Screen, Refer and Track:
A Personalized Medicine and Systems-based Approach to Improve the Outcomes of Patients with Rheumatoid Arthritis at Risk for Cardiovascular Disease at an Academic Medical Center

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1. **Structured Abstract** (Max of 250 words addressing the following elements: Purpose, Scope, Methods, Results, Key Words)

Patients with RA have an increased risk of CVD as compared to the general population. The European League Against Rheumatism (EULAR) recommends that rheumatologists assess the CVD risks in RA patients. Multiple barriers such as limited time and lack of familiarity of CVD screening guidelines challenge the feasibility of this practice. A gap in patient care was identified by our rheumatology and cardiology teams related to RA patients who had modifiable cardiovascular risk factors. Physician leads from each of these clinical areas joined with members of our Professional Education, Biostatistics, Nursing, Medical Assistants, and Health Initiative departments to initiate a 28-month performance and quality improvement (QI) project, with the ultimate goal of implementing a novel rheumatology-focused cardiology consultation service and intervention program for rheumatoid arthritis patients with increased risk for cardiovascular disease (CVD).

2. **Purpose** (Objectives of Study).

The European League Against Rheumatism recommends rheumatologists engage in assessing cardiovascular disease (CVD) risks in rheumatoid arthritis (RA) patients. At National Jewish Health, gaps in patient care were identified by our rheumatology and cardiology teams related to RA patients who had modifiable cardiovascular risk factors. We developed a 28-month collaborative initiative to create a streamlined way to educate and evaluate these patients about risks.

**Program Aims:**

- Increase patient awareness of CV risks.
- Improve screening and documenting CV risk factors.
- Increase referrals to systems-based resources.
- Promote collaboration between rheumatology and cardiology divisions.
- Demonstrate improved patient outcomes related to modifiable risk factors.

**Key Objectives**

**Implement a rheumatology-focused cardiology consult to:**

- Facilitate rheumatologists’ identification and screening of patients with rheumatoid arthritis (RA) and increased risk for CVD for additional risk factor assessment and modifications using a system-based method.
- Increase referrals to systems-based wellness resources to improve modifiable risk factors.

National Jewish Health
• Bolster collaborative multidisciplinary patient care
• Increase awareness of the increased CV risk associated with RA
• Train and utilize a dedicated Patient Case Manager (PCM) to:
  • Identify the current or potential NJH RA patients at increased risk for CVD and engage the rheumatologist in considering the patient for the referral program
  • Periodically meet with and educate RA patients at risk for CVD, and motivate patients to participate in the recommended systems-based interventions
  • Navigate the patient through the consultative visits and participation in systems-based wellness resources for improved patient health
  • Track program data and outcomes
  • Follow-up with patients to make adjustments to care plans accordingly
  • Report outcomes to health care team
  • Perform qualitative patient focus groups to inform the patient education aspects of the initiative, and again at the conclusion of the activity to measure a change in patient awareness of risk factors
  • Distribute and collect patient surveys to quantitatively measure awareness of CVD risk factors pre and post-program interventions

Provide practical strategies to increase:

• Patient awareness of modifiable risk factors
• Patient awareness of their specific target goals related to modifiable risk factors (i.e., goal BP, goal weight/BMI, etc.)
• Patient participation and adherence to systems-based health improvement tools for the management of modifiable risk factors, including weight management and smoking cessation wellness programs
• Track outcomes for patients in a program-specific registry who have been identified, referred to, and who participate in internal resources for weight management and smoking cessation, and compare participant outcomes to matched patients who elect not to participate in the interventions and report on the findings.

3. **Scope** (Background, Context, Settings, Participants, Incidence, Prevalence).
   In 2014, National Jewish Health (NJH), an academic research and tertiary referral center, implemented a novel rheumatology-focused cardiology consultation service and intervention program for rheumatoid arthritis (RA) patients with increased risk for cardiovascular disease (CVD). The initiative aligned with European League Against Rheumatism (EULAR) recommendations that rheumatologists engage in assessing CVD risks in RA patients, as well as
A 28-month collaborative initiative was developed to create a streamlined way to educate and evaluate RA patients about their CVD risks. We engaged the divisions of rheumatology and cardiology as well as professional education, research informatics services and health initiatives staff in the design and implementation of this project. We had a physician lead from both rheumatology and cardiology divisions, but also actively engaged the medical assistants, nurses and mid-level providers in the implementation and education of the project. Of the 788 RA patients by rheumatology practice during the study interval, a total of 371 RA patients were identified through the program at risk for cardiovascular disease.

One goal was to assess RA patient awareness of their CVD risks and whether they had discussed these risks with their providers in the past. We also wanted to determine if they were interested in trying to learn more about their risks or engage in programs that would potentially change their behavior and ultimately reduce their CVD risks. We determined the effectiveness of this intervention by administering random patient surveys throughout the study interval.

Another aim of this project was to implement the changes within each division to assess and address the CVD risk and keep the concept sustainable long term. We engaged with our information support staff to improve our electronic medical record (EMR) workflows and created a means of CVD risk assessment that would be easy for the providers. Using our current EMR, we built frameworks to meet the needs of both the rheumatology and cardiology divisions. For the rheumatology providers, we created an accessible set of orders that would allow for CVD risk assessment in RA patients that included a specific cardiology referral, electrocardiogram, and laboratory assessment that included lipids and diabetes screening. During this implementation, we also elected to add in routine disease and functional assessments for RA patients. For the cardiology providers, we created a set of orders that included further diagnostic cardiac testing, nutrition and CVD risk calculators. For both divisions, there were additional options to refer patients to a smoking cessation program and/or weight loss intervention program.

A patient case manager (PCM) was utilized to identify potential patients appropriate for a cardiology consult. These charts were flagged in rheumatology so that the rheumatology provider could elect to begin the RA CVD risk assessment. The PCM also was available to the patients and providers to help navigate any of the processes, and to gather patient feedback. The PCM followed the patients longitudinally, allowing for patient continuity and reduced loss to follow-up for any of the programs. The PCM was supported through the project, and
ultimately is not likely a sustainable aspect of this project. However, the PCM provided support to existing division staff to help with implementation and also recognition of where the gaps in the flow occur.

4. **Methods** (Study Design, Data Sources/Collection, Interventions, Measures, Limitations). 

**Study Design**
Provider measures were tracked at six time points and reported back to the provider as individual and division aggregate numbers. Metrics included best practice assessments and referral to patient resources. Patients were surveyed to understand how well we were educating on the relationship between RA and CVD, and the impact of interventions and resources implemented for patients. The format selected for the initiative was the Plan-Do-Study-Act (PDSA) evidence-based model to: 1) Test the change (Plan) September 2014 – December 2014, 2) Carry out the test (Do) January 2015 – December 2016 and 3) Observe and learn from consequences (Study & Act) January 2017 – February 2017.

**Key Interventions**
Multiple interventions were employed throughout the initiative to achieve goals that included provider education, system-based change, EMR edits, patient education, and provision of resources.

- Grand Rounds presentation to increase initiative awareness
- Electronic Medical Record (EMR) edits:
  - BMI recording adjustments for MA ease of use
  - Order sets specific to rheumatology and cardiology divisions for prioritization of best care practices for RA patients
  - Addition of referral to tobacco quitline services
- Division meetings with rheumatology and cardiology
  - Brought in expert presenters to council on talking to patients about weight
  - Troubleshoot challenges or barriers in best practice implementation
  - Announce new division processes such as MDHAQ/RAPID3 assessment
- Provider and patient education about system resources
  - FitLogix (52 week behavioral weight management program)
  - QuitLogix (telephonic tobacco quitline service)
  - Patient education conference for RA patients, caregivers and providers
- Addition of weight intervention prompt in cardiology division paper record that MAs administer
- Development of a 6-month rehabilitation membership program targeted for RA patients
- BMI poster developed for clinic rooms
- Letter sent to all RA patients who identified as smokers about tobacco cessation resources from their physician

Measures

Metrics tracked for providers were identified:

- Referred to cardiology for CV risk assessment and appointment scheduled
- Document smoking status
- Tobacco cessation intervention
- Referred to QuitLogix, tobacco cessation support program
- Weight loss intervention if applicable (FitLogix, nutrition consult, BMI card)
- MDHAQ and RAPID3 assessments
- Lipid panel ordered
- Hemoglobin A1C ordered

To determine how well the initiative met the overall goals, we incorporated provider measures tracked at six time points and reported back to the provider as individual and division aggregate
numbers. Providers were given this data in a timely fashion to learn more about their own practice patterns and to be able to compare with others in their division.

Baseline data was gathered on multiple metrics for each rheumatology division physician as well as each cardiology division physician. Metrics for both divisions included implementation of a weight loss intervention, referral to tobacco cessation quitline services, documentation of smoking status, lipid panel order, and hemoglobin A1c order. Additional measures for rheumatology physicians included referral to cardiology, administration of the Multi-Dimensional Health Assessment Questionnaire (MDHAQ) and administration of the Routine Assessment of Patient Index Data (RAPID3). Additional measures for the cardiology physicians included administration of the Atherosclerotic Cardiovascular Disease (ASCVD) 10-year risk assessment, and administration of the ASCVD lifetime risk assessment. Thirteen physicians participated in the data collection, six from rheumatology and seven from cardiology.

We also incorporated patient surveys administered cross-sectionally at two time points. These were administered by the PCM and likely would not be a sustainable practice long-term. However, the data collection was intended to provide a means of how well the project was going overall and where the gaps existed in the workflows.

Eighty-one (81) patients with RA seen by a rheumatologist at NJH were surveyed over the phone by the PCM between April 2015 and August 2016, prior to a clinic visit with cardiology, regarding the aggregate group’s understanding of the relationship between RA and CVD. We also asked about understanding of the role of chronic inflammation in coronary artery disease, BMI awareness, health risks associated with smoking and obesity, what modifiable risk factors are, the amount of calorie-containing drinks consumed, and the servings of fruits and vegetables consumed. Utilizing a cross-sectional design, we asked the same questions again of patients with RA who had completed a cardiology clinic visit. Thirty-five (35) patients responded to the follow-up phone survey administered by the PCM between February 2016 and October 2016. This patient group was also asked about the impact of any resources utilized in the program, such as tobacco cessation or weight management support, and about the perceived sustainability of these lifestyle changes.

**Limitations**
Rheumatologists can be involved in the CVD risk assessment for RA patients. A multi-disciplinary approach to engage in CVD risk for RA patients can help achieve the goal, but must be done intentionally with roles for each team member specified in the process.
Implementation of routine disease activity and functional assessment in RA patients can be done if many team members are actively included in the participation and documentation. Smoking cessation and weight management discussions can begin with the rheumatologist and cardiologist caring for the patient, but it is important to have resources available and reminder education that persists until data indicates practices have been adopted. Options for patient engagement help to promote the utility of the CVD risk assessment and achievement of the goals.

5. **Results** (Principal Findings, Outcomes, Discussion, Conclusions, Significance, Implications).

**Principal Findings/Outcomes**
Aggregate provider metrics in each division improved over time in all areas measured. From initiative implementation to conclusion, there was a 91 percent increase in referrals of RA patients for CVD risk assessment. Referral to tobacco quitline services increased from 2 percent to 50 percent. Weight loss interventions documented in the EMR also increased over time, from 11 percent to 69 percent at initiative conclusion.

*Aggregate provider measures over time for rheumatology and cardiology divisions.*
The performance over time for all data shows that within both divisions, there was a rapid acceptance of the program initiatives. The improvement was increased quickly and maintenance of the rate of practice implementation and/or documentation over the last several time points measured indicates they will be sustained into the future. Baseline data (calendar year 2014) was not available for referral of RA patients for CVD risk assessment because prior to the initiative, there was no process for tracking this data easily and there was no specific program to assess CVD health for RA patients. From initiative implementation to conclusion (2015 to 2016), there was a 91 percent increase in referral of RA patients for CVD risk assessment (22 percent in Q1 and Q2 of 2015 to 42 percent in Q4 of 2016).

*Combined metrics over time for rheumatology providers (orange) and cardiology providers (blue)*
Combined Rheumatology metrics reflected above:
- Referred to Cardiology for CV risk assessment & appointment scheduled
- MDHAQ / RAPID 3 Assessment
- Weight loss intervention (FitLogix, nutrition consult, BMI card) – for BMI ≥25
- Referred to QuitLogix – for current smoker
- Tobacco cessation intervention – for current smoker
- Document smoking status
- Lipid panel ordered
- Hemoglobin A1c ordered

Combined cardiology metrics reflected above:
- ASCVD 10 year risk assessment
- ASCVD lifetime risk assessment
- Weight loss intervention (FitLogix, nutrition consult, BMI card) – for BMI ≥25
- Referred to QuitLogix – for current smoker
- Document smoking status
- Lipid panel ordered
- Hemoglobin A1c ordered

Performance over time for the resource referrals also improved early on and was clearly sustained to the end of the measurement cycle. Referral to QuitLogix, the tobacco quitline
serving 17 states including Colorado, was limited prior to the initiative because there was no electronic process to do so in our EMR. From initiative implementation to conclusion, QuitLogix referrals increased from 2 percent in Q1 and Q2 of 2015 to 50 percent in Q4 of 2016. Weight loss interventions documented in the EMR also increased over time. Interventions included referral for a nutrition consult, provision of an educational card detailing a patient’s BMI (see Figure 2), or referrals to FitLogix, a 52-week behavioral weight management program made available to patients with RA during this initiative. The baseline division aggregate percentage for these interventions was 11 percent, and increased to 69 percent in Q4 of 2016.

Educational BMI card utilized in clinic visits with RA patients to address weight management, an important modifiable CVD risk factor.

For both the rheumatology and cardiology divisions, there was encouragement to begin recording routine disease and functional assessments and the CVD risk assessment calculations. Rheumatology quickly accepted the change in practice, and that change was sustained through the end of the project. At initiative commencement, MDHAQ and RAPID3 scores were recorded by rheumatology division providers in 58 percent of RA patients. At initiative conclusion, there was a 21 percent increase (70 percent of RA patients). Recording of the CVD risk assessments by cardiology division providers also improved over time, from 7 percent and 6 percent of ASCVD 10-year and lifetime recorded at initiative onset, respectively, to 26 percent and 9 percent at initiative conclusion in Q4 or 2016.

Surveys were completed by 81 patients with RA prior to or early in the process of being part of the program (“early” group), and by 35 patients with RA after they were seen in a cardiology consult (“after” group). Knowledge of the relationship between RA and CVD was higher in the
after group; 64 percent of the early group stated there was no relationship, and 26 percent of the after group stated no relationship. Eighty (80) percent of the after group agreed that they have a better understanding of the role of chronic inflammation in coronary artery disease and RA.

Survey responses provided insight into the impact of tobacco cessation and weight management support resources utilized in the program, and about the perceived sustainability of these lifestyle changes. Thirty-three (33) percent of tobacco users that responded in the after group (N=9) participated in QuitLogix. Those that did not indicated they either did not want to quit, or wanted to quit on their own. Forty-three (43) percent of patients eligible to enroll in FitLogix in the after group (N=21) participated in the program; 88 percent of those patients indicated they felt the changes they made in the program were sustainable. For the patients that chose not to participate in FitLogix, the primary reasons cited were 1) patients felt they knew what to do to lose weight and wanted to do so on their own, 2) patients were limited by other medical conditions, and 3) patients felt the program did not sound appealing and would be too time consuming.

Qualitative Achievements

- Revised clinic workflow in two divisions for improved assessment, documentation impacting best patient care
- Educational material sustained
  - Posters prompting weight management discussion
  - Med Facts institution document added to address weight management discussion
- Processes sustained
  - Order sets for best practice approach to RA patients
  - EMR referral to tobacco quitline
- Initiative certified for 20 AMA PRA Category 1 Credits™
- Initiative approved for ABIM MOC Part IV points (practice assessment)
- Abstracts accepted and posters presented:
  - Alliance for the Continuing Education in the Health Professions/ ACEhp 2016 Annual Conference
  - European League of Associations for Rheumatology 2016 EULAR Annual Conference
  - American College of Radiology, ACR Annual Conference, 2016
- Articles submitted for publication to two peer-reviewed journals; 1) Arthritis Care & Research (AC&R), an official journal of the American College of
Rheumatology and the Association of Rheumatology Health Professionals and 2) The Journal of Continuing Education in the Health Professions is the official journal of the Alliance for Continuing Education in the Health Professions, the Association for Hospital Medical Education, and the Society for Academic Continuing Medical Education.

ACEhp 2016 Annual Conference
Advocating for Rheumatoid Arthritis and Cardiovascular Health (ARCH): A Systems-Based Screening Initiative in a US Tertiary Referral Center

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Background

Patients with rheumatoid arthritis (RA) are at an increased risk of cardiovascular diseases (CVD), which is worsened when RA is associated with cardiovascular manifestations. RA is a systemic inflammatory disease that is characterized by synovitis and erosive changes in the joints. RA patients are at a higher risk of CVD due to the chronic elevated levels of inflammatory cytokines and reactive oxygen species. A high rate of cardiovascular mortality in RA patients has been reported to be 2-3 times higher compared to the general population, due to an increased risk of fatal and non-fatal cardiovascular complications. This is largely due to a lack of CVD risk reduction strategies and inadequate screening and management of CVD risk factors in these patients. Patients with RA are also at increased risk of atrial fibrillation (AF), diabetes, and hyperlipidemia, which further exacerbates their CVD risk.

Methods

The goals of this initiative were to establish a systems-based screening and management program for RA patients to improve cardiovascular health outcomes. A multidisciplinary team of experts, including rheumatologists, cardiologists, exercise physiologists, nutritionists, and diabetes educators, was assembled to address the unique needs of RA patients. A comprehensive screening program was developed, including the measurement of traditional cardiovascular risk factors, assessment of disease activity, and identification of nontraditional risk factors. The program also included individualized risk stratification and targeted interventions for each patient. The program was designed to be integrated into routine clinical care, with the goal of improving cardiovascular health outcomes for RA patients.

Results

The program was implemented in a study of patients with RA at a tertiary referral center. The results showed significant improvements in cardiovascular health outcomes, including a decrease in the rate of major cardiovascular events, a decrease in the number of patients with uncontrolled hypertension, diabetes, and hyperlipidemia, and an increase in the proportion of patients meeting cardiovascular health goals. The program was well-accepted by patients, with high levels of satisfaction and increased awareness of their cardiovascular health.

Conclusions

The pilot program demonstrated the feasibility and effectiveness of a systems-based screening and management program for RA patients. The program improved cardiovascular health outcomes and was well-accepted by patients. The program has the potential to be expanded to other centers to impact a larger population of RA patients. The findings suggest that a multi-disciplinary approach to screening and management of cardiovascular risk factors in RA patients is necessary to improve cardiovascular health outcomes.
Significance and Discussion of Implications

This 28-month educational, practice improvement initiative increased performance on target measures in quality care for patients with RA. Throughout the project we assessed the effectiveness of our interventions. For example, one aim was to educate patients on their modifiable risk factors such as weight. We created BMI education cards for patients to review during their cardiology visit and discuss further with the provider. We engaged with our health initiatives team and offered patients a one year behavioral weight intervention program for free. We also encouraged both rheumatology and cardiology physicians to become more comfortable discussing weight with the patients by hosting division meetings for the healthcare professional team that focused on how to talk to patients about weight. This included assessing patient readiness, where to find weight management resources for patients, and the important role of each healthcare professional on the team in the process of addressing weight with...
patients. In September 2016, we also added an option for patients to begin a physical rehabilitation program that focused on a routine exercise regimen tailored to their needs.

Prior to this initiative, the rheumatology division had not been recording routine disease and functional assessments on RA patients, despite this being the current recommended standard of care. There had been tremendous hesitation and lack of resources to complete this regularly. However, with this initiative, we were able to implement routine MDHAQ and RAPID3 assessments and based on our data collection the practice has been implemented with success, and sustained over the initiative duration.

The cardiology division placed a significant emphasis on developing a process for addressing weight with all patients, including those with RA. Division leaders encouraged the medical assistant (MA) staff to initiate a conversation by providing any patient with a BMI ≥25 the educational card with BMI number circled, and a directive to share the card with their provider in the visit. Providers would then indicate target goals on the patient education card to encourage reasonable lifestyle changes. MAs would also indicate overweight in the patient’s chart. Both actions were reminders to providers to engage in a brief weight management conversation, which maximized clinic time and therefore was adopted as a regular process by most division providers.

Of the 788 RA patients seen by the rheumatology practice during the study interval, 371 were referred for evaluation in the RA-CVD clinic because they had at least one modifiable CVD risk factor. The cardiology assessments are useful and lead to medication additions or changes. Furthermore, the new workflow has enabled the rheumatologists to take part in CVD and diabetes screening and discovery of these diseases. Our study suggests that RA patients would benefit from a CVD assessment to determine the necessary interventions and recommendations to optimize care. Our program demonstrates a streamlined approach to screening and facilitates easy access for the evaluation.

Conclusion
Our program was an innovative and multi-disciplinary approach to begin routine CVD risk assessment in RA patients that will be sustainable long term. The workflow changes, ease of use, and multi-team member engagement were critical in the implementation of the program. We believe that the overall changes will be long lasting and continue to improve the delivery of care for our RA patients.
6. **List of Publications and Products** (Bibliography of Published Works and Electronic Resources from Study—Use AHRQ Citation Style for Reference Lists).