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Implementation of a Coordinated Care Clinical Education and Practice Model to Promote Health: The Interprofessional Diabetes Clinic

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Abstract

This paper describes the design and evaluation of an interprofessional clinic that prepares students for future health-care delivery, while serving the needs of a growing diabetic population via improved access and coordination of quality team-based services, in a convenient, efficient, and culturally sensitive patient-centered environment.

Representing Optometry, Dental Health Science, Occupational Therapy, Physical Therapy, Psychology, Physician Assistant Studies, and Pharmacy, 25 faculty providers and 84 professional students volunteered to attend a monthly Interprofessional Diabetes Clinic (IDC) during its first year. Patient care was followed by an interprofessional case management conference. The bilingual Patient Care Coordinator facilitated navigation of the predominantly Latino patients, coordinating follow-up care, referrals, patient/family health and lifestyle education, and preventive services delivered by the healthcare team and community.

Data for the first 50 consecutive patients are summarized to provide a demographic portrait of the clinic population. The results of anonymous patient and student evaluations gathered to inform the ongoing design and practice of the IDC are also provided. Patient satisfaction was high, rating care on a scale ranging from 1 (poor) to 5 (excellent) as 4.7 ($M, SD = 0.6$); 97 percent would refer others to the IDC. Students rated their overall experience very favorably, highlighting knowledge gained for other professions' roles ($M = 4.3, SD = 0.7$); the collaborative learning environment ($M = 4.2, SD = 0.6$); more comprehensive knowledge of diabetic patients ($M = 4.3, SD = 0.7$); and an increased appreciation of the value of interprofessional patient care delivery ($M = 4.4, SD = 0.6$).

University-based interprofessional teaching and practice models for care of chronic disease, such as diabetes, have the potential to transform future healthcare by providing students opportunities for clinical experience in a coordinated practice setting.

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Introduction

The urgent need for healthcare reform and dramatic increase in diabetes and other chronic disease, in adults and children, call for innovative and coordinated healthcare delivery models that focus on prevention and wellness. New approaches to care delivery must effectively reach at-risk, underserved populations, and be responsive to the needs of the community and current economic challenges. This paper describes the design and evaluation of an innovative approach to improving access to comprehensive, affordable and culturally sensitive healthcare that, through interprofessional education of future practitioners, has the potential to transform the way diabetic and other chronic care is delivered.

There is now a substantial body of literature supporting an interprofessional approach to achieving better patient care. Interprofessional education provided during the training of the healthcare workforce enables effective collaboration among professionals when in practice (WHO, 2010; Duboulez, 2010). The national Interprofessional Education Collaborative (IPEC), in its recent report *Core Competencies for Interprofessional Collaborative Practice*, summarized interprofessional competencies in healthcare as:

integrated enactment of knowledge, skills, and values/attitudes that define working together across the professions, with other health care workers, and with patients, along with families and communities, as appropriate to improve health outcomes in specific care contexts (IPEC, 2011, p. 2).

A growing number of studies demonstrate, when applied to clinical practice, these competencies translate into actual improved patient care outcomes and improved health (Jason, et al., 2009; Renders, et al., 2001; Smith, et al., 2008; Wagner, 2000; WHO, 2010; Zwarenstein, et al., 2009). In the context of healthcare reform, this patient-centered approach optimizes resources across the entire array of providers by practicing to the full-scope of their professions, and can minimize costly acute care and hospitalizations by focusing on the health, wellness, and quality of life of the whole patient, rather than the isolated disease entity (Lewin, et al., 2001).

In 2010, the College of Optometry and College of

Health Professions at Pacific University endeavored to create a culturally-sensitive and affordable health clinic, in collaboration with community partners, that addressed healthcare disparities while providing patients and students the benefits and experience of first-hand interprofessional practice. Diabetes management was the starting point for this healthcare delivery model, as it is a complex multi-system disease prevalent in the mostly uninsured Latino population that the university clinics serve. A core group of faculty from the Colleges of Optometry and Health Professions developed specific protocols, determined the scope of care to be provided, recruited student and faculty volunteers, and coordinated use of existing facilities (Aamodt, et al., 2010). Through healthcare-related foundation grant funding, this project resulted in the formation of Pacific University's Interprofessional Diabetes Clinic (IDC) (Timpone et al., 2012).

Patient Population

Washington County, Oregon, where the IDC is located, has a mixed urban, suburban, and rural population of 530,000, with 35,000 diabetics (6.6 percent), of which two-thirds have hypertension; and where over half the adults, and nearly one-quarter of the children are overweight or obese. Fifty-six percent of adults have at least one of the following conditions: arthritis, asthma, diabetes, high blood pressure, high cholesterol, or stroke (OCHS, 2009).

Employing an interprofessional model, eye health and vision, dental, physical and occupational therapy, pharmacy, mental health, and physician assistant medical services have been provided at one easily accessible location, in a culturally sensitive environment. In addition to traditional barriers to healthcare access, such as physical location and cost, cultural barriers within this population are considerable. Beyond language interpretation services, providing culturally sensitive healthcare delivery involves the acknowledgement of cultural differences that shape values, attitudes, behaviors, beliefs, customs, interpersonal interaction and communication styles, and ultimately influence patients' perceptions and acceptance of healthcare practices. Culturally competent healthcare providers are responsive to cultural barriers that affect patient adherence, developing adaptations to delivery of care that reflect an understanding of these cultural differences (Cross, et. al., 1989). The role of the bilingual, bi-culturally educated Patient Care

Coordinator has been integral to the success of this patient-centered model.

The IDC Practice and Teaching Model

The IDC, which opened in June 2010, offers patient evaluations on Saturday mornings to better serve the predominantly Latino, agricultural worker based community. Patients access care at the IDC through various paths: by referral from area safety-net or federally funded community health centers; the community hospital; through community or university-based outreach screening efforts; by entry into any one of the university's individual discipline specific clinics located at the Health Professions Campus, such as Optometry or Dental Health; or by referral from need-based community sponsoring agencies. All patients have an identified primary care physician. Patients are introduced to the IDC through the Patient Care Coordinator, who works with the referral sources and patients to schedule and prioritize appointments, orient patients to the IDC, and establish a shared language and patient-centered cultural connection. Evaluations are scheduled for each patient with faculty practitioners and professional student teams for three of the healthcare services offered, within the same three-hour clinic block of time, to enhance coordination of care and facilitate patient attendance. Patients return for a follow-up visit to receive the remaining services, all on a subsequent clinic day. Services patients receive each visit are prioritized based upon urgent needs, the patient's chief complaint, and/or as requested by the referring provider. An integrated electronic health record (EHR) has been developed to coordinate data and communication between the various attending faculty practitioners, staff, and students. Spanish language interpreters are provided for examinations.

Interprofessional Education (IPE), as defined by the World Health Organization, "occurs when students from two or more professions learn about, from and with each other to enable effective collaboration and improve health outcomes" (WHO, 2010, p.13). To foster the interprofessional experience, in addition to performing evaluations with the attending faculty within their own discipline, students in the IDC escort each patient through the examination sequence, assisting in the transition of the patient from one service to the next, while having the opportunity to observe, firsthand, the other professional evaluations, roles, and

scopes of practice. When appropriate, some of the services are paired together in one patient encounter, such as Physical and Occupational Therapy, or Pharmacy and Physician Assistant services.

Interprofessional collaboration strives to achieve "a partnership between a team of health providers and a client in a participatory, collaborative and coordinated approach to shared decision-making around health and social issues" (CICH, 2010, p.11). Crucial to the success of any integrated care plan are patient education and understanding, engagement of patients in their own care and decision-making, and adherence to the recommended treatments. In the IDC model, each professional service develops, in collaboration with the patient, a management plan that will educate and engage the patient in his/her own care. During the afternoon case discussions, students present patient evaluation results to the interprofessional team of providers and other students. The treatment and management plans are shared, integrated, and prioritized in consideration of the needs appropriate to the health and well-being of the whole patient. The Patient Care Coordinator communicates this final plan to the patient, schedules the follow-up visits and, with the Clinic Director, prepares a comprehensive written report sent to each patient's primary care provider. The role of the Patient Care Coordinator (PCC) is modeled after the Patient Navigator devised and promoted by the National Cancer Institute (NCI), as an intervention to address disparities to access to care. NCI evidence has shown that underserved racial/ethnic minorities and socially disadvantaged populations are less likely to receive timely advice and care, especially related to conditions that require complex testing, management, and treatment, such as cancer or diabetes. Navigators guide their patients through the healthcare system, coordinating more appropriately timed care and providing information about treatment and preventive behaviors (Freund, et al., 2008). The PCC not only assists the patient by facilitating coordination of care, but also facilitates communication between the patient, healthcare providers, and community services by bridging language and cultural gaps, and addressing challenges specific to the patient's needs.

The complexities of navigating the current healthcare system often lead to missed appointments, and delay or absence of needed services (Karter, et al., 2004). This eventually results in increased visits to emergency rooms, absence from work and school, a dimin-

ished quality of life, and increases in healthcare costs. Recent Kaiser Permanente research determined that poor appointment-keeping was associated with an increased risk of elevated HbA1c (>7 percent) of 20 percent, elevated low-density lipoprotein (>100 mm/dl), 30 percent; and systolic blood pressure elevation (>130 mmHg), 40 percent. Latinos and African Americans had the highest risk of missing planned primary care appointments, nearly twice that of Caucasians (Parker, et al., 2011). Missed routine clinic appointments by patients with diabetes have been reported to be as high as 30 percent, in similar populations. (Karter, et. al, 2004). In the IDC model, the Patient Care Coordinator has consistently met this challenge, employing a personalized, culturally sensitive, patient-centered approach. Over the past year, the IDC has had a relatively high kept appointment rate of 87 percent (missed appointments = 13 percent).

Another challenge for the IDC has been the limited health literacy of the population the IDC has served.

Inadequate health literacy affects all segments of the population, but it is more common in certain demographic groups, such as the elderly, the poor, members of minority groups, and people who did not speak English during early childhood. The economic consequences of limited literacy for the U.S. healthcare system are considerable, estimated to cost between \$50 billion and \$73 billion per year. (Weiss, 2007, p. 7)

Evidence has shown that in patients with diabetes, more personalized, culturally appropriate, and comprehensive patient education in self-management improves outcomes, glycemic control, and knowledge of diabetes and healthy lifestyles (Hawthorne, et al., 2010; Foster, et al., 2007). To aid in achieving these improved outcomes for IDC patients, the PCC has been trained and certified to teach these patients Stanford University's evidence-based Chronic Disease Self-Management Program designed for Spanish-speakers, *Tomando Control de su Salud* (known also as *Living Well with Chronic Conditions*). This interactive workshop, taught by certified lay person leaders, provides support and builds participants' confidence in their ability to manage their disease and maintain active, healthier lives. Workshops, typically offered weekday evenings for six weeks, cover techniques to manage fatigue, pain, frustration, and isolation; exercise for maintaining and im-

proving strength, flexibility, and endurance; nutrition; appropriate use of medications; effective communication with family and health professionals; and how to evaluate new treatments. Family members are encouraged to attend (Stanford University Patient Education Research Center, n.d.).

First Year Patient Population

In order to obtain a profile of the IDC's specific patient population and understand the extent of services needed, demographic data and key healthcare measures were gathered through chart review of the initial evaluations of the first 50 consecutive patients seen in the IDC (Table 1, following page). These data, representing a mix of recently diagnosed and more longstanding diabetic patients with varying degrees of adherence to medication and therapeutic lifestyle changes, clearly demonstrate the extensive need for comprehensive services for this underserved, uninsured, population. Modifiable risk factors measured include: obesity, mean BMI was 38.4 kg/m², 82 percent of patients had a BMI of 30 or higher; uncontrolled blood glucose, mean HbA1c was 8.4 percent, with 72 percent of patients at 7.0 or higher, 61 percent greater than 7.4, and 48 percent greater than 8.0; hypertension, 51 percent of patients had systolic blood pressure above 129 mmHg, and 46 percent had diastolic pressure greater than 81, with 22 percent above 89 mmHg.

Based on these data, and individual patient assessments that disclosed prevalent non-adherence and low health literacy, 62 percent of patients would benefit from timely follow-up medical and pharmacy consultation services (Table 2, following page). Further evaluation found 42 percent of patients with diabetic retinopathy, 6 percent requiring referral for retinal specialty treatment services; 12 percent had glaucoma, with an additional 10 percent identified as glaucoma suspects. All patients had varying degrees of moderate to severe periodontal disease, with abscess, and bone and tooth loss in the most severe cases. Physical and occupational therapy evaluations identified 44 percent of patients with physical limitations, including pain that interfered with mobility and neuropathy with reduced protective sensation of extremities; and 26 percent with daily living functional impairments that called for intervention, including one home visit to evaluate accessibility, safety, and potential for modifications to improve the functionality of the home environment. Based upon

Table 1*Patient Demographics and Data Summary*

n = 50	% of patients		
Sex:			
Female			62%
Male			38%
Ethnicity:			
Latino			90%
African-American			2%
Non-Hispanic White			8%
	<i>Range</i>	<i>Mean</i>	
BMI (kg/m ²)	25.7 – 68.6	38.4	82% > 29
HbA1c (%)	5.2 – 13.4	8.4	72% > 6.9, 61% >7.4, 48% > 8.0
BP:			
Systolic (mmHg)	104 – 191	133	51% > 129
Diastolic	60 – 106	81	46% > 81 22% >89
Age (yrs)	30 – 71	50	

Table 2*Interprofessional Intervention Needs Identified*

Discipline	% of patients
Optometry:	
Diabetic retinopathy	42%
Glaucoma	12% (additional 10% suspect)
Dental:	
Periodontal disease	100%
Physical Therapy	44%
Occupational Therapy	26%
Mental Health	34%
Medical: Physician Assistant/Pharmacy	62%
Patients needing multi-discipline (>2) interventions	46%

results from screenings—for depression, anxiety, and other distress associated with diabetes—and individual patient consultations, 34 percent were recommended for further mental health services. This understanding of the patient population—which will likely evolve as more patients are seen in the clinic—has helped the IDC anticipate the demand for care from the different health professions involved in the clinic.

IDC Evaluation Strategies

As a new university-based collaborative clinical teaching and practice model, it has been important to obtain from the outset of the IDC’s operation, timely and ongoing feedback from patients, students, and faculty, to assess continued feasibility and to guide ongoing development. In addition to quarterly meetings for participating faculty and open discussions about the model and process with students and faculty following patient case discussions at the close of each clinic, preliminary

patient and student surveys were developed. The results of these surveys have been used within the IDC to both reinforce practices that are working and to make adjustments where indicated in order to improve the patient or student experiences.

Patient Satisfaction Survey Results

At the conclusion of their initial evaluations, patients were invited to complete, anonymously, a questionnaire about their experience and satisfaction with their care. Survey items and responses are displayed in Table 3.

Patients were very satisfied with their care ($M = 4.7$, $SD = 0.6$); 97 percent would refer other patients to the IDC (survey participation rate = 74 percent). These results were supported by additional written comments that were overwhelmingly positive, expressing gratitude for the personalized and attentive, compassionate and comprehensive services they received from

Table 3

Patient Satisfaction Survey (Translated from Spanish)

Item	(n = 37/50; Participation: 74%)	% Yes	% No
Was it easy to find and get to the clinic today?		97%	3%
Did you have opportunity to communicate all your concerns?		100%	
Did the flow from one service to the next work well for you?		100%	
Were you comfortable with the number of providers in the room?		97%	3% (too many)
Was your care culturally appropriate?		100%	
Was there enough time allotted for your appointments?		100%	
Were your main concerns addressed today?		100%	
Was the clinic visit too long today?		5%	95%
Would you recommend us to others you know with diabetes?		97%	3%
What form of transportation did you take to the clinic?		75% by car; 16% walked; 9% by bus/MAX rail	
Rate your overall satisfaction with your care: (scale of 1 to 5: 81% Excellent; 13% Good; 6% Average; 0% Fair; 0% Poor)		M = 4.7	SD = 0.6

faculty providers, students, the PCC, and interpreters. It was apparent, for so many patients, that their IDC visits provided the first opportunity for them to express and address their concerns to such depth with providers whose expertise spanned all aspects of the impact chronic disease, and specifically diabetes, has had on their health and daily lives. While two patients (5 percent) felt that the clinic visit was too long, both commented that the time spent was necessary.

In an effort to enhance interprofessional care and optimize students' interprofessional experience, some professions were paired during evaluations. One challenge has been maintaining patient comfort with the increase in number of practitioners and students in the exami-

nation room during these evaluations. Only one patient reported discomfort from too many providers in the room on the questionnaire. However, from the students' perspective, survey responses indicated varied perceptions; several students did not agree that patients appeared comfortable with the number of practitioners and students in the room ($M = 3.8, SD = 1.0$) (See Table 4). This was also reflected in written student comments and faculty observations.

Student Experience Survey Results

Students were encouraged to complete and submit an online anonymous survey following their experience in the IDC. Survey response rate was 49 percent, with 32

Table 4

Student Experience Surveys

Item	(N = 41/84; Participation: 49%)	Mean*	SD
1. Participating in the IDC has increased my appreciation of the value of interprofessional patient care delivery		4.4	0.6
2. The atmosphere was collegial, supporting a learning environment between faculty and students of the various professions		4.2	0.6
3. I benefited from interactions with other student professionals, gaining better knowledge of their roles in patient care		4.3	0.7
4. The Interprofessional afternoon Case Conference was valuable and added to my understanding of my patient's condition, needs and challenges		4.3	0.7
5. The patients in the IDC received quality and culturally sensitive care		4.3	0.8
6. My patient appeared comfortable with multiple practitioners and students in the examination room		3.8	1.0
7. The time allotment for patient evaluations was appropriate		3.7	0.9
8. I liked the format of the afternoon case discussions.		3.7	1.1
9. The clinic was well organized and efficient		3.3	1.1
10. The IDC taking place on a Saturday, rather than a weekday, was a potential deterrent for me to volunteer to participate		2.8	1.4
11. I would recommend participation in the IDC to fellow students		4.3	0.9

***(5 - Strongly Agree; 4 - Agree; 3 - Neutral; 2 - Disagree; 1 - Strongly Disagree)**

Students represented: 32% Optometry, 12% Occupational Therapy, 5% Dental Health, 7% Pharmacy, 17% Physical Therapy, 22% Physician Assistant, and 5% Psychology

percent of respondents representing optometry, 12 percent occupational therapy, 5 percent dental health science, 7 percent pharmacy, 17 percent physical therapy, 22 percent physician assistant studies, and 5 percent psychology.

Students participating in the IDC reported that they benefited from interactions with other student professionals, gaining better knowledge of their roles ($M = 4.3$, $SD = 0.7$). The overall IDC experience increased student appreciation of the value of interprofessional patient care delivery ($M = 4.4$, $SD = 0.6$). Individual comments were mostly very supportive of the interprofessional patient care and learning experience. Students felt that the afternoon case management conference was valuable and added to their understanding of the challenges of living with chronic disease, and the needs of patients with diabetes ($M = 4.3$, $SD = 0.7$); several commented that it was the best part of the experience. However, results indicated there was room for improvement in the actual format of the afternoon sessions ($M = 3.7$, $SD = 1.1$). Modifications, regarding the presentation style and time allotted for each case, have been made to address these concerns.

Discussion

University of Chicago researchers have projected that in the U.S., the number of people with diabetes will almost double in the next 25 years, and the cost of treating the disease may well triple (Huang, et al., 2009). The IDC initial patient evaluation findings presented align well with reported current national trends. National Eye Institute (NEI) statistics cite more than 40 percent of diabetics aged 40 and older with diabetic retinopathy, the leading cause of preventable blindness in working age adults, with 8.2 percent having advanced, vision-threatening disease (NEI, 2011). The incidence of glaucoma, which also leads to blindness if left untreated, has been reported in people with diabetes to be up to nearly double that of the non-diabetic population (GRF, 2012). The American Academy of Periodontology (AAP) reports that more than 80 percent of diabetic patients between the ages of 45 and 54 years have periodontal disease, twice the rate of the general population. Studies of the relationship between periodontal disease and diabetes indicate that diabetes is a well known risk factor for periodontal disease; on the other hand, dental hygiene treatment for control of periodontal inflammation results in improvements in

glycemic control of patients with diabetes (Teeuw, et al., 2010; AAP, 2011). According to the Center for Disease Control (CDC), almost 30 percent of people with diabetes aged 40 years or older have impaired sensation of the feet, putting them at risk for serious complications, such as ulcers, and those with diabetes aged 60 years or older are two to three times more likely to be unable to walk one-quarter of a mile, do housework activities, or climb stairs compared with those similarly aged without diabetes (CDC, 2011). Physical therapy interventions can provide improved function and mobility for physical activities and exercise, important for improved glycemic control and cardiovascular risk reduction. Depression affects up to 5 percent of the population, but, according to the American Diabetes Association (ADA), increases to up to 20 percent in people with diabetes, and up to 40 percent of those with diabetes have elevated symptoms of anxiety (Grigsby, et al., 2002); both depression and anxiety can interfere with patients' ability to manage their disease (ADA, 2011).

In Oregon, while the proportion of people with diabetes who made at least two visits per year to a healthcare provider has remained relatively steady at 70 percent over the last 10 years, only 14 percent have received all of the recommended services, as outlined in the *Oregon Population-based Guidelines for Diabetes Mellitus*. Measures to monitor the quality of care provided to a population of people with diabetes include: annual foot, dilated eye, and dental exams; semi-annual visits to the healthcare practitioner, including HbA1c testing; screening for depression; biennial fasting lipid panel; and diabetes education in past five years with documented self-management goals (Oregon Population-Based Guidelines Advisory Panel and Oregon Diabetes Coalition, 2006). Nearly 20 percent have received only two or fewer recommended services (Oregon Diabetes Coalition Progress Report, 2008). The IDC approach, where patients have access to several professions at one visit, has facilitated reaching these recommended services goals for the targeted patient population. The IDC model also mirrors recent efforts in healthcare reform focused on patient-centered collaborative care for chronic disease. Prominently endorsed by the U.S. Department of Health and Human Services Centers for Medicare and Medicaid Innovation, and by states such as Oregon, under the auspices of The Affordable Care Act of 2010, these proposed transformations in healthcare delivery emphasize coordination of care for improved outcomes and prevention, and the design of

new team-based roles for existing health professionals (CMS, 2011; OHA, 2012). Moreover, the World Health Organization reports there is sufficient evidence that “in both acute and primary care settings, patients report higher levels of satisfaction, better acceptance of care and improved health outcomes following treatment by a collaborative team” (WHO, 2010). This was reflected in the IDC Patient Survey results that also indicated very high patient satisfaction with the coordinated care they received.

Improved outcomes in patients with Type 2 diabetes have also been shown to occur in settings with “teams of interprofessional learners” (Jason, 2009, p. 1540). University clinic based IPE models are beginning to appear in the literature, describing hands-on clinical teaching and practice (Copley, et al., 2007; Dubouloz, et al., 2010). Previous studies have emphasized that the introduction of core competencies centered on interprofessional teamwork and communication skills, as early as in the first year of health professional education, is critical to fostering effective collaboration (Horsburgh, et al., 2001; Dubouloz, et al., 2010). Pacific University’s College of Health Professions introduces students to interprofessional collaboration and competencies through a required first-year course “Interprofessional Competence: Theory and Practice,” and offers additional campus-wide interactive interprofessional case conferences throughout the year. Thus, important core competencies are introduced early in the curriculum. The number of professional students who have volunteered to participate in the IDC indicates eagerness to apply what has been learned in the classroom to the caring for actual patients. The IDC complements IPE coursework, providing opportunity for interprofessional patient care and team-based experience. There is evidence that interprofessional education and training continues to develop, when applied to real world practice experiences (WHO, 2010). IDC Student Survey results indicated students found the IDC patient care experience beneficial to increasing their understanding and appreciation of the value of both interprofessional team-based practice and the roles of other professions in their patients’ care. Dubouloz, et al. (2010) noted that “a key element of IPE is demonstrating awareness and understanding of the importance of other health professions in caring for a shared client” (p. 22). From their experience with a university-based interprofessional rehabilitation clinic in primary care, students from different professions learned to collaborate, and

what’s more, they also incorporated other professions’ strategies for better patient care into their own interventions. This was also observed with students in the IDC, particularly with history-taking and patient interview skills.

For the IDC model, the advantages of a coordinated, interprofessional approach to diabetes management for patient care and student education fully emerged during the afternoon patient case discussions. Students and faculty observed first-hand, and more fully appreciated, the impact intervention in one area had on the achievement of goals in another (Copley, et al., 2007). For example, best practices for diabetes care include recommended lifestyle changes, such as weight management and physical activity to improve glycemic control and reduce risk of cardiovascular disease. However, for many IDC patients, management of mobility impairments and pain, provided by physical therapy, was necessary before achievement of goals for lifestyle changes could be attempted or fully realized. Patients were prescribed glaucoma medications or dental hygiene techniques, but instillation of eye medications and meticulous brushing require hand coordination and gripping skills that are difficult for some diabetic patients with neuropathy, reduced sensation, and limited hand strength. These interventions to preserve vision and promote dental and periodontal health would not be as successful without patient training by the occupational therapist in use of adaptive techniques to overcome these manual limitations. With the wealth of expertise from all professions present, the benefits of various interventions, as well as the potential side effects of medications and treatments, were addressed. The team better understood patients’ challenges, barriers, and needs, and through these insights into their life experiences, was better able to develop strategies to safely move patients forward in their care and self-management.

In addition to providing opportunities for professional students to engage in collaborative interprofessional care, some of the unique advantages of interprofessional team-based practice, recognized by the faculty early in the operation of the clinic were: 1) the opportunity for development of a more comprehensive patient history and life story when gathered within the different contexts of each profession, that aided in developing a more comprehensive treatment plan; 2) more opportunities for both patients to express, and providers to

identify, problems and key barriers to successful self-management; 3) delivery of consistent, coordinated patient education; and, 4) the sharing of information and multi-faceted perspectives on treatment that each profession would not have gathered nor devised independently. These factors led to enhanced coordination, prioritization and modification of treatment plans as a team, to optimize adherence, patient self-management, quality of care, and quality of life (Aamodt, et al., 2010).

Challenges implementing the IDC during its first year included scheduling a time when all professional students, faculty, and clinical facilities were available. Conducting clinic on Saturday, convenient for the patient population, has largely circumvented this problem, but has relied on the availability of student and faculty volunteers. Volunteers bring high motivation and interest, but due to continual turnover that can lead to lack of familiarity with clinic protocols and procedures, reliance solely on volunteers can hamper efficiency, clinic organization, and ultimately, patient and student experiences. Efforts have been ongoing during the second year of operation to make improvements to meet these challenges. The most significant has been a transition from purely volunteer faculty providers, many attending intermittently, to those who attend each month, as part of their faculty contracts. This consistency in staffing has already helped foster continuity and consistency in process and procedures, use of the EHR's, and a renewed commitment to the ongoing success of the IDC. Future plans include offering more frequent clinics, including weekdays, to accommodate more patients, and eventually providing hands-on clinical opportunities in interprofessional practice for all professional students.

Conclusion

Recent research has shown improvement in diabetes management when provided by a multi-faceted, coordinated and patient-centered approach, where intervention is shifted from crisis-driven reactive care to proactive preventive care that targets the entire individual and promotes health and wellness through improved self-management. By providing professional students opportunities for interprofessional clinical experience in such a coordinated practice setting, university-based teaching and practice models for care of chronic disease, such as diabetes, have the potential to transform the future of healthcare and its workforce.

The IDC at Pacific University is a team-based, coordinated, hands-on clinical practice experience that has been well received by patients, students, and faculty. Areas for improvement have been identified, and efforts to enhance the program are ongoing. Other key elements of the clinic include a Patient Care Coordinator, a culturally sensitive environment, and culturally appropriate patient education in diabetes self-management.

Ongoing evaluation with follow-up data gathered from the IDC will determine the long-term impact of this clinical approach on disease management, prevention of complications from diabetes, cost of care, and patient quality of life. Future applications for this interprofessional model may include, in addition to diabetes, management of other chronic diseases or care of other patient populations with complex disorders, such as those who have experienced traumatic brain injuries or stroke, or children with autism. The preliminary evaluation tools used at the clinic (i.e. the surveys described here) have been useful for improving local practice; however, more robust instruments should be constructed if systematic research on the efficacy of this model is to be conducted to inform practice outside of the Pacific University IDC. Further work is also needed to develop appropriate instruments to more systematically evaluate student learning and team-based competencies in interprofessional clinical practice.

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HIPAA Note

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