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REVIEW, APPROVAL AND ACCEPTANCE

The document mentioned above has been reviewed and accepted by the student's advisor, on behalf of the advisory committee, and by the Assistant Dean for MSN and DNP Studies, on behalf of the program; we verify that this is the final, approved version of the student's DNP Project including all changes required by the advisory committee. The undersigned agree to abide by the statements above.

Katharine R. Layton, Student

Dr. Elizabeth Tovar, Advisor

Final DNP Capstone Report: Evaluation of a Rheumatology Patient Prioritization Triage System

Katharine Layton, BSN, RN

University of Kentucky

College of Nursing

April 28, 2015

Elizabeth Tovar, PhD, APRN-Committee Chair

Elizabeth Salt PhD, APRN-Clinical Mentor

Beatriz Hanaoka, MD-Committee Member

Dedication

For my sister Robyne Lyn Offutt (August 4, 1970- October 17, 2011)

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Chapter 1

Capstone Report Introduction

Introduction

The United States health care system is currently experiencing an increase in demand for services due to an aging population. Currently over 46 million Americans are affected by arthritic conditions with an estimated increase to 67 million by 2030 (Centers for Disease Control and Prevention, 2009). Rheumatology, an Internal Medicine sub-specialty, treats those patients with arthritic conditions as well as other autoimmune and inflammatory conditions such as systemic lupus erythematosus, gout, and fibromyalgia (American College of Rheumatology, 2012). A shortage of 2,609 rheumatologists is projected by 2025, adding additional stress to an already burdened clinical area (Deal et al., 2007). This means patients can face substantial wait times when requesting consultation with a rheumatology provider. This is problematic since early pharmacological intervention is the standard of care for many rheumatic diseases including initiation of disease-modifying antirheumatic drugs (DMARDs) for patients with rheumatoid arthritis (RA) within the first six months of disease activity (West & West, 2014). In order to address the shortage of providers and the increase in demand for services, some rheumatology clinics have implemented triage systems to prioritize patients to ensure acutely ill patients are seen within an appropriate time frame (Graydon & Thompson, 2008; Sathi, Whitehead, & Grennan, 2003). Additionally, primary care providers (PCPs) play an integral part in early recognition and referral for those patients presenting with inflammatory arthritis. Communication of accurate and detailed referral information can avoid delays in care and improve patient outcomes.

This capstone project will present three manuscripts that explore the referral process from primary to specialty care and strategies to reduce wait times. The first manuscript is a literature review that presents information surrounding current referral processes. Various strategies that

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have been developed to address poor communication between providers, a lack of guidelines, and disagreement on urgency are explored (Chew-Graham, Slade, Montana, Stewart, & Gask, 2007; De Coster, Fitzgerald, & Cepoiu, 2008; Speed & Crisp, 2005). The second manuscript presents current evidence-based practice guidelines on the identification and management of RA in primary care. It emphasizes the importance of a timely referral to a rheumatology provider and communication of supporting history, physical, laboratory studies and radiographs. PCP involvement is integral in decreasing wait times and assuring patients receive timely access to specialty care. Finally, the third manuscript evaluates a rheumatology patient prioritization triage system currently being used in a large rheumatology clinic in central Kentucky to determine its accuracy in identifying acutely ill patients. The combined information presented in these manuscripts help support recommendations for improving the referral process between primary and specialty providers to ensure that patients receive necessary care delivered in a timely manner to optimize patient experience and outcomes. Suggestions for practice and future research will also be identified and discussed.

Chapter 2

Manuscript #1:

Literature Review on Specialty Referrals and Triage Systems

Katharine Layton, BSN, RN

Elizabeth Tovar, PhD, APRN

Elizabeth Salt, PhD, APRN

Abstract

The increasing prevalence of rheumatic disease and the relatively low number of available specialists have resulted in significant wait times for appointments. Various strategies are used to ensure acutely ill patients are seen in a timely manner. The objective of this literature review is to describe the current evidence related to referral processes, tools, and triage systems used by specialty practices when prioritizing patient referrals. The findings from this review suggest there is a knowledge deficit related to criteria for appropriate patient referrals and there is no standardized information required with referrals. However, several tools and systems have been evaluated in order to improve patient wait times and to ensure urgent patients are assessed and treated in a timely manner. The literature supports the development of referral guidelines for musculoskeletal diseases and preappointment triage of new patients by specialty providers, in order to identify inappropriate referrals and more promptly treat acutely ill patients.

Background

Rheumatology is an internal medicine sub-specialty that focuses on the treatment of rheumatic conditions such as fibromyalgia, gout, and systemic lupus erythematosus (American College of Rheumatology, 2012; Table 1). Many rheumatologic conditions are referenced as arthritic conditions, and are the most common cause of disability in the U.S. (Klippel, Stone, & White, 2008). They affect over 46 million adults and are costly, with estimated direct and indirect costs of 128 billion U.S. dollars (Centers for Disease Control and Prevention, 2009; Helmick et al., 2008; Klippel et al., 2008). Of critical importance is the exponential growth of these conditions in the U.S. population with the rates reported in 2009 13 times larger than those in 1999 (CDC, 2009). Because of an aging population, the prevalence of arthritic conditions is expected to increase to 67 million by 2030. This increase will affect already burdened clinical areas treating rheumatic diseases (CDC, 2009).

Table 1. Prevalence and Description of Common Rheumatic Conditions

Rheumatic Condition	Prevalence
Osteoarthritis	46.4 million
Fibromyalgia	5 million
Rheumatoid Arthritis	1.3 million
Systemic Lupus Erythematosus	161,000-322,000

(Centers for Disease Control and Prevention, 2009; Helmick et al., 2008)

At present, there are only 4,946 rheumatologists in the U.S. and most patients have to wait an average of 41 days for an appointment with a rheumatology provider (Kirwan, 1997). A shortage of 2,609 rheumatologists is projected by 2025 (Deal et al., 2007). Wait times for appointments will increase and result in delayed care, which is important because timely

treatment including earlier specialty consultation significantly improves health outcomes (Möttönen et al., 2002; Pincus, Gibofsky, & Weinblatt, 2002; Yelin, Such, Criswell, & Epstein, 1998). For example, disease-modifying antirheumatic drugs (DMARDs) are ideally initiated within the first six months of disease onset for a patient with rheumatoid arthritis which is also referred to as RA (Oliver & St. Clair, 2008). Delayed treatment of the persistent inflammation from RA can lead to irreversible joint damage and disability, which contributes to the morbidity and mortality for this population (Oliver & St. Clair, 2008).
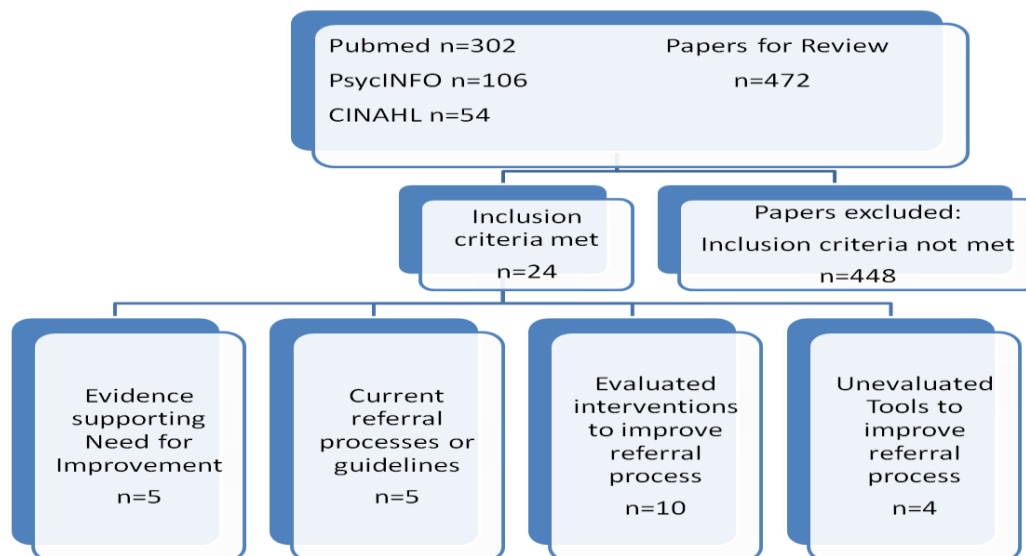
Because of increasing numbers of patients requiring treatment and the shortage of specialized health care providers, various strategies (e.g., referral guidelines, patient prioritization systems, pre-appointment management) are used to screen patient information and prioritize the order in which they receive an appointment (Graydon & Thompson, 2008; Harrington & Walsh, 2001; Pincus et al., 2002). These systems are implemented to avoid delayed care for those in need, but to date, a standard of care for the management of rheumatology patient referrals has not been established. Therefore, the purpose of this literature review is to examine the evidence related to referral processes, tools, and triage systems used by primary and specialty care providers. Rheumatology is not the only area where an inequity between patients requiring care and available providers leads to extended wait times. In order to explore all possible mechanisms used to address the lack of providers available to offer sub-specialty care, referral processes used by other sub-specialty areas were included in this literature review.

Methods

A review of the literature was conducted in order to identify the published data on specialty referrals systems. The databases PubMed, CINAHL, and PsychInfo were searched with no date limitation. Along with these searches, a manual review of reference lists for the relevant

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published articles was completed. The search terms *referral process, referral system, specialty referrals, wait times, waiting times, and patient prioritization* were used. Those articles published in the English language involving the study of human participants 18 years of age or older were included in this review. Selected articles focused on the referral process between primary and specialty providers and waiting times that patients experienced between the referral and appointment. Articles that addressed waiting times in emergency departments as well as waiting times in the office were excluded because they do not address scheduled waiting times for a consultation with a specialty provider. Article titles and abstracts were sorted and literature relevant to the topic of referrals from primary care to specialty care, without regard to disease, including tools and triage systems, were evaluated. These searches yielded 472 articles; of the 24 that met inclusion criteria, five were classified as evidence highlighting the need to improve the referral process due to a shortage of specialists and improved outcomes for patients under specialty care, five described current referral processes or guidelines, ten described interventions developed and evaluated to improve the referral process, and four described tools that have been developed but not formally evaluated (See Figure 1).

Figure 1. Representation of Article Selection.

Pubmed n=302 Papers for Review
PsycINFO n=106 n=472
CINAHL n=54

Inclusion criteria met n=24

Papers excluded: Inclusion criteria not met n=448

Evidence supporting Need for Improvement n=5

Current referral processes or guidelines n=5

Evaluated interventions to improve referral process n=10

Unevaluated Tools to improve referral process n=4

Results

Evidence Supporting the Need to Improve the Referral Process

The literature suggests that patients who receive specialty care receive evidence-based treatments earlier in the disease process (Möttönen et al., 2002; Yelin et al., 1998) yet it also suggests there is an inadequate supply of specialty providers, including rheumatologists (Helmick et al., 2008). Therefore, improvements to the referral process are needed in order to ensure that patients receive timely care. The increasing prevalence of rheumatic conditions and the need for additional specialists provides evidence to support the future supply and demand mismatch for rheumatology services (Helmick et al., 2008; Kirwan, 1997). The literature indicates that there are current substantial wait times of 34-48 days for specialty care and that this situation will continue to get worse in the immediate future (Centers for Disease Control and Prevention, 2009; Deal et al., 2007; Hootman & Helmick, 2006). Hootman and Helmick (2006) concluded that by 2030 there will be an increase of 20 million adults with arthritis. Deal et al. (2007) conducted a survey to estimate the future number of rheumatology providers. When the gender of providers is analyzed, data suggest that women see fewer patients; this finding is

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significant since the number of women in the rheumatology workforce has risen significantly. They also concluded that a 30% increase in fellowship positions every five years would be necessary in order to keep up with the demand for rheumatology services (Deal et al., 2007). It has been shown that patients are more likely to attend appointments when they experience waiting times of two weeks or less compared to those waiting one to three months. This evidence further supports the benefits of reducing waiting times for specialty consultations (Hicks & Hickman, 1994).

Current literature on health outcomes for patients receiving care from specialists versus PCPs supports the need for referrals. Two articles provide support for the importance of patients receiving a timely consultation with a specialist in order to initiate medications earlier and achieve improved symptom control. McAlister and colleagues (2007) conducted a study of patients and found that those under specialty care were more likely to receive recommended pharmacological interventions. Yelin and colleagues (1998) conducted a longitudinal study ($N=$ 1,025) comparing those receiving care in a rheumatology specialty versus primary care, and found that measures of joint pain ($p=.01$) and swelling ($p=.22$), morning stiffness, global pain ($p=.57$), functional status, and global improvement were better for the rheumatology group, but the authors were unable to find a statistically significant difference.

Current Referral Processes or Guidelines

A number of researchers have evaluated the referral process between primary and specialty care. Their findings indicate that there is a lack of understanding and agreement between the referrers and the specialists in relation to referral processes (De Coster et al., 2008)Chew-Graham, Slade, Montana, Stewart, & Gask, 2007). Studies, conducted in several countries using different health care systems across a variety of sub-specialties, all outline the

lack of agreement between PCPs and specialists (De Coster, Fitzgerald, & Cepoiu, 2008). A qualitative study conducted in the United Kingdom examined the perceptions of PCPs and specialists (in this case, community mental health teams) in relation to the role of the specialist and referral appropriateness (Chew-Graham et al., 2007). There was consensus between providers over the function of the specialists but confusion over referral criteria. Some referrers wanted a consultation when they were having difficulty managing a patient; however, most PCPs agreed that referral criteria would be beneficial. A literature review by De Coster, Fitzgerald, and Cepoiu (2008) found that rheumatologists and PCPs agreed on the need for early referral for patients with suspected RA and ankylosing spondylitis (AS), but priority setting criteria do not currently exist except in cases that would be considered urgent. However, many of the patients requiring consultation did not fall into this category. The implications of these studies are that ambiguity is present when PCPs decide to refer patients to specialists and that clarifying the referral process would be beneficial.

The factors considered when PCPs refer patients to specialty services include appointment timeliness, quality of specialist communication, and specialist efforts to return the patient to the primary provider for care (Kinchen, Cooper, Levine, Wang, & Powe, 2004). Since PCPs consider these factors important, improved communication should be a focus of future studies in order to investigate the impact on patient outcomes. A review of referral letters highlighted the need for improved communication, since many referrals made for musculoskeletal diseases were found to be misdirected, inappropriate, or lacking in essential information (Newton, Hutchinson, Hayes, & McColl, 1994; Speed & Crisp, 2005). These studies highlight the lack of agreement between providers regarding what information should be provided by the referrer.

Table 2. Current Referral Processes or Guidelines

AUTHOR/ YEAR	DESIGN/ SAMPLE	MAJOR FINDINGS
Chew-Graham, C., et al. (2007)	Qualitative/ 35 interviews with GPs 17 (12 team leaders and 5 psychiatrists)	• No existing referral criterion resulting in lack of consistency • Tension exists between limited resources and clinical responsibilities
De Coster, C., et al. (2007)	Literature Review	• No single set of priority-setting criteria • Example of emergent referral- cranial arteritis or systemic vasculitis; routine referral- fibromyalgia and other soft-tissue syndromes
Kinchen, K.S., et al. (2004)	Correlational/1,252 primary care physicians	• Factors in primary care providers' choice of referral specialist include: skill, timeliness, insurance, experience, quality communication, efforts to return patient to primary physician, and good patient-specialist rapport.
Newton, J., et al. (1994)	Descriptive/ 39 cases referred to ENT and Rheumatology	• Majority of referral letters contained: appropriate patient identifiers, reason for consult, and information on patient communication and expectations.
Speed, C. A., et al. (2005)	Descriptive/ 1087 consecutive referral letters to orthopedic and Rheumatology	• No diagnosis in 63.4% of referrals. • 58% of orthopedic referrals were considered appropriate • 94% of rheumatology referrals were defined as appropriate

Evaluated Interventions to Improve the Referral Process

Intervention studies have been conducted with the purpose of improving the referral process between PCPs and specialists. Some researchers have advanced communication and agreement between the groups through the development of guidelines, but areas for improvement remain (Rao, Halsey, Bukhari, Dodds, & Mitchell, 2005). Some successful programs developed referral guidelines by working in conjunction with specialists and PCPs. The guidelines were then dispensed to local PCPs and made available online (Rao, Halsey, Bukhari, Dodds, & Mitchell, 2005). Although the guidelines were adhered to over 87% of the time, over 10% of patients were referred to the wrong specialty (e.g., referred to rheumatology instead of orthopaedics). This study shows that referral guidelines can help clarify ambiguity for PCPs, but

specialists will continue to receive some inappropriate referrals. Developing guidelines for areas that often receive inappropriate referrals (e.g., rheumatology, physical therapy and podiatry) would be especially beneficial.

Other studies in which PCPs attempted to improve outcomes by assessing severity and assisting in the development of referral guidelines provide evidence that primary and specialty care providers need to work together in order to improve this process and allow for prompt care (Rao et al., 2005; Slade et al., 2008; Watson, 2005). Again, referral guidelines only contribute to improvement when actually utilized by providers, and they work most effectively when developed collaboratively between services.

Accurately prioritizing patients through the use of triage systems can also help to improve wait times. Effective triage systems rely heavily on good communication between the referring provider and the specialist. New patients are triaged, either by a specialty or referring provider, and then given a grade based on the ranking of perceived urgency. A prioritization system (A,B,C) based solely on the information provided in the referral letter found overall good agreement (k=0.71) between preconsultation and postconsultation grading (Sathi et al., 2003). However, incomplete or inaccurate referring information is a major barrier to an effective triage system. When referral letters lacked key information, including a presumptive diagnosis, a description of involved joints, and a report of symptom duration, 47% of cases received a grade change after the office visit with a rheumatologist and 17% of these required a higher urgency grade (Graydon & Thompson, 2008).

An additional benefit of triage systems is identifying inappropriately referred patients (Harrington & Walsh, 2001). In one study, only 59% of referrals actually required appointments with rheumatologists, which allowed more timely appointments for patients in need of specialty

care (Harrington & Walsh, 2001). These prioritization systems allow specialists to act as gatekeepers to their practices. If implemented correctly, these systems can contribute to improved wait times for patients. However, it is important to note that these systems are only effective when the specialist is triaging patients. When PCPs rate patients on urgency using a prioritization system, there is low to moderate agreement (*kappa* = 0.44-0.47, *p*= .001) with specialists (Mariotti, Meggio, de Pretis, & Gentilini, 2008). This shows that although referral guidelines can contribute to improved agreement between providers, ultimately specialists need to control their prioritization system in order to optimize these systems.

In another study to improve wait times, educational groups were provided for patients in an attempt to empower the patient and support self-management in order to decrease the amount of non-essential patients requesting appointment times (Davies et al., 2011). The groups were led by health care professionals and addressed completing activities of daily living, and personal pain experiences. Only 48% of attendees requested appointment times after participation in the sessions which resulted in decreased wait times (Davies et al., 2011). Although it is not clear whether chronic pain patients are similar to other specialty patients, empowering these patients with information to care for themselves substantially improved wait times. Other researchers made attempts to decrease wait times by allowing time for same-day urgent appointments and improved efficiency by overhauling entire systems (Newman, Harrington, Olenginski, Perruquet, & McKinley, 2004; Ogunbamise, Reardon, Mohoboob, & Lelliott, 2005). This change was achieved by lengthening follow-up times for stable patients, hiring additional providers and allocating one morning every other week to see all new referrals. The referrals were then discussed post clinic and plans of action were agreed upon and initiated, which significantly reduced wait times for patients (Newman et al., 2004; Ogunbamise et al., 2005). These studies

suggests that predetermining appointment times, hiring more providers, and allotting time for

new referrals can help patients receive care in a timely manner.

Table 3. Evaluated Interventions to Improve Referral Process

AUTHOR/YEAR	DESIGN/SAMPLE	INTERVENTION	MAJOR FINDINGS
Davies, S., et al. (2011)	Prospective Cohort/ 319 patients with persistent pain referred to a pain clinic	Self-Training Educative Pain Sessions is a six-session educational program offered over two days.	• Over half did not schedule an appointment following attendance. • Wait times and cost of new patients were reduced
Graydon, S. L., et al. (2008)	Descriptive Correlational/ 206 referrals	Referral letters triaged for urgency (A, B, C, D) by rheumatologist	• 96 cases (47%) experienced a grade change between referral and consultation. • Urgent cases revealed the absence of a presumptive diagnosis, symptom duration, and involved joints in over 30% of referrals.
Harrington, J. T., et al. (2001)	Descriptive/ 279 new patients referred to Rheumatology	Rheumatologist reviewing each newly referred patient's medical records prior to scheduling an appointment (pre-appointment management).	• Only 59% of referred patients required a rheumatology consultation
Mariotti, G., et al. (2008)	Correlational/ 488 outpatients who were referred for gastroscopy or colonoscopy	PCPs filled out a referral form using developed guidelines for homogeneous waiting groups based on clinical indications. Each group (U, A. B, C, E, P) was assigned a max wait times of urgent- no limit)	• Poor to moderate agreement exists between GPs and specialists in regards to patients' priorities. • Over 22% of referrals were deemed inappropriate by specialists
Newman, E. D., et al. (2004)	Descriptive	Measured and eliminated backlog, allowed time for same-day patients, center appointment process around patients, developed protocols to be used by PCP	• The 3rd available appointment fell from about 60 days to <2 days. • Cancellations fell from 40% to <20%.
Ogunbamise, A., et al. (2005)	Correlational/ 200 referrals- 100 consecutive referrals prior to implementation of new fast track assessment (FTA) system and 100 consecutive referrals	Fast Track Assessment all referrals are discussed at the weekly meeting. all individuals, except emergencies, are now sent a fixed appointment staffed by four or five members of the team (the	• Resulted in 1st appointment offered was reduced to 18 days from 55 days

	post implementation	consultant psychiatrist, associate specialist two or three non-medical professionals). Individuals booked in 45 min intervals and assessed by a single professional structured 'core assessment' pro forma and a simple risk assessment checklist	
Rao, C., et al. (2005)	Descriptive/ 8993 cases were referred for a musculoskeletal opinion.	Implementing agreed referral and management guidelines	• 87.2% of musculoskeletal referrals adhered to the guidelines.
Sathi, N., et al. (2003)	Correlational/ 102 consecutive new GP referrals	Patients received urgency grade (A, B, C) based on referral letter then compared to post-consultation grade.	• Agreement between paper priorities made by the consultant on receipt of the GP's letter and clinical priorities made after seeing the patient in the out-patient clinic ($r = .71$).
Slade, M., et al. (2008)	randomized controlled trial/ 73 practices (408 839 patients) to 11 community mental health teams (CMHTs).	GPs to complete referrer-rated assessment of severity Threshold Assessment Grid (TAG) then CMHTs to rate referral appropriateness	• Asking GPs to complete a TAG when referring to CMHTs did not improve primary–secondary care agreement on referrals.
Watson, J. M., et al. (2005)	Correlational/ 92 individuals with intellectual disabilities	Compare the old referral system to the new Single Point of Referral System	• Waiting times for appointments improved from 66 to 6 days ($p<.001$) • Number of inappropriate referrals was reduced from 26% to 13% ($p<.05$)

Unevaluated Tools to Improve the Referral Process

There is evidence to support that tools, including referral guidelines, may be essential to improving the referral process. One example of an effective tool is to include essential elements in a referral: chief complaint, the reason for the referral, results of laboratory and radiographic tests, and physical examination results. This can improve continuity of care and communication between providers (Berta et al., 2009). Guidelines have also been developed to assist PCPs in identifying and referring patients with suspected early RA: the presence of more than three swollen joints and morning stiffness lasting greater than 30 minutes (Emery et al., 2002). An

additional tool, the Priority Referral Score (PRS), was developed by a clinical panel of

rheumatologists and PCPs to identify the urgency with which a patient needs to be evaluated

(Fitzgerald et al., 2011). Points are assigned for each level selected under the criteria for a

potential total of one hundred points. The higher the score, the more urgently the patient needs to

be seen for evaluation and treatment. The tool was evaluated by other practitioners which

resulted in acceptable interrater (ICC=.80) and intrarater (ICC=.83) reliability. Long wait times

in Canada led to the development and use of priority rating scales in patient populations

(Noseworthy, McGurran, & Hadorn, 2003). These scales, although not curative, are supported by

the public in order to improve wait list times for those with greater urgency. These tools and

guidelines were developed in an attempt to improve the referral process. Although not all of

these tools were developed for rheumatology, some may be beneficial if implemented by

rheumatology clinics experiencing long wait times.

Table 4. Unevaluated Tools to Improve the Referral Process

AUTHOR/YEAR	DESIGN/ SAMPLE	MAJOR FINDINGS
Berta, W., et al. (2009)	Systematic Review	• 15 essential components of a referral (ex. demographics, problem, labs/assessment findings, therapy, plan of care)
Emery, P., et al. (2002)	Literature Review	• Rapid referral to a rheumatologist is advised for suspected RA. • This may be supported by the presence of any of the following: >3 swollen joints, metatarsophalangeal/ metacarpophalangeal involvement, and morning stiffness of >30 minutes
Fitzgerald, A., et al. (2011)	Correlational/ 14 rheumatologists, 10 PCPs reviewed 16 modified case scenarios	• Priority Referral Scale developed to improve referrals from primary care to rheumatology; Correlation between pre and post consultation scores were 0.80 and 0.81 for the rheumatologists and PCPs.
Noseworthy, T., et al. (2003)	Descriptive/ Clinical panels constituted in 5 clinical areas	• Point-count scoring systems were constructed to prioritize waitlisted patients. • Tool had evidence to support face validity and a pragmatic scoring system.

Discussion

The literature presented in this review highlights the numerous problems that exist in current referral systems for specialty care, which can be attributed to the lack of guidelines for referral. PCPs often experience a great deal of uncertainty when deciding on appropriate referrals for specialists. Although it appears that there is greater agreement between providers when identifying urgent cases, most cases are not considered urgent (De Coster et al., 2008). An analysis of communication between providers revealed a lack of consistent, pertinent information conveyed from the PCP to the specialist; clearly communication between providers must be improved (Newton et al., 1994; Speed & Crisp, 2005). Although there is disagreement on how to make care timelier, there is agreement that long wait times and delays in care are detrimental.

Tools and guidelines that have been developed to help improve communication aim to identify those patients who need to be seen urgently in order to give them prompt medical attention (Newman et al., 2004; Rao et al., 2005; Sathi et al., 2003). Examples include referral guidelines, prioritization systems, and urgency scales. Evaluated interventions indicate that prioritization systems, when implemented by specialty practices, can improve wait times and referral processes (Sathi et al., 2003). Other interventions that were shown to be beneficial include preappointment educational sessions (Davies et al., 2011), allocating blocked time for new referrals, collaboratively developed referral guidelines, and predetermined appointment lengths (Slade et al., 2008).

Although research has been aimed at evaluating referral systems utilized between primary and specialty care, no one system has been shown to work across all disciplines. It is not clear whether these systems are as effective in other specialty areas. In general, triage systems

are effective at reducing wait times and identifying acutely ill patients, but systems should be tailored to meet the specific needs of that patient population. Other gaps in knowledge include identifying the cause of inappropriate referrals. It is unclear whether these referrals are due to the PCP's misunderstanding of the scope of specialty practices, or to misdiagnosis of the patients. Additionally, clinics that experience high rates of unexpected cancelations or patients who do not attend scheduled appointments may require an alternate solution in order to address the problem. There are some limitations of the reviewed articles to consider. Since no date limitation was used some of the articles are well over ten years old. Additionally some of the articles had small sample sizes. Expert opinion was used in the development of many of the tools and guidelines reviewed.

Future research should be directed at continued evaluation of such systems. However, improving access to care requires a multi-method approach as no single intervention will be sufficient to adequately improve the increasing supply and demand mismatch. The existing evidence strongly supports that the key elements necessary for improvement are: the development of referral guidelines in which primary and specialty care providers collaborate and the development of the patient prioritization systems to be utilized by specialty care clinics.

Conclusion

In the context of an increasing mismatch between patients' timely treatment and the availability of specialty providers, accurate referrals to enable specialist triage and ensure timely treatment are vital. This literature review highlights the crisis of overwhelmed specialty care areas related to the growing prevalence of persons with rheumatic diseases without an increase in the number of rheumatologists (Helmick et al., 2008). The evidence suggests that there are health

benefits to receiving treatment from a specialty provider, including earlier initiation of recommended pharmacological interventions for some of the rheumatic diseases including RA (Möttönen et al., 2002; Yelin et al., 1998). More research is required in this area as patients who are started on medications earlier in their disease get older and further comparison can be made as to the effectiveness of earlier treatment by specialty care providers.

The reviewed studies point to lack of communication, understanding, and agreement as reasons for the discontinuity between primary and specialty care (Mariotti et al., 2008; Newton et al., 1994). Certainly the providers have different priorities and knowledge when identifying appropriate referrals. In addition, there is inconsistency surrounding what information constitutes a referral (Speed & Crisp, 2005). Guidelines on RA seem to be widely accepted and utilized. However, there is a broad range of musculoskeletal diseases that exist without similar guidelines for PCPs. A need for the development and use of such guidelines is clearly highlighted throughout the literature.

Other methods to improve efficiency in the referral process include development of prioritization triage systems (Graydon & Thompson, 2008; Harrington & Walsh, 2001). These systems require a specialist to review patient information and decide how urgently the patient needs to be seen. These systems require refinement but certainly improve wait times for the majority of urgent patients. They can also identify inappropriately referred patients, who can then be redirected to appropriate specialties, thus eliminating them from filling the high-demand appointment slots (Harrington & Walsh, 2001). While increasing the number of providers is an obvious strategy to decrease wait times for patients seeking rheumatologic care, improving efficiency in the flow of the appointment timing can also be beneficial. In addition, evidence supports that referral guidelines specifically improve communication and agreement between

providers (Fitzgerald et al., 2011). Thus, implementation of several strategies including

development of referral guidelines, patient prioritization triage systems, and efficient clinic work

flow may be required to adequately address the problem.

Chapter 3

Manuscript #2:

Identification and Management of Rheumatoid Arthritis in the Primary Care Setting

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Abstract

1.3 million Americans are diagnosed with Rheumatoid Arthritis (RA). Early diagnosis and treatment of RA is essential to optimize patient outcomes. The inflammation that leads to permanent damage can now be significantly reduced with early pharmacological intervention. However, many patients do not receive diagnosis or treatment in a timely fashion due to delayed disease recognition and significant wait times for appointments with a rheumatology specialist. Patients with early signs of RA often present initially in primary care, thus it is critical that primary care providers are aware of and deliver care consistent with current, evidence based standards of care. This article summarizes current guidelines for recognition and management of RA for first contact providers which have been developed by the two leading organizations for RA: National Collaborating Centre for Chronic Conditions (NCC-CC; 2009) and American College of Rheumatology/European League against Rheumatism (ACR\EULAR; 2010).

Key Points:

- Early recognition and treatment of RA by PCPs may reduce patient morbidity and mortality

- A thorough history & physical should include impact on activities of daily life, duration of symptoms and evaluation of large and small joints

- Initial diagnostic tests ordered by the PCP must include: at least a RF, Anti-CCP , and CRP or ESR; X-rays of affected joints

- Ensure influenza and pneumonia vaccines are up to date on patients taking DMARDs; avoid live vaccines if on biologics

Introduction

Rheumatoid Arthritis currently affects an estimated 1.3 million U.S. adults eighteen and

older and as much as 1% of the world population (Helmick et al., 2008). It is not known how

many patients suffer without treatment or are in the early stages of the disease and have yet to be

correctly diagnosed. However, in some areas patients average over sixteen months between

symptom onset and consultation with a provider (Rodríguez-Polanco, Al Snih, Kuo, Millán, &

Rodríguez, 2011). When patients do seek care, they most often initially present to a primary care

provider (PCP) with complaints of joint pain and stiffness and are then referred to rheumatology

for specialist care (Conditions, 2009). This means that PCPs often serve as the first contact with

the health care system and thus have an important opportunity to recognize early symptoms and

facilitate early treatment.

RA is a progressive and incurable autoimmune disease that attacks the synovial

membrane of joints resulting in swelling and pain (Crowther-Radulewicz & McCance, 2013). As

the disease progresses, swelling spreads to cartilage, tendons, and ligaments producing

significant discomfort, deformity and loss of function. Joints that are most commonly attacked

are those essential in carrying out activities of daily living including those in hands, feet, elbows,

and knees. Fever, malaise, lymph node enlargement, and Raynaud's phenomenon are also seen

in these patients (Crowther-Radulewicz & McCance, 2013). Patients with RA are also at

increased risk of developing cardiovascular disease and osteoporosis due to disease activity and

medication side-effects (West & West, 2014).

RA affects women more frequently than men at a 3:1 ratio and is more prevalent in those

over the age of thirty years (Crowther-Radulewicz & McCance, 2013). The cause of this

debilitating disease remains unknown but there is believed to be a reproductive and hormonal

component which explains the higher prevalence in women. Genetic susceptibility and an initiating event such as an infection are thought to trigger the extreme immune response (Crowther-Radulewicz & McCance, 2013). When left untreated, the persistent inflammation from RA can lead to irreversible joint damage and therefore, disability contributes to the mortality and morbidity for this population (Oliver & St. Clair, 2008).

Prompt treatment is necessary to reduce permanent joint destruction. These patients may experience symptoms at home for several months prior to seeking care. Then a correct diagnosis must be made by the first contact provider in order to receive a referral to a rheumatology specialist. Unfortunately, patients often face substantial wait times for an appointment with a specialist because many clinical areas treating rheumatic diseases are already strained due to a supply and demand mismatch where the prevalence of patients with arthritic conditions seeking treatment far exceeds the supply of available rheumatology providers (Deal et al., 2007). Currently, typical wait times for an appointment with a rheumatology provider are in the range of 34 to 48 days and this wait is expected to get even longer because of a projected shortage of 2,609 rheumatologists by 2025, causing more delays in care which can lead to even more adverse health outcomes for patients with RA (Deal et al., 2007; Kirwan, 1997). In a typical scenario, a patient with suspected RA often waits a few months before seeking treatment from their PCP because they think the pain will be self-limiting. When the pain does not resolve and they are first evaluated by their PCP, they often have to wait an additional five to seven weeks before initiating treatment with the rheumatologist; as a result, several months can pass between onset of symptoms and initiation of important medications. Earlier prescribed pharmacological interventions are now the standard of care for RA, including disease-modifying antirheumatic drugs (DMARDs) within the first three to six months of disease onset (*Lippincott's Illustrated*

Reviews:Pharmacology, 2012). Timely care can slow disease progression and improve quality of life, thus it is imperative that primary care providers are able to recognize and begin initial management for patients with suspected RA.

Because of the number of patients requiring treatment and the relatively low number of health care providers who have specialized in rheumatology, systems to screen and prioritize patients are often used to make the referral process more effective (Pincus et al., 2002). Symptoms, lab work, radiographs, and histories are evaluated by specialty providers so that urgent patients are scheduled promptly; thus it is important that primary care providers are gathering and submitting appropriate information in a timely manner so that patients with RA can be most effectively triaged. Failure to do so can further delay treatment for patients that are experiencing symptoms which can not only decrease quality of life but lead to permanent destruction and functionality of the joints. The more complete and accurate the referral information is, the more likely the patient will receive an appropriate appointment time for the patient's need. Therefore, the purpose of this paper is to summarize the most current evidence based standards for initial evaluation and treatment of patients with suspected RA. These guidelines have been put forth by the 2009 National Collaborating Centre for Chronic Conditions (NCC-CC) and 2010 American College of Rheumatology/European League Against Rheumatism (ACR\EULAR) for the evaluation and treatment of RA and provide suggestions for practice implementation for primary care providers (Aletaha et al., 2010; Conditions, 2009).

Clinical Practice Guidelines

There are currently two guidelines that can be utilized by PCPs to help guide care for patients with suspected RA. One guideline was developed by the NCC-CC (2009) on behalf of

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the National Institute for Health and Clinical Excellence (NICE) and the other by the American

College of Rheumatology (ACR) and European League against Rheumatism (EULAR; 2010).

Although both guidelines encompass the diagnosis and management of the disease at the

rheumatology specialist level, both include practice guides relevant to primary care to assist in

the early diagnosis and referral of patients with suspected RA.

The NCC-CC guideline (2009) was developed by an expert panel to be a user-

friendly evidence based clinical practice guide. Similarly, the ACR and EULAR (2010) formed a

joint committee of expert members who determined goals that included identifying those at high

risk for developing erosive disease and when to initiate DMARD therapy. This updated the 1987

ACR classification of RA by refocusing on earlier stages of the disease rather than later

manifestations. The new guidelines state that synovitis in at least one joint that is not better

explained by another diagnosis should be considered for classification. This is different from the

1987 criteria which placed significance on later clinical manifestations of disease progression

(e.g., erosions).

Both the NCC-CC and ACR/EULAR guidelines now focus on the early recognition and

prompt care including pharmacologic intervention for patients with RA. Guidelines have shifted

the focus on identifying and intervening early in the disease with medications in order to prevent

the deformities and physical impairments that are often present with untreated late stages of RA.

However, there are some differences between them. The NCC-CC guideline seems to be more

user-friendly and is intended to be used by all providers and patients with RA, including PCPs.

The ACR/EULAR guideline is intended to accurately identify those with RA specifically for

rheumatologists, rather than for use by patients or PCPs as a referral tool. However, many of the

recommendations, particularly related to the initial stages of diagnosis and treatment, are relevant

to PCPs and can be used by them to correctly identify, assess and refer patients with an unexplained inflammatory arthritis.

Specific recommendations

History & Physical Assessment

For patients complaining of joint pain, a complete history should be taken to determine if any systemic manifestations have been present even if none are evident during assessment (Table 1). The PCP should ascertain if there has been any recent trauma that could explain the pain, swelling or stiffness and ask the patient to identify involved joints and the duration of symptoms. It is essential for the practitioner to inquire about morning stiffness and the amount of time required before the patient feels like their joints "loosen up" as much as possible for the day. Information on the extent of disability and impairment on activities of daily living should also be explored (Oliver & St. Clair, 2008). The disease may be impacting the patient's work and recreational activities, which can lead to a significant decrease in quality of life and financial strain. Self-report measures can be used to evaluate disease activity, such as the Health Assessment Questionnaire Disability Index (HAQ-DI) which is an assessment tool to help quantify a person's functional ability (Bruce & Fries, 2003). It assesses different categories of functioning including hygiene, grip, and feeding. It can be administered at different points during disease progression to gauge disease activity and response to treatment.

A thorough physical assessment must include location of affected joints, and signs of pain and swelling (Oliver & St. Clair, 2008). Each joint should be inspected and range of motion tested. Large joints including the shoulders, hips, knees, ankles, elbows as well as small joints including the metacarpophalangeal (MCP), proximal interphalangeal (PIP), and wrists should be visualized and palpated. Observation of visible effusions and rheumatoid nodules over surfaces

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or bony prominences should be documented. Assessment of systemic symptoms is indicated including fatigue, discoloration of the hands, dry mouth or eyes, or chest pain. Serious systemic complications are rare but can include interstitial lung disease, pericarditis, and vasculitis (Oliver & St. Clair, 2008).

Table 1. Key Information to obtain during History & Physical of Patients with

Possible/Suspected Rheumatoid Arthritis

History	Physical
Recent trauma	Inspection of affected joints- effusions or nodules
Duration of morning stiffness	ROM of joints
Impact on ADLs	Discoloration of hands
Joints affected	Dry mouth or eyes
Duration of symptoms	Heart sounds
Fatigue	Breath sounds
Chest pain	

Initial Diagnostic Tests

Both guidelines recommend that patients with possible/suspected RA have some laboratory studies obtained (Aletaha et al., 2010; Conditions, 2009). A referring provider must obtain at least a rheumatoid factor (RF) which is useful in the diagnosis but not to gauge disease severity or activity. RFs are autoantibodies, antibodies that attack host tissues, and can consist of two classes of immunoglobulins (Crowther-Radulewicz & McCance, 2013). Seventy five to 85% of RA patients will have detectable RF levels at some point throughout their disease while only 50% will be positive in the first six months of disease activity (Oliver & St. Clair, 2008). Other chronic inflammatory states or diseases can also cause detectable RFs including hepatitis C so if a patient has a positive RF a PCP should consider a hepatitis panel as well. One difference in the terminology used by the two groups is the NCC-CC guidelines recommend anti-cyclic

citrullinated peptide antibodies (anti-CCP) while the ACR/EULAR guidelines recommend anti-citrullinated protein antibodies (ACPA). The ACPA is tested with the anti-CCP serum test since anti-CCP recognizes multiple citrullinated proteins. (Aletaha et al., 2010; Conditions, 2009; Ioan-Facsinay et al., 2010). So, although the terminology is different both groups recommend the anti-CCP serum test since these autoantibodies are believed to contribute to the development of RA (Oliver & St. Clair, 2008). Anti-CCP has a sensitivity of 70% but a superior specificity of 95% compared to RF; as many as 35% of RA patients will initially test negative for RF but positive for anti-CCP (Oliver & St. Clair, 2008). This is why it is beneficial to obtain both RF and anti-CCP when RA is suspected. However, these serum labs are not required for a diagnosis to be made but can contribute to the working diagnosis. Also, no serial testing is indicated since repeating these labs does not correlate with disease progression or response to treatment.

Table 2. Recommended Lab Work & Radiographs for Suspected RA

Upon presentation of inflammatory arthritis with no other explanation, order the following:
Rheumatoid Factor (RF)
Anti-cyclic citrullinated peptide (anti-CCP)
C-reactive protein (CRP)   AND/ OR   Erythrocyte sedimentation rate (ESR)
Radiographs of affected joints in hands and feet

Acute phase reactants (APRs) are proteins that increase in serum concentration during times of inflammation or tissue injury and as a result reflect the presence and intensity of an inflammatory condition such as RA; C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) are the most common APRs. At least one APR, either CRP or an ESR, should be performed by the referring provider. CRP is independent of the hemoglobin concentration and has a major function that permits recognition of foreign pathogens and damaged cells. This means several conditions can cause CRP elevation including infection. ESR on the contrary can be affected by the number of red blood cells and responds slower to patients' conditions than

CRP. It is possible that ESR may not rise in early inflammation, thus may be within normal limits early in the disease process. Although which APR to use is at the discretion of the provider, CRP is a better choice if the provider believes the patients has recently experienced initial symptoms. As with RF and anti-CCP, elevated ACPs are not required in order to make a diagnosis. This is why elevated CRP and ESR levels should only be considered in conjunction with patient presentation and other blood work.

Radiographic changes in affected joints can be invaluable when diagnosing RA and thus x-rays of hands or feet are recommended by both groups (Aletaha et al., 2010; Conditions, 2009). Early changes can be noted sometimes within six months of disease activity and is seen as periarticular osteopenia (Oliver & St. Clair, 2008). Other early changes include bony erosions and joint-space narrowing. However, uncontrolled RA can lead to subluxation and loss of joint alignment (Oliver & St. Clair, 2008).

In conclusion, when a patient presents with synovitis of at least one joint that cannot be explained by another process, the provider should obtain at least a RF, anti-CCP, either a CRP or ESR, and radiographs of the affected joints.

Table 3. The 2010 ACR-EULAR Classification Criteria for Rheumatoid Arthritis

Patients who:

1. Have at least 1 joint with definite clinical synovitis (swelling)
2. With the synovitis not better explained by another disease

Classification Criteria for RA - Score-Based Algorithm	Points
A. Joint involvement	
1 large joint	0
2-10 large joints	1
1-3 small joints (with or without involvement of large joints)	2
4-10 small joints (with or without involvement of large joints)	3
>10 joints (at least 1 small joint)	5
B. Serology	
Negative RF *and* negative ACPA	0

Low-positive RF *or* low-positive ACPA	2
High-positive RF *or* high-positive ACPA	3
C. Acute-phase reactants (at least 1 test result is needed for classification)	
Normal CRP *and* normal ESR	0
Abnormal CRP *or* abnormal ESR	1
D. Duration of symptoms	
<6 weeks	0
≥6 weeks	1
TOTAL SCORE	

Scoring: Sum scores from each category. A score of ≥6/10 is needed for classification of a patient as having definite RA.   (Aletaha et al., 2010)

Referral

Specialty evaluation by a rheumatology provider is essential for patients with suspected

RA and thus a rheumatology referral is recommended by both the NCC-CC and ACR/EULAR

guidelines (Aletaha et al., 2010; Conditions, 2009). There is abundant evidence to support the

benefits of early treatment by a rheumatology provider on patient outcomes and earlier

pharmacological intervention with DMARDs (Pincus et al., 2002; Yelin et al., 1998). When

contemplating a referral, a provider can use the 2010 ACR/EULAR RA classification system

(Table 3) to help determine if RA is a likely diagnosis and if a referral is indicated. A score

greater than or equal to six would indicate a RA diagnosis. Since a goal of treatment is to initiate

care early, a provider does not have to wait until a score of six to refer but should definitely

consider specialty consultation if a patient's score is elevated.

When completing a referral, it is important that the PCP completes an accurate history

and physical, with particular attention to key components/systems/anatomy previously described,

obtains initial lab and diagnostic tests (RF, anti-CCP, APR, and x-ray), and provides complete

and accurate documentation to the specialist.

Medications

There are a number of important medications used in RA including DMARDs, biological agents, and glucocorticoids (Aletaha et al., 2010; Conditions, 2009). However, many of these medications can alter labs including APRs that are considered for diagnosis and the referring practitioner should consult with the rheumatology provider before initiating these regimens. A course of analgesics or NSAIDS may be initiated by the PCP to help with symptom control until the patient consults with the rheumatologist.

Although the PCP typically will not prescribe DMARDs, biological agents, or glucocorticoids, it is very likely that they will be caring for patients taking these medications and thus it is important that they understand the properties of these medications as well as potential side effects and/or possible interactions with other medications. It is beyond the scope of this article to thoroughly describe these medications; however, a brief description of each drug class with common side effects and special considerations (including interactions to common medications) that are important for the PCP to know has been presented in an article by Dunkin (2014).

DMARDs.

Most rheumatology specialists will initiate therapy with first-line drugs such as methotrexate or hydroxychloroquine when there are no contraindications (West & West, 2014). DMARDs can help stop the destructive progression of RA when initiated early in the disease process (*Lippincott's Illustrated Reviews:Pharmacology*, 2012). This drug should be selected based on patient profile and characteristics; sometimes several drugs may be trialed prior to finding the most appropriate for a specific patient. In general, these drugs are typically effective and safe.

Biologics.

The Biologics are given orally , by injection, or IV infusion and are the newest treatment

for RA (*Lippincott's Illustrated Reviews:Pharmacology*, 2012). Some of the biologics, known as

TNF-inhibitors (etanercept, adalimumab, infliximab, golimumab, certolizumab) greatly improve

patients' symptoms, reduce destruction and thus improve function (West & West, 2014)**.** They

carry an increased risk of TB and herpes zoster so live vaccinations (MMR, varicella/zoster,

flumist) should be avoided (Vivar & Van Vollenhoven, 2014). They are often used in

conjunction with other DMARDs especially methotrexate and also have an increased risk of

infection. However, patients often feel improvement as soon as four to six weeks. Anakinra,

abatacept, rituximab, and tocilzumab are other biologics that are used generally if response to

DMARD therapy is inadequate. Although DMARDs and biologics have different mechanisms of

action, they slow the progression of the disease and improve patients' symptoms and quality of

life (West & West, 2014)**.**

General Considerations for Patients taking Anti-Rheumatic Medications.

Some general considerations include that all of these medications lead to an increased

risk of bacterial and viral infections. Vaccinations including influenza, pneumonia, hepatitis B,

zoster, and human papillomavirus (HPV) should be given prior to initiation when possible (Singh

et al., 2012). However, they may be administered during treatment with the exception of the

zoster vaccine. All live vaccines are contraindicated if a patients is receiving a biologic (Singh et

al., 2012). Additionally, it often takes three to four months for patients to experience the full

effect of the medication, thus pain may be an issue addressed by the PCP in conjunction with the

rheumatology specialist.

Implications for Practice and Follow-up

Both practice guidelines offer evidence-based strategies to prevent or decrease further disease activity including not only a referral to a rheumatology specialist, but other multidisciplinary treatment (Aletaha et al., 2010; Conditions, 2009)**.** Occupational therapy, podiatry and nutritional consultation and mental health counseling are frequently indicated to improve quality of life. Complementary therapies may also be utilized by patients including acupuncture and aromatherapy (Conditions, 2009).

While a rheumatology provider will manage the RA condition, the PCP plays an important role in a patient's overall care and provides a complementary role by following and reinforcing the specialist's RA treatment plan and ensuring that aspects of care that fall within his or her scope of practice are delivered. For example, ensuring vaccinations are up to date (especially important for patients receiving immunosuppressant medications), providing education about the disease and strategies to decrease risk of infection, and answering questions are all tasks important to the ongoing care of these patients. PCPs can aid in the early identification of cardiovascular risk factors including hypertension, hyperlipidemia, and smoking then initiate recommended treatment and follow-up to help decrease the risk of atherosclerosis. This is imperative since cardiovascular disease is the most prevalent cause of mortality for patients with RA (West & West, 2014). Additionally, PCPs should be aware that cardiovascular disease develops on average five to ten years earlier than in the general population (West & West, 2014). Similarly, monitoring vitamin D and calcium levels, recommending supplementation when necessary, and obtaining a bone density scan when indicated can help prevent the development of osteoporosis in this population. The PCP can also monitor the patient

during other routine appointments and facilitate communication with the rheumatology provider if the patient is experiencing problems.

Awareness of best practice is vital when caring for patients with a suspected or confirmed RA diagnosis and implementation of the evidence-based practice guidelines summarized in this paper can help facilitate optimal care and a smooth referral process between primary care and specialty providers. PCPs have the ability to directly impact the initial and ongoing treatment of patients with RA and thus can influence the progression or non-progression of the disease and subsequent disability or other complications and overall quality of life. When working in collaboration with rheumatology providers and patients, PCPs are important members of the health care team and can help decrease the risk of complications to maximize patient outcomes and quality of life.

Chapter 4

Manuscript #3:

Evaluation of a Rheumatology Patient Prioritization Triage System

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Abstract

Background: The discordance between the numbers of rheumatology providers relative to persons seeking care has resulted in significant periods of time in which patients wait for care. Patient prioritization systems have been used to triage referred patients to facilitate timely treatment of acutely ill patients, but there is limited data to support the effectiveness of these systems as implemented in the clinic setting.

Methods: A prospective study design was conducted among adult patients referred to a large university rheumatology clinic (N= 103) to compare the pre- and post-appointment provider-assigned, triage-system acuity scores. Data were collected from May through September of 2014. The intra-class correlation coefficient (ICC), paired t-test, and the Bland-Altman plotting method were used to compare acuity scores and summarize the findings.

Results: The ICC between the pre- and post-appointment acuity scores was 0.50 ($p < .001$). The average difference between the pre- and post-appointment acuity scores was not significant ($t = -1.17$; $p = .24$). The Bland-Altman plot suggests the pre- and post- appointment patient triage scores were typically within the limits of agreement; only 8 of the 103 score differences were outside of the limit of bias (± 2 *SD*). Compared with the pre- scores, three patients were given a higher acuity score and five patients were given a lower acuity score following their clinical evaluation.

Conclusion: Our findings suggest the specialty-provider triage system evaluated is effective at accurately classifying rheumatologic patient acuity. When resources are limited and delayed evaluations and treatments result in negative health outcomes, the use of triage systems is likely an effective strategy to reduce the impact of limited provider availability relative to patient census.

Introduction

Rheumatology is an Internal Medicine sub-specialty focusing on the treatment of a vast number of pain, autoimmune, degenerative, and inflammatory conditions (e.g., rheumatoid arthritis, osteoarthritis, fibromyalgia, systemic lupus erythematosus). Many of these rheumatologic conditions are often classified as arthritic. In the U.S., there were 4,946 rheumatologists charged with treating the population of persons with rheumatic conditions, which is estimated to be over 48 million (2005) (Centers for Disease Control and Prevention, 2009; Helmick et al., 2008; Lawrence et al., 2008). With an expected increase in the prevalence of arthritic conditions, a shortage of 2,609 rheumatologists by 2025 is projected (Deal et al., 2007; Kirwan, 1997).

This shortage of rheumatologists relative to the number of persons seeking care results in significant wait times for rheumatology clinic appointments. An estimated six to seventeen months elapse between a rheumatology patient's first symptoms to his or her rheumatology appointment (Hernández-García et al., 2000; Kumar et al., 2007). Timely diagnosis and treatment of rheumatologic conditions is imperative for optimal treatment and delays in care result in worsened health outcomes including permanent damage to organ systems increasing morbidity, mortality, and rates of disability (Oliver & St. Clair, 2008; Yelin et al., 1998).

To address the disporpotionate need for rheumatology care relative to the supply of rheumatology health care providers, many rheumatology practices use patient-triage systems. These systems identify referred, acutely-ill (urgent need for an appointment) rheumatology patients and prioritize their care in order to provide time-appropriate treatment (Sathi et al., 2003).

A number of specific triage systems are used by rheumatology and other specialty practices where the need for services outweighs the number of available providers. Triage systems can be grouped into those triaged by a specialty provider (Graydon & Thompson, 2008; Harrington & Walsh, 2001; Sathi et al., 2003) or by the referring provider (Slade et al., 2008). Typically those systems in which new referrals are triaged by a specialty provider involve review of referral information by a provider trained in rheumatology who then assigns a score based on the patient's rheumatologic acuity (Graydon & Thompson, 2008; Harrington & Walsh, 2001; Sathi et al., 2003). Appointments are scheduled based on the acuity score considering appointment availability (Harrington & Walsh, 2001; Slade et al., 2008). These systems also identify patients who were inappropriately referred to rheumatology or the outpatient setting and redirect them to appropriate services (Harrington & Walsh, 2001). Systems in which referrals were triaged by the referring provider for outpatient specialty services involve referring providers assigning patients a score based on urgency for outpatient services (Mariotti et al., 2008). The patients are then given appointment times with maximun waiting intervals based on the score (Mariotti et al., 2008). Both systems aim to identify acutely ill patients and reduce wait times for those patients that need to be seen urgently.

There is conflicting evidence on the accuracy of patient triage systems at correctly classifying acutely ill patients. Evaluation of prioritization systems in which patients were triaged by a rheumatology provider suggest good agreement between pre- and post-consultation score (*kappa* = 0.71); yet the efficacy of these triage systems is hinged on accurate information from the referring provider (Graydon & Thompson, 2008). Evaluations of referring-provider systems have suggested poor to moderate agreement (*kappa* = 0.44-0.47, *p*= .001) between the referring and consulting provider (Mariotti et al., 2008; Slade et al., 2008).

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In summary, the inequity between the high number of persons with rheumatic conditions and the few specialty providers available to provide this population with specialty care has resulted in the use of patient-prioritization triage systems, which aid in identifying and providing timely treatment to high-acuity rheumatologic patients. The dearth of and conflicting research findings in regards to these systems has resulted in a lack of a standardized, evidence-based triage system; therefore further research is needed to improve quality in patient care. Therefore, we conducted a prospective study to compare the pre- and post-appointment provider-assigned, triage-system acuity scores assigned using a patient prioritization triage system at a rheumatology clinic in a large university medical center.

Description of the Current Triage System

The patient prioritization triage system evaluated consisted of a board-certified rheumatologist reviewing documents sent by a referring provider and then assigning an acuity score; thereby determining rheumatology appointment immediacy. Acuity score levels ranged from 1 to 4, with lower scores indicating more urgency: (1) urgent (e.g., systemic vasculitis); (2) emergency (e.g., active inflammatory arthritis); (3) next available (e.g., stable inflammatory arthritis); and (4) lowest priority (occupational musculoskeletal condition). Additional health information was often requested from the referring provider (i.e., lab results, office notes) and then re-reviewed. The acuity score was entered into a secured, Health Insurance Portability and Accountability Act-compliant World Wide Web-based database (Sharepoint®). This Web-based database contained key information provided by referring providers (including date of referral, lab results, key assessment findings, and pertinent medical history). The database also contained information entered by the rheumatology department, including acuity score, presumptive

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diagnosis, and date of appointment. Appointments were made by a scheduling center based on the pre-appointment acuity score.

Methods

Approval was granted from the university Medical Institutional Review Board. A written informed consent was given to all of the providers explaining the study and to request their participation.

Sample and Setting

All persons newly referred to the university rheumatology clinic from an outside facility age 18 or older between May 2014 and September 2014 who were provided a pre-appointment acuity score were eligible for inclusion in the study. The sample comprised 103 adults who met inclusion criteria.

Protocol

Pre-appointment acuity scores were obtained from a Sharepoint® system used by the clinic prior to the initiation of the study. To evaluate the accuracy of the score, providers were asked to score patient acuity using the triage scoring system following the initial consultation. All information was de-identified by clinic staff who assigned patients a participant number prior to the patient being seen for consultation entered data into an Excel© spreadsheet which was provided to the research team. This information included: date of referral, age, gender, county of residence, scheduled rheumatology provider, appointment date, and presumptive diagnosis. Data collection sheets (with the de-identified patient number assigned by clinic staff) were given to providers after their initial consultation with patients; these sheets asked the provider to assign the patient a post-appointment acuity score and document a presumptive diagnosis based on the

information gathered during the consultation. This de-identified information was then entered in the Excel© spreadsheet with the corresponding pre-appointment acuity scores and demographic information collected prior to the appointment by clinic staff.

Analysis

Descriptive statistics, including means and standard deviations or frequency distributions, were used to summarize demographic and clinical characteristics of study participants. To evaluate the efficacy of the triage system, the Bland-Altman method was implemented and included an intra-class correlation coefficient (ICC), a paired t-test and Bland Altman plot (Altman & Bland, 1983; Martin Bland & Altman, 1986). ICC was used as the test of association to determine the correlation between pre- and post-acuity scores. The paired t-test was used to determine whether the average difference between the pre-appointment acuity score and the post-appointment acuity score was significantly different from zero (Rayens, Svavarsdottir, & Burkart, 2010). The Bland-Altman plot was used as a graphical way of depicting agreement between the acuity scores by assessing differences between the "gold-standard" or most accurate rating (post-appointment acuity score) and triage system (pre-appointment acuity score) (Rayens et al., 2010). Data analysis was performed using Statistical Package for the Social Sciences (SPSS©) 21 software; an alpha level of .05 was used to determine statistical significance.

Results

Summaries of patient demographic and clinical characteristics are displayed in Table 1. The mean age of participants was 46.1 years ($SD = 13.3$; range = 18-85). Consistent with rheumatologic disease in the U.S., the majority of the sample was female (81%) (Klippel et al., 2008). Patients waited an average of 36.5 days ($SD = 15.8$) from the time of outside provider referral until their initial clinic consultation. The predominant working rheumatology diagnoses

included osteoarthritis (34.9%), fibromyalgia syndrome (24.3%), rheumatoid arthritis (16.5%),

and systemic lupus erythematosus (3.8 %).

Table 1. Demographic and clinical characteristics of study participants (*N* = 103)

	Mean (SD); range or n (%)
Age (years)	46.1 (13.3); 18 – 85

Gender
  Male
  Female
	
	20 (19.4%)
	83 (80.6%)

Time from referral to appointment (days) Predominant Working Diagnoses Osteoarthritis Fibromyalgia syndrome Rheumatoid Arthritis Systemic Lupus Erythematosus	36.5 (15.8); 3 – 105 36 (34.9%) 25 (24.3%) 17 (16.5%) 4 (3.8%)
Pre-appointment acuity score	3.3 (0.7); 2 – 4
Post-appointment acuity score	3.4 (0.9); 0 – 4

The ICC for the acuity scores was 0.50 (*p* < .001), which suggests moderate agreement

according to the guidelines established by Landis and Koch (Landis & Koch, 1977). There was

not a significant difference between the pre- and post-appointment acuity scores according to the

paired t-test (*t* = -1.17; *p* = .24). The Bland-Altman plot (Figure 1) suggests that the pre- and

post- appointment triage scores were within the limits of agreement; only 8 of the 103

differences were outside of the limit of bias (± 2 *SD*). Three patients were given a higher acuity

score and five patients were given a lower acuity score following their clinical evaluation

(relative to their triage acuity score prior to being seen in the clinic).

Figure 1. Bland-Altman Plot
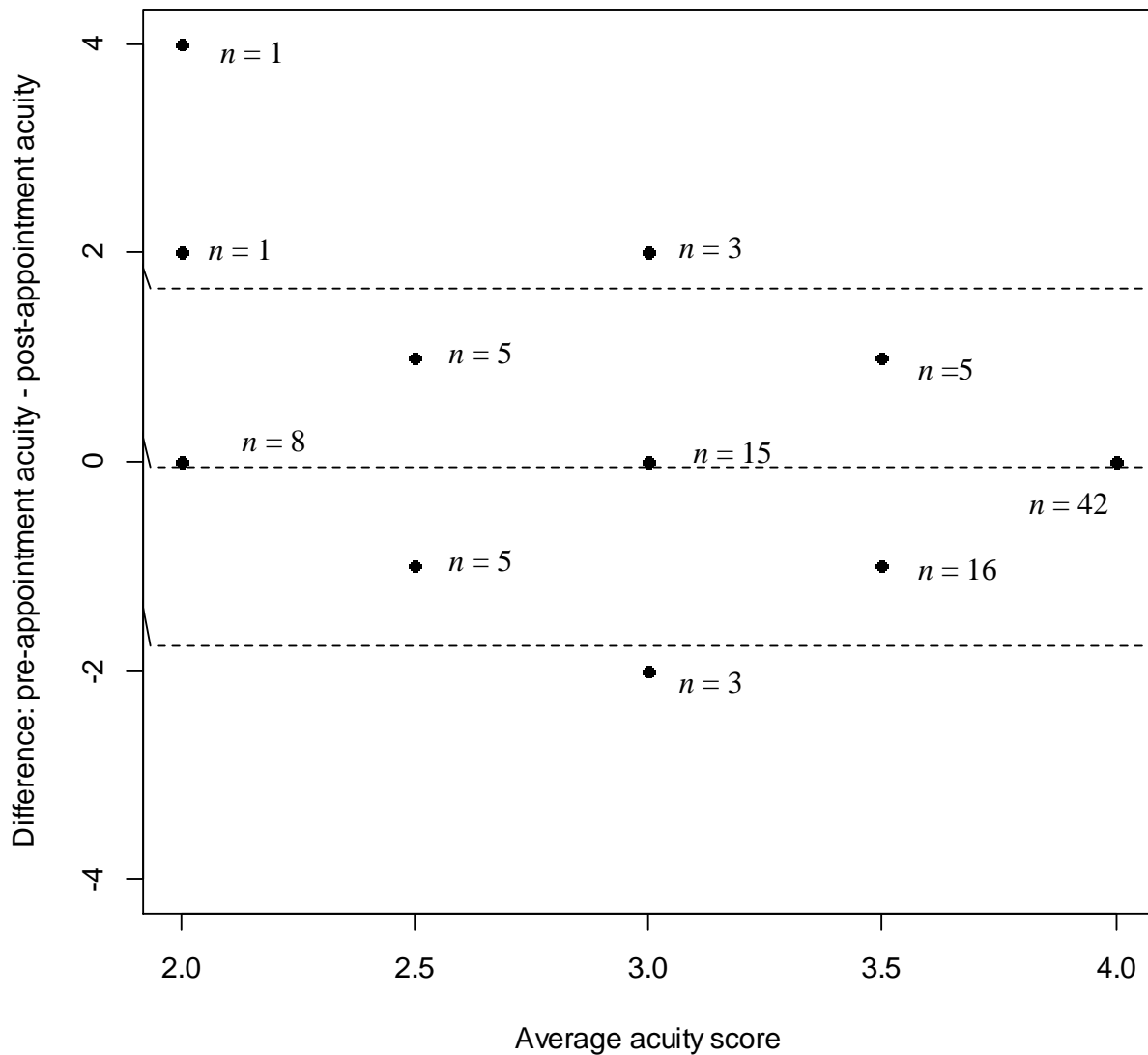
Note: Bland Altman plot showing the directional differences in pre-appointment and post-appointment acuity scores, the average bias and limits of agreement ($N = 103$).

Discussion

The specialty provider prioritization triage system evaluated in this study was effective in identifying acutely-ill rheumatologic patients as evidenced by the moderate agreement found between the pre- and post-appointment acuity scores (ICC = 0.50). Paired t-tests results found no significant difference between the means, and only 7.8% of the scores fell outside of limits of agreement as shown on the Bland-Altman plot. This is consistent with other research aimed at evaluating the accuracy of similar triage systems (Sathi et al., 2003). Sathi and colleges (2003) found that good agreement (*kappa = 0 .71)* existed between scores based on the referring information and those after consultation. Importantly, most scores that were different between the pre- and post-assessments were due to a lower priority assigned at post-assessment, suggesting that acutely ill persons received timely care.

Despite the triage systems being used and inappropriate referrals being redirected to appropriate services, we found that patients still waited on average 37 days before being seen by a rheumatology health care provider. This is important considering that up to 41% of patients requesting consultation with a rheumatology provider are inappropriate; thus, wait times would have likely been significantly longer had this system not been in place (Harrington & Walsh, 2001). Because accuracy in referring information is imperative in order to receive an appropriate acuity score (i.e., the lack of a presumptive diagnosis, symptom duration and involved joints can lead to acuity ill patients receiving lower acuity scores), future studies should aim to develop quality improvement strategies to improve the accuracy and efficiency in which health information is provided from referring providers to sub-specialties (Graydon & Thompson, 2008).

The time required to implement the prioritization triage systems is an additional limitation to wide-spread use. Future studies should be directed at making system improvements to advance feasibility by streamlining the process of assessing and recording this information.

When designing this study, we felt it was important to evaluate the prioritization triage system as it was implemented in the rheumatology clinic setting. However, some limitations were present because of this approach to conducting the study. In this clinical setting, the pre- and post-appointment triage acuity scores were often assigned by different providers. This may have contributed to variability despite the use of a standardized scoring system. Because of the time lag in appointment wait times, it is possible that patient acuity changed over the time that elapsed between the initial acuity score to when the patient was seen in the rheumatology clinic. For this reason, the comparison of pre- and post-assessment acuity is conservative since some discrepancy may be due to patient status changes rather than errors in acuity measurement.

Conclusion

This study indicates that there is agreement between the pre- and post-appointment acuity scores. This supports the effectiveness of provider-assigned patient prioritization triage systems at accurately identifying acutely ill patients referred to a rheumatology specialty care clinic. Because timely access to care will continue to be a challenge for providers as the population ages and imbalances between supply and demand worsen, improving referral processes will be imperative to facilitate quality patient care outcomes. Our findings suggest that prioritization triage systems are one mechanism that can positively affect these quality outcomes.

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Chapter 5

Capstone Report Conclusion

Conclusion

Although significant research has been done surrounding the referral process between primary and specialty care, improvement is needed. In this report, several strategies and tools have been identified such as improving self-management through educational sessions, blocked time for new referrals, and collaboratively developed referral guidelines (Davies et al., 2011; Mariotti et al., 2008; Newman et al., 2004). Pre-appointment management through patient prioritization systems is a leading effective strategy in identifying acutely ill patients and reducing wait times to ensure patients are seen in a timely manner (Harrington & Walsh, 2001; Sathi et al., 2003). Furthermore, PCPs play an important role in reducing wait times by recognizing patients presenting with early inflammatory arthritis and facilitating prompt treatment by a rheumatology specialist. Awareness and adherence to guidelines presented in chapter three will help facilitate the referral by providing recommended information including laboratory and radiographic studies (Aletaha et al., 2010; Singh et al., 2012). PCPs contribute to the ongoing care of patients under the supervision of a rheumatology provider by reinforcing treatment plans including providing life saving vaccinations, monitoring for disease progression and medication side effects.

The results of this quality improvement project demonstrated that the rheumatology patient prioritization system strategy evaluated in this study was able to identify acutely ill patients to ensure they are seen in an appropriate time frame. These findings are consistent with other studies evaluating specialty provider triage systems (Sathi et al., 2003). This report in addition to the existing research provides a strong recommendation for implementing a triage patient prioritization system in clinical areas where there are limited providers and long wait times. Eliminating delays in care is imperative since early identification and pharmacological

intervention is not only the standard of care, but can significantly improve morbidity and mortality (McAlister, Majumdar, Eurich, & Johnson, 2007; Yelin et al., 1998). As the population ages and the prevalence of arthritic and rheumatic diseases increases, improving the referral process and decreasing wait times or delays in treatment will become even more necessary. This project highlights the need for prompt specialty consultation for patients with inflammatory arthritis, the need for improvement in the referral process, and provides evidence in support of an effective strategy to address these needs.

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