these institutions, where there is typically protected time for research, a small number of faculty are engaged in clinical trials research (Weston, Bass, E.B., Ford, D.E., & Segal, 2010; Zinner & Campbell, 2009). Despite widely recognized barriers to creating translational research endeavors, the design of systematic approaches to promoting clinical research has been largely limited to these same research-intensive institutions (Rosenblum & Alving, 2011). In two papers, which explored attitudes and beliefs about participation in clinical trials at nonacademic healthcare delivery systems by physicians, Somkin et al. (2005; 2008) also identified barriers that led to a significant mismatch between perceived value of clinical research by physicians and actual participation by physicians in clinical trials. While almost three quarters of cardiologists and oncologists viewed participation in clinical trials as important and valuable, less than 30% actually participated as a clinical trial principal investigator. Barriers to participation included: (1) a mismatch between beliefs of the institutional leaders and clinicians about value of clinical research, (2) lack of adequate skilled support staff (e.g., nurse clinical coordinators), (3) lack of or noninvolvement of research department in clinical trials, (4) lack of dedicated research time for physicians, and (5) lack of secondary support staff (pharmacists, data managers, statisticians, etc.). The authors did not address strategies to increase clinician principal investigators in clinical trials, or how institutions could support an environment conducive to physician involvement in clinical trials.

This article describes the processes by which a newly established Department of Research focused on promoting research collaborations as a tool to help the a research enterprise grow at an independent academic medical center. Maricopa Integrated Health System (MIHS) is centered in a large metropolitan area with a diverse socioeconomic patient population. The cornerstone of MIHS is Maricopa Medical Center (MMC), a major teaching hospital with a history dating back more than 100 years. MIHS became an independent health care district by voter approval in 2005 and is governed by an elected five-member Board of Directors. As an independent academic medical center, the core missions include medical education and research, with MIHS offering nine residency programs training over 295 residents annually. The Department of Research was established in 2006 to meet several goals, but the driving need was the Accreditation Council for Graduate Medical Education (ACGME)’s review of physician training programs, at MIHS and elsewhere, which demonstrated the vulnerability of programs lacking a credible research component. Another important driving force was MIHS’s intention to assume the role of a major university- affiliated teaching hospital and clinical hub for its research partners. The author, the first Director of Research, assumed this position in

early 2007. The administrative growth and organizational design of the department is detailed elsewhere (Joyce 2011).

This article is framed in reflective practice (Leitch & Day, 2000; Jacobs, 2012), and aims to use case studies to illustrate an antecedent situation leading to a theory-based strategy and exemplar practice episodes. The antecedent situation was the establishment of the Department of Research within MIHS at a point when growth in the research enterprise was both critical to and defined as part of the mission of the institution. A set of research enterprise drivers was organized as the theoretical framework, which also served as the management framework supporting specific strategies to promote research growth at MIHS. The practice episodes are detailed as case studies, where resources and outcomes were clearly identifiable. The experience of the author in his previous position as Director of a center for Parkinson's disease research, a center without walls, when he was at a research institute framed this core strategy. The core strategy was dependent on forming collaborative ventures with partner institutions

Understanding Research Enterprise Drivers

The predominant reason cited by Somkin et al. (2005; 2008) for a successful research enterprise at an IAMC or nonacademic healthcare delivery system is the alignment of the core values and mission of the system executive leadership and the physician/investigator leaders around the value of the research enterprise. The authors identified the second most important reason as being an active and participative research office or department. From its inception in 2006, the Department of Research worked with the executive leadership to set mission driven goals that focused on the value of the research enterprise. The five specific mission goals were: (1) Service/Access -increase sponsored clinical studies; (2) Quality -reduce clinical study approval time period; (3) Growth -launch new researchers, (4) People -serve on external collaborative research committees; and (5) Financial -increase cost recovery for clinical research operations. The author, as first Director of Research, developed the management framework to translate these goals into a set of research enterprise drivers encompassing three domains: (1) Commercial ventures; (2) Clinical practice; and (3) Civic and Community relationships (Figure 1) which have an impact on other MIHS core missions for MIHS (e.g., medical education). These enterprises drive research growth because of the intersection with, and impact upon, multiple interested parties.

The domain-based management framework is similar to "a combined process methodology/ industrial sector management framework" for university-industry research collaborations discussed by Philbin (2010). Philbin identified three categories in which there are benefits or key drivers that impact university-industry collaborations. The present framework expands the intersections from the similarly defined IAMC (MIHS)-government/industry commercial enterprise to two other enterprises: clinical practice and civic/community. This author identified the interested parties in each enterprise in order to engage them in beneficial research collaborations. The interested parties in the commercial venture enterprise included industry sponsors, federal funding agencies, and foundations. The interested parties in the clinical medicine practice enterprise included physicians, residents, medical and graduate

students. The interested parties in the civic and community enterprise included partnering universities, not-for-profit research institutions, and service organizations. Each enterprise has different strategies for growth, development, and engagement, yet they influence each other significantly. Because the execution of the strategies required steep research administration growth and support at MIHS and alignment with other MIHS departments (i.e. information technology, finance and revenue, legal and compliance departments) the Research Department developed an administrative and implementation strategic plan in collaboration with the medical staff, and MIHS executive leadership. The research compliance environment and evolution is covered elsewhere (Joyce, 2011). This article describes the planning, development and implementation of the strategies to grow the research enterprise at MIHS.

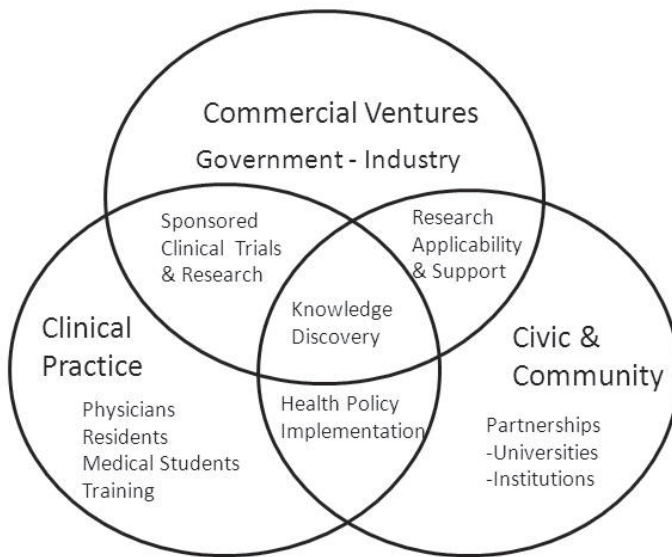


Figure 1. Hybrid Domain Research Enterprise Drivers

Reducing Barriers and Increasing Incentives

While a research enterprise is not a business, the primary drivers for a successful research enterprise are commercial ventures. As a consequence of declining research revenue prior to re-establishing the department of research MIHS senior administration set a goal for the department to recover 50% of administrative costs within 3-5 years. The Director's senior team implemented a three-stage process, guided by the strategic plan, to increase revenue and recover costs. The first step was to increase the number of industry-sponsored clinical trials and increase the revenue generated from contracts. To increase the number of contracts, the department streamlined the contract negotiation and approval process, reduced IRB approval time, and negotiated more effectively to increase the income per contract. Because the department was successful in this solution (increasing by 29% the amount per contract

to MIHS, and reducing the negotiation timeline by 60%) it encouraged other physicians to explore their involvement in clinical trials. The department provided clinical coordinator managerial support and training for “new investigators”, matched new investigators with experienced investigators for mentoring, and developed processes to better match clinical trials to physicians and our patient population. The Research Department doubled the number of industry-sponsored clinical trials each the first three years, from 2007-2010. The department engaged in two further solutions: (1) focusing in specific clinical areas without a research tradition (e.g. Pediatrics) to develop clinician investigators and a research infrastructure; and (2) serving as a lead institution for a University- Quintiles prime site agreement which uses a community-based model to match sites with clinical trials submitted by Quintiles. According to Center Watch (Anonymous, 2011), Quintiles, the world’s largest pharmaceutical services company, is using this model as part of its plan to focus the delivery of all clinical trials through these Prime Sites. As a member of the six person executive team (three community members and three Quintiles members) the author provided leadership in the implementation of the prime site alliance including site selection, quality assurance and cost recovery.

The second goal, initiated in the Department’s second year, was to significantly increase the number of federal grants. The Department hired an experienced senior manager for academic research to build the infrastructure to better manage the federal funded grants and subawards. Simultaneously, the Director concentrated on the strategy of developing partnerships and alliances, connecting MIHS physicians with interested scientists and clinicians at other institutes and medical centers to establish research programs and mentor young physician/scientists. The initial step was to engage key leaders at academic and not-for-profit research institutes in identifying basic scientists who were interested in the clinical imperatives or health outcomes of their research. The department team worked together to “match” interests with the physician-scientists at MIHS. As the synergy worked, highly successful collaborations developed rapidly and funding from federal agencies (e.g., the NIH and Department of Defense) evolved. The sponsored grant awards to the partnerships provided tangible resources which supported the longevity of collaborative ventures, but could have been improved by providing institutional seed funding. However, an experienced grant developer/manager was hired to be responsible for identifying funding sources, supporting grant development and completing co-institutional grant submissions. At the ground level, the author and grant developer/manager actively supported the development of the collaborative teams typically focused around a disease entity, and this provided the intellectual support for program development. With time the collaborative teams matured in their internal grant development skills, and with successive submissions obtained sponsored grants.

The third step was to increase accountability for research administration costs and cost recovery through the development of new policies and procedures. In conjunction with VP of Finance and other MIHS staff, the department instituted new policies, procedures and processes for financial aspects of research activities, including budgets, cash flow projections and financial reports. This included establishing new positions in the Finance Office to oversee the research budgets, accounts and patient billing issues. The department also engaged a professional consulting firm to inform the MIHS senior financial team (VP of Finance and CFO) on the

need to increase the federal indirect cost rate. As a result, the department, key MIHS leaders, and the consulting firm negotiated a substantially increased indirect cost proposal, which was submitted and approved by DHHS in 2010.

A Major Role for Partnerships

To increase public awareness of MIHS research activities, the department implemented research partnerships and alliances with major institutions, which supported the mission of MIHS. Partners and allies include, but are not limited to: (1) a state university with biomedical, health policy and social sciences research as a major partner which would align basic research capabilities with MIHS clinical research operations; (2) a university medical school which would partner to place students, thus supporting the MIHS goal to become a major teaching hospital for that program; and (3) institutions and organizations that would provide the best means to provide for the underserved and medically needy, a core MIHS mission. These relationships and alliances were established with the understanding that they would evolve in ways defined by MIHS's operational goals in academic research and physician training.

A strong relationship with a local university, Arizona State University (ASU) merits special mention. Physician/scientists at MIHS developed successful collaborations with colleagues in centers at ASU in many fields, including the Southwest Interdisciplinary Research Center (SIRC), Center for Metabolic Biology, Center for Health Information & Research (CHIR), the Biodesign Institute, College of Nursing & Healthcare Innovation, and the Department of Biomedical Informatics. As a result, partners received three NIH funded awards in the area of health disparities in Hispanic women. This success conferred immediate validity and recognition for MIHS in the biomedical/health research community.

The collaborations with ASU investigators were so successful that of the author co-led (with an ASU: leader) the development of a Memorandum of Understanding which reinforces research partnerships in four priority areas: metabolic disorders, women's health, health policy (epidemiology), and mental health. The partners implemented an intellectual property and technology transfer agreement to cover all joint research projects. The MOU emphasizes the relationship between graduate training and research programs, clinical research mentorship opportunities and the reduction of barriers to developing research collaborations.

Case Studies

The independent academic medical center is a good environment for conducting translational research, as it requires active collaborations between basic research scientists and research oriented clinicians. While the initiatives led by the author and Department of Research team within MIHS and between institutions represent important steps to create a research culture conducive to translational research, it is the clinician investigators who drive the enterprise. Clinicians with interests in translational research require a variety of support mechanisms to achieve their goals. Case studies illustrate successful approaches leading to externally funded translational research, and where the resources and outcomes were identified clearly. In the first, the Department of Pediatrics at MIHS is an example of an area with investigators whose

Table 1. Source and type of resources for developing research programs

Project/Investigator Dept.	Internal Resources	External Resources
<i>Clinical Research/Pediatrics Pain Medication: pharmacokinetic, pharmacodynamic, efficacy, and safety data</i>	Research Department team negotiated pre-award support for CRC, provided support for recruitment and training of CRC	Identified key processes to increase sponsored studies through CONECTR membership and executive leadership on CONECTR
<i>Academic Research/Pediatrics Modeling and factors associated with the spread of methicillin resistant staphylococcus aureus (MRSA) infection in pediatric population</i>	Research Grants Project Manager and Director of Research provided grant writing and editing expertise. Identified funding source for competitive grant submission	Identified key resources at partner university to support project: ASU/CHIR/AZHQ database and collaborator in School of Human Evolution and Social Change
<i>Academic Research/Pediatrics Use of information devices (kiosk) to reduce language barriers to medical treatment in the ED</i>	Research Grants Project Manager and Director of Research provided grant writing and editing expertise. Identified funding source for competitive grant submission	Identified key resources at partner university to support project: collaborator in Biomedical Informatics
<i>Academic Research/Ob-Gyn Collaborative community research projects to improve women's health. MIHS and ASU have two NIH funded studies in: (1) efforts to increase physical activity in low income Hispanic women and decrease health risks associated with obesity; and (2) to evaluate risks and protective factors for post-partum depression (PPD).</i>	Research Department team identified barriers to effective implementation of research projects within research compliance operations including: changing dual institutional IRB approval of research; Spanish translation documentation process; approval process for employees of external institutions to be involved with research on MIHS patient population.	Identified key resources at partner university to support project: collaborators in Department of Psychology and College of Nursing & Healthcare Innovation. Grant funding developed by ASU PIs with collaborative input from MIHS. Research is with MIHS clinical population.
<i>Academic Research/Ob-Gyn Collaborative community research projects with focus in health services research examining health disparities in reproductive and preventative women's health among immigrant and refugee populations</i>	Director of Research worked with ASU leader to identify academic home for clinician investigator, process for appointment at ASU and salary support. Department of Ob/Gyn provides salary support for non-clinical activities in addition to clinical responsibilities as Director of the Refugee Women's Health Clinic at MIHS	Key support services, faculty home and collaborative research team provided by Southwest Interdisciplinary Research Center (SIRC) within ASU College of Public Programs, SIRC is An Exploratory Center of Excellence on Health Disparities Research and Training Funded by NIMHD/NIH
<i>Academic Research/Ob-Gyn Maricopa Integrated Health System (MIHS) participation in the public cord blood bank project sponsored by University of Colorado Cord Blood Bank (UCCBB) and Arizona Biomedical Research Commission (ABRC)</i>	Research Grants Project Manager and Director of Research developed grant to fund operations at MIHS. Department team led implementation of research project within hospital compliance operations.	Funding provided by ABRC (now within AZDHS) and initiative developed by UCCBB for public cord blood bank project which aims to use cord blood, which is usually discarded following the birth, for transplantation into other persons with life-threatening diseases.

primary interest is industry-sponsored research who practice alongside colleagues who have an investigator-driven research agenda. The other case study is of the Department of Obstetrics and Gynecology, which has a focus on community-based academic, non-industry, sponsored research. Both sponsored and non-sponsored research have value, but have different impacts on patients' health, health policy, and research enterprise drivers. Table 1 lists resources the Department of Research used to support clinician investigators to achieve success in their research programs. There are internal resources which rely exclusively on the skills and expertise of the department team and external resources which depend on identifying resources, such as collaborators at partner institutions. The value in identifying and utilizing external resources lies in reciprocal, ongoing research collaborations which in turn led to more contract and grant awards, operations which involve multiple enterprise drivers (Figure 1).

Department of Pediatrics: A Mixed Case Model

Industry-sponsored clinical research is often seen as propelled by the sponsor's interests rather than the investigators, and driven exclusively by the commercial venture (see Figure 1). However, for MIHS, clinical studies in the pediatric population are propelled by both the commercial ventures and clinical practice enterprises. The pharmaceutical industry traditionally has had little incentive to undertake pediatric clinical trials, which has resulted in off-label use of medication approved for adults in 60 to 90% of children and newborns (Bazzano et al, 2009). Due to new US Food and Drug Administration (FDA) European Medicines Evaluation Agency (EMA) policies regulating approved and investigational drugs, and the FDA pediatric exclusivity incentive program to pharmaceutical companies which conduct safety and efficacy studies with children, there is an increasing number sponsored pediatric pharmaceutical studies. The FDA incentive has resulted in an important number of pediatric medications trials (Anonymous, 2007). Recently scholars have noted that most of these trials are conducted outside of the United States, and more than one-third of enrolled patients reside exclusively in developing/transitioning countries (Pasquali, Burstein, Benjamin, Smith, & Li, 2010). The impact of this globalization is unclear, but the increased opportunity to conduct rigorous patient-centered research in this country is essential to match pediatric trial populations appropriately to intended markets for the drug being tested. One of the issues is the safety and efficacy testing of drugs in children, the regulatory structure and qualifications of the investigators. Unlike adult population studies, Phase IV pediatric studies often involve collecting pharmacokinetic and pharmacodynamics data in addition to efficacy and safety data. Consequently, the local PI's role in assessing appropriate study design is invaluable and lends itself to the environment and resources an academic medical center provides. In recent years, the Department of Pediatrics clinical faculty's interests at MIHS had shifted away from a minority of faculty conducting outpatient studies to creating a department of academically trained, research-focused clinicians. The Department of Research was able to assist by working with the Department of Pediatrics financial analyst to justify hiring clinical research coordinators (CRC) prior to successfully competing for grants and contracts, which would eventually be, used support their salary costs. The CRCs were recruited and trained by the Manager of Research Operations (a member of the Department of Research team.)

In addition, staff in the Department of Research took advantage of membership in the University-Quintiles prime site alliance (CONNECTR) to enhance all partners' understanding of the clinical studies pipeline, which included a substantial number and increase in planned future pediatric patient trials. In addition, as part of the prime site alliance, both investigators and the IRB (a component of the Department of Research) were able to review clinical study protocols at an early stage, and any requested changes in study design were incorporated into the sponsor's final protocols. Thus, the strategy had a positive impact on three of the research enterprise drivers. The Commercial Ventures driver was positively affected by an increase in sponsored clinical trials, and Clinical Practice was affected as a result. It resulted in physicians and residents being trained in state of art treatment of the pediatric population. The University-Quintiles prime site alliance is a partner-based, community-aligned clinical trials consortium that is strongly supported by placing successful studies, and had a direct impact on the third enterprise driver (Civic and Community, Figure 1)

In addition to industry-sponsored pediatric research, the Department of Research is also positioned to offer support for academic research, as illustrated in strategies offered to two clinical investigators in early stages of their careers. One clinician has broad research interests in developing mathematical and data mining tools to detect previously unknown patterns from large, anonymous, clinical data sets. These interests intersect with several research enterprise drivers including: *public health informatics* - use of public health records to validate mathematical models of spread of certain bacterial infections (e.g., MRSA); *clinical informatics* - accessing information in the electronic health records for clinical research and quality improvement; and *graduate medical education* - improving the quality of teaching and self-evaluation through the use of electronic medical records. The other investigator, a Pediatric Emergency Department Physician, is very interested in pursuing research projects related to pediatric emergency care, particularly for underserved populations. To foster physicians' research interests, members of the Department of Research team identified appropriate funding mechanisms (state and federal) at the programmatic level and spent significant one-on-one time developing the project ideas and editing the proposals. During the initial phases of the development of the proposal, more than 8 hours per week were devoted by the author and/or grant manager/writer to working with the physicians. To obtain successful funding, the Department of Research identified key external faculty, instrument cores, and other resources at a partner university (ASU) to establish collaborations with MIHS clinicians. The Department of Research identified faculty who had overlapping interests with MIHS clinicians, hosted group meetings and provided written feedback as to progress on proposal development, pilot data and the alignment of any necessary resources. During the final preparation and submission phase of the grant proposal the grants manager/writer devoted 16 to 24 hours per week working with the investigators and collaborating institutional administrators to complete the submission of the grant. Both of these example cases benefitted from the previously described MOU, which was implemented to reduce barriers to collaborative funding and had a demonstrated history of successful research projects with various centers at ASU. The MIHS physicians' research successes again intersect with the three research enterprise drivers at multiple levels and nodes (Figure 1): Commercial Ventures through sponsored research (state and federal grants), Clinical Practice

through physicians and medical students who are involved in scholarly projects supported by the sponsored grants; and Civic & Community enterprise through involving the partner university in the collaborations and awarded subcontract. The intersection of these enterprises is also reciprocal: the projects would not have been successful in seeking external funding without the support of the partner university, and there is direct benefit from research results in the clinical setting which are expected to change health policy (e.g. modeling of the spread of MRSA).

Department of Obstetrics and Gynecology: Academic Research Collaborations

The Chair of the Department of Obstetrics and Gynecology (OB/Gyn) has been highly committed to increasing sponsored research through collaborative opportunities with investigators at a partner university (ASU). The Department of Research team and the OB/Gyn Chair developed a strategy to reduce barriers to effective collaborations and increase faculty investment in research. For example, through participation in two NIH-funded studies, for which the Chair of the Department of OB/Gyn was co-PI and site PI at MIHS, it became apparent that certain implementation policies and processes were absent, required clarification, or needed to be modified. This is exemplified by the funding of the 1st NIH-supported study, which needed both institutions' IRB approval, and the standardized translation into Spanish (70% of MIHS patients are Hispanic) of the informed consent and behavioral instruments at both institutions and re-approval by both IRBs. The lack of interinstitutional policies process for IRB approval of studies and translation of documents delayed the initiation of the project even after the awarding of the grant. The project's delay was compounded by the lack of a process for approving students and research associates from external institutions to conduct research at MIHS and with the medical center's clinical population. Cooperative group meetings between all site PIs and the Department of Research team identified specific obstacles and proposed solutions. One solution was that the author and ASU Deputy Vice-President for Research and Economic Affairs accelerated a Human Subject's Protection (IRB) reciprocity agreement between MIHS and ASU which determined IRB authority over joint research programs. Additionally, the Department of Research team engaged the MIHS office of Community Relations, which has oversight of language interpreters and translation of documents, to standardize the translation process for key research documents (e.g. consent forms, data tools, etc), reduce review turn-around time, and approve a single-site review process. The final step was to implement an adjunct research associate certification process, which allows collaborating researchers, students, and staff from partner institutions to work on clinical research projects within MIHS. In the Department of Research developed this credential in cooperation with the Chief Nursing Officer, office of Academic Affairs, Human Resources office, and the Compliance Office.

In another case example, the OB/Gyn Chair identified a key recruitment that would significantly enhance both the clinical practice and research endeavors of OB/Gyn. The Chair of OB/Gyn recruited the clinician investigator to be the Director of Refugee Women's Health Clinic (RWHC) at MIHS. The investigator's research examines health disparities in reproductive and preventative women's health services among immigrant and refugee populations. However, the

major research collaborations for that clinician investigator resided at ASU, and no process for a joint faculty appointment at ASU existed. At the time of her appointment at MIHS, the author, in cooperation with the Office of Clinical Partnerships at ASU, identified a research faculty appointment and academic home at ASU to secure access to graduate students, research mentoring and research support mechanisms. In addition, the MIHS Department of Research team promoted the clinician investigator's focus in Community-Based Participatory Research (CBPR) and the socio-cultural determinants of health-seeking behavior among refugee and immigrant women through assisting in the formation of the Refugee Women's Health Community Advisory Coalition (RWHCAC). The RWHCAC is an interdisciplinary team of more than 60 community stakeholders, including representatives of local ethnic organizations, refugee resettlement and voluntary agencies, mental health and social service agencies, and academic partners who serve as equal partners in the community engagement activities and RWHCAC research activities.

In a final example, the MIHS Department of Research supported a clinician investigator who aimed to partner with The University of Colorado Cord Blood Bank's (UCCBB's) to establish a MIHS site for a patient population that is largely Hispanic and that typically does not have access to umbilical cord blood storage and transplantation. Because the collection and storage was not FDA approved, it was considered human subjects research and needed grant funding for the operational expenses. While there was a physician leader in MIHS OB/Gyn, it was the Department of Research team that identified and prepared the grant support from the Arizona Biomedical Research Corporation (now within the Arizona Department of Health Services) to support the clinical research staff to oversee the research compliance operations and personnel needed to collect umbilical cord blood from a largely Hispanic population. This cord blood collection benefitted many parties such as the patient's families and the UCCBB. The publicity surrounding the cord blood collection project generated positive branding for MIHS and likely contributed to the increase in Hispanic patients to OB/Gyn clinics at MIHS. Thus, the cord blood collection project influenced all three of the research enterprise drivers.

All three examples demonstrate how several research enterprise drivers intersect, particularly with the Civic & Community driver. In order to grow, the MIHS Department of Research needed to build strong collaborations and negotiate institutional commitments with partner universities; reduce barriers to research implementation at MIHS through developing and updating research policy at MIHS and contributing to policy discussions with the partner university, and identifying sources of sustainable financial support (Commercial Ventures). This effort has a direct impact on the MIHS Clinical Practice enterprise by providing MIHS patients access to clinical research and training with medical and graduate students from the partner institution.

Concluding Remarks

The author assumed an administrative leadership position at MIHS as Director of Research following a career in translational research. Past experiences in collaborative, multi-institute research projects laid the basis for the strategies employed by the Department of Research to

grow the research enterprise at MIHS. The management framework identified by the author was based on the theoretical framework that assumption key benefits or drivers across three domains (enterprises) important to IAMCs have an impact on advancement of the research enterprise (Figure 1). Over time the author was able to demonstrate to senior leadership that the promotion of the research enterprise positively affected these drivers, benefiting MIHS in all 3 domains. To build this success in an environment with restricted internal financial resources, the strategy that the author employed identified interested parties in each enterprise in order to engage them in research collaborations that would be mutually beneficial. Case studies were presented to illustrate framework-driven strategies used to develop the collaborations, to highlight the beneficiaries of the collaborations, and to illuminate resources utilized. In considering the entire process from a reflective practice point of view, the research enterprise engaged MIHS and the members of each enterprise in implementing translational research. This fulfills the social obligations of the research enterprise not realized by any of the ventures by themselves.

Implementing translational research

MIHS, as an independent academic medical center, provides fertile ground for the broad range of translational research. The NIH definition of translational research focuses on two steps or roadblocks to translating basic research into medical practice termed T1 and T2: T1 is “the transfer of new understandings of disease mechanisms gained in the laboratory into the development of new methods for diagnosis, therapy, and prevention and their first testing in humans” and T2 is “the translation of results from clinical studies into everyday clinical practice and health decision making.” (Sung et al., 2003). To many individuals, T1 refers to the development of biologics (e.g. drugs) or medical devices and T2 to their approval and implementation into health practice. However, many authors have provided schemas of translational research that addresses expansion into multiple arenas of research, not just biology, from discovery to population health impact and application (Khoury, Gwinn, & Ioanni, 2010; Woolf, 2008; Lander & Atkinson-Grosjean, 2011). At MIHS, translational research broadly includes investigational medications and products, evaluation of psychosocial, behavioral, and evidence based interventions, and development of novel means for analysis of clinical practice. Lander & Atkinson-Grosjean (2011) also describe the iterative nature of the forward-reverse translation of research and propose that there are many hybrid-domains of translational research and to effectively implement translational research requires clinicians and scientists working with research development professional who are “boundary spanners” to break down boundaries. The authors go on to describe the informal, and often hidden, research network and interactions, which exist to facilitate translational research. The author, with support of the Department of Research team at MIHS, developed a set of strategies to formalize mechanisms, relationships, and enterprises to facilitate the efforts of boundary spanners to support translational research in a clinical setting. The article emphasized steps taken to establish internal institutional goals through which the research enterprise was aligned with the clinical, teaching and patient services enterprises. The illustrative case examples demonstrate different strategies for enhancing research capacity through leveraging clinical

faculty and extramural partners' interests. Somkin et al (2005, 2008) identified that an important barrier to promoting research in nonacademic healthcare systems is the mismatch between the perceived value of clinical research by physicians and senior administration leadership. This author described a successful approach to align the mission of MIHS with promotion of research, particularly focused in translational research with partner institutions, and thereby alleviating that particular barrier. This approach can be applied to IAMs in a wide variety of clinical, financial and service oriented settings.

Author's Note

This article summarizes and integrates the author's original scholarship prepared for workshops, educational sessions, and discussion groups at various international professional societies in the last several years. The opinions in this article are those of the author and do not represent the view of Maricopa Integrated Health System. The author wrote this article while at Maricopa.

Jeffrey N. Joyce, Ph.D.

Vice President for Research
Professor of Pharmacology
Kansas City University of Medicine & Biosciences
1750 Independence Avenue
Dybedal Research Center
Kansas City, MO 64106-1453
Email: jjoyce@kcumb.edu

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