HHS Public Access

Author manuscript

Clin Rheumatol. Author manuscript; available in PMC 2015 April 06.

Published in final edited form as:

Clin Rheumatol. 2010 April ; 29(4): 363–367. doi:10.1007/s10067-009-1314-9.

Differences between the United States and the United Kingdom in the Treatment of Rheumatoid Arthritis: Analyses from a Hand Arthroplasty Trial

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Abstract

Purpose—Previous studies have found differences in rheumatoid hand surgical practice around the world. The specific aim of this study is to compare baseline characteristics of rheumatoid arthritis (RA) patients in the United States (US) and the United Kingdom (UK) that may be influenced by the two different health care systems.

Methods—Patients were recruited from 3 sites (2 in the US and 1 in England) as part of a National Institutes of Health funded study to examine outcomes of silicone metacarpophalangeal joint (MCPJ) arthroplasty in RA patients. Outcomes measurements included biomechanical assessments (grip strength, pinch strength, and mean ulnar drift and extensor lag at the MCPJs of

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DISCLOSURES:

Kevin C. Chung: Supported in part by a grant from the National Institute of Arthritis and Musculoskeletal and Skin Diseases (R01 AR047328) and a Midcareer Investigator Award in Patient-Oriented Research (K24 AR053120) (to Dr. Kevin C. Chung).
Sandra V. Kotsis: NONE
David A. Fox: NONE
Marian Regan: NONE
Frank D. Burke: NONE
E. F. Shaw Wilgis: NONE
H. Myra Kim: NONE

all four fingers), a health-related quality of life questionnaire (the Michigan Hand Outcomes Questionnaire), and a medication assessment.

Results—American patients have a significantly higher income level ($p<0.001$) and have completed higher levels of education ($p<0.001$) than British patients. There were no significant differences in terms of self-reported disease severity or deformity at the MCPJs. RA patients in the US are more likely to take biologic medications ($p<0.001$), steroids ($p=0.02$), and Cox-2 inhibitors ($p=0.02$). Patients in the UK are significantly more likely ($p<0.001$) to take Non-Steroidal Anti-Inflammatory Drugs.

Conclusions—There are differences in the demographic characteristics and medication use of RA patients with hand deformities in the US and UK. These differences may be influenced by the private versus socialized health care systems. However, the perception of hand disease severity in participants in this study appears to be comparable between these countries.

Keywords

Rheumatoid Hand; United States; United Kingdom; Healthcare Systems; the Michigan Hand Outcomes Questionnaire

Previous studies have indicated that there are differences in opinion between rheumatologists and hand surgeons regarding the effectiveness of rheumatoid hand surgery procedures.[1, 2] These differences in opinion, caused by a lack of high level evidence for rheumatoid hand surgery procedures, are accompanied by disparate practice patterns among various states in the United States.[3, 4] Differences in surgical practice patterns are also found across the world, based on a qualitative assessment of the management of the rheumatoid hand in the United States, Europe, and Asia.[5] Some of the practice differences are related to the diverse healthcare systems found in the countries studied. Medication is an important component in the treatment of rheumatoid arthritis (RA). Differences in rheumatoid medication use have been found at an international level. For example, the use of TNF-inhibitors in the United States is about 3 times that of Europe.[6]

In this study, we will compare the baseline patient characteristics (demographics, disease severity, joint deformity, and medication use) between the US and the UK RA patients enrolling in an international multi-center outcomes study on silicone metacarpophalangeal joint (MCPJ) arthroplasty. The purpose of this study is to determine whether there are differences in baseline patient characteristics and if these could be influenced by the differing healthcare systems of the US and UK.

Methods

Patients are recruited as part of a National Institutes of Health-funded study (R01-AR047328) to investigate outcomes of silicone MCPJ arthroplasty in RA patients with severe hand deformities marked by ulnar subluxation and extension lag. This is a prospective cohort study in which patients choose whether they would like to enroll into a surgical group (cases) to undergo silicone MCPJ arthroplasty or a medical group (controls) that does not undergo silicone MCPJ arthroplasty. Both cases and controls are followed for regular medical care by their treating rheumatologists. The study protocol has been shared

previously.[7] This study is a collaborative, international effort between rheumatologists and hand surgeons at three centers: The University of Michigan (Ann Arbor, Michigan), Curtis National Hand Center (Baltimore, Maryland), and Pulvertaft Hand Centre (Derby, England). These study sites were chosen because they are all comprehensive centers dedicated to the treatment of upper extremity disorders with a wide referral base. The two US sites are public facilities that accept patients with all types of medical insurance or none at all. All have a large rheumatology program, which enhances patient accrual. In addition, the heterogeneous racial composition at these three centers ensures that minority groups are represented. At each center, potentially eligible patients are identified by their treating rheumatologist as having RA, being between the ages of 18–80, and having a requisite degree of deformity at the MCPJs (the sum of the average MCPJ ulnar drift and average MCPJ extensor lag equal to or greater than 50). Patients are then referred to the hand surgeon at each respective study location for the hand consultation. If a patient is found to be eligible for the study, he/she is enrolled and chooses whether to be a case or a control subject. Baseline measurements are taken at study entry and identical measurements are again taken at the pre-determined follow-up periods. Measurements include biomechanical assessments (grip strength, pinch strength, and mean ulnar drift and extensor lag at the MCPJs of all four fingers), a health-related quality of life questionnaire (the Michigan Hand Outcomes Questionnaire), and a medication intake assessment. The biomechanical measurements are completed by a trained hand therapist, the patient him/herself completes the questionnaire, and the medication assessment is completed by a trained research assistant. All data shown are for the baseline period only.

The Michigan Hand Outcomes Questionnaire is a validated questionnaire that assesses 6 domains related to patients' hands: function, ability to complete activities of daily living, work, pain, aesthetics, and satisfaction.[8] The overall score is the mean of these 6 combined domain scores. The MHQ has been validated and shown to be responsive for RA conditions.[9–11]

The medication assessment collects information for different drug categories: Biologics, Cytotoxic Disease-Modifying Anti-Rheumatic Drugs (DMARDs), Non-Cytotoxic DMARDs, Steroids, Cox-2 inhibitors, and Non-Steroidal Anti-Inflammatory Drugs (NSAIDs). Because some patients take medications from more than one of these groups, they are counted in all applicable groups. All tables represent the medications taken at baseline.

In this analysis, we combined the patients from the University of Michigan and the patients from the Curtis National Hand Center to represent the "US" patients and compared them to patients from the Pulvertaft Hand Centre who represent the "UK" patients. Statistical analyses included chi-square tests to test for differences in proportions and two-sample t-tests to test for differences in means. Statistical significance was set at 0.05.

Results

108 patients were recruited in the US and 55 patients were recruited in the UK. This series is the largest cohort with uniform RA MCPJ disease collected in the world thus far. The

demographic data of these patients are shown in Table 1. The American and British patients have similar baseline demographic data in terms of age and gender. There is a significant difference in the race of the participants ($p<0.001$), with the US having more non-Caucasian patients; however, some patients did not report their race (an optional question on the study questionnaire). American patients do have a significantly higher income level ($p<0.001$) and have completed higher levels of education ($p<0.001$) compared with the British patients. The income and education questions were also optional in our questionnaire. We had a non-response rate of 9.2% (15/163) for income and 6.1% (10/163) for education. Non-response for income in other studies using mailed questionnaires has ranged from 8.8%–22.3%.[12–13] The missing responses for education and income are not likely to affect our results because the percentages of missing responses are low and there are large differences between the US and UK in these two demographic questions.

We compared cases versus controls in the US and UK for each medication type and found that there were no significant differences between the two study groups. Thus, case and control data were combined for each country. There was no significant difference between the proportions of cases in the UK (51%; 28/55) and the US (39%; 42/108) ($p=0.18$). In Table 2, we compared the patients in the US and UK for disease severity and joint deformity using the Michigan Hand Outcomes Questionnaire and various biomechanical measures. We did not find significant differences between the patients in these two countries for any of these disease severity or joint deformity measures.

Table 3 illustrates that there were significant differences in the proportions of patients taking certain medications in the US and UK. Rheumatoid patients in the US are more likely to take biologic medications ($p<0.001$), steroids ($p=0.02$), and Cox-2 inhibitors ($p=0.02$) compared to patients in the UK. Patients in UK are significantly more likely ($p<0.001$) to take NSAIDs compared to RA patients in the US. There were no significant differences in the use of cytotoxic ($p=0.23$) and non-cytotoxic DMARDs ($p=0.45$). In general, US RA patients in this study received more intensive medications than the UK patients.

Discussion

In our study, RA patients in the US were significantly more likely to have completed higher levels of education and have higher income than patients in the UK. A study of total knee arthroplasty comparing patients with osteoarthritis in the US and UK found similar results.[14] These findings may be related to the health care systems in these two countries. The US primarily has private health insurance. Although the US has the publicly-funded Medicare program for persons aged 65 and older, the National Health Service (NHS) in the UK has no age criterion for their health care system.[15] Patients of higher socioeconomic status who can afford private health insurance in the US have more access to RA care. Because the mean age of US patients in our study was 60.6 years, most of these patients would not yet be covered under the Medicare system and would have to fund their own medical care using another type of insurance or paying out-of-pocket. In contrast, the NHS is open to all English citizens and thus all patients, regardless of socioeconomic status, have access to care.

Compared to the NHS, visits, medications, and referrals to specialists in the US are less likely to be rationed. One study found that patients with migraine in the US had more visits to a general practitioner for their condition and were more likely to be referred to a specialist compared to patients in the UK.[16] In the UK, "access to specialists is only through referral by a general practice 'gatekeeper'."[17] We did not have data on the duration of RA at the time of study referral for any of the patients, but our study found that RA patients in the US and UK reported similar disease severity and had equal deformity at the MCPJs at the time that they enrolled in this cohort study. Thus, the perception of disease status and the medical care that is received by RA patients appears to be comparable in these two countries.

Our study also found that 47% of American patients versus 16% of British patients take some type of biologic medication. Biologic medications, which include TNF-inhibitors, were first introduced in 1998. Approximately 70% of the use of TNF-inhibitors is for RA.[6] These medications have proven to be very costly, with the estimated wholesale monthly costs of these medications in the US, without administration cost, ranging from $906 to $12,820.[18] The treatment costs of TNF inhibitors have been estimated to be €10,000–15,000 per patient per year ($13,000–19,000). In contrast, traditional DMARD treatment is estimated at €500–1,500 ($650–1900).[19] Much of the costs of RA care is driven by the use of biologic medications, with 90% of patients being treated with conventional drugs, but 90% of costs being due to biologics.[6] "The use of medicines has come under considerable scrutiny within the past decade" by the NHS where medications comprise 15% of all NHS costs.[20] In 1999, the National Institute for Health and Clinical Excellence was established in the UK to provide "health care professionals in England and Wales with advice on securing the highest attainable standards of care for NHS patients."[21] This includes appraisals of pharmaceuticals for their clinical- and cost-effectiveness.[22] There has been a drive to encourage general practitioners in the UK to ration their number of prescriptions.[23]

Similar results in terms of diverse medication uptake between countries have been found with other diseases. A study of coronary heart disease and depression found that US internists were significantly more likely than general practitioners in England to prescribe medications for both of these illnesses.[24] Furthermore, in a study of hypertension prevalence and treatment, it was found that 52.5% of hypertensive persons aged 35–64 in the United States were taking medications compared to 24.8% of hypertensive persons of the same age in England.[25]

The lack of specific treatment guidelines may also affect medication prescribing. Most reports have recommended the TNF-inhibitors etanercept and infliximab for patients who have failed at least 2 or 3 standard DMARD therapies.[26] However, RA patients in Scandinavia can receive TNF-inhibitors even with moderate to low disease activity.[6] Some countries have a formalized decision-making process, at times including a cost-effectiveness analysis for making national reimbursement decisions for medications whereas other countries have no specific guidelines before allowing a medication to be prescribed.[26] A report from the Canadian Coordinating Office for Health Technology Assessment concludes that "neither etanercept nor infliximab seem to be cost-effective under commonly accepted criteria."[27]

This study is limited by the generalizability of the study sample. Although our patients come from 3 large medical centers in the United States and England, they may not be representative of all RA patients or their medication use. We were unable to randomize patients to the surgical versus non-surgical cohorts due to preferences by the RA patients and participating surgeons and rheumatologists. More British patients in our study chose to enroll into the surgical cohort compared to American patients (51% versus 39%), but this difference was not statistically significant. The enrolled study subjects represent consecutive patients who presented to the respective centers and potential selection bias should not be a concern for this sample. The patients in our study were chosen because they had hand deformities and thus their RA may be more severe, affecting their medication use. Because the patients in the US and UK had similar hand deformities, this would not affect our comparison of other baseline characteristics. Furthermore, not all patients in the US have access to tertiary care facilities, such as the two represented in our study. Although these facilities accept patients with any type of insurance or none at all, patients who live in rural areas or those without health insurance may have physical or financial difficulty traveling to one of these facilities and enrolling in our study. Our study does not address the issue of whether the greater use of biologics in the US compared to the UK prevents hand deformities in RA, but it does provide evidence that progression of deformities to a stage that merits consideration of surgical correction can occur in at least some patients who are treated with biologic medications. Structural endpoints in RA clinical trials have typically been radiographic indices of joint space narrowing and erosion, without measurement of hand deformities or objective documentation of hand function.

In conclusion, the type of health care system does seem to influence the demographic characteristics of RA patients as well as the medications that they receive. When presenting the outcomes data of RA patients with hand diseases, researchers must consider the influential effect of the healthcare system of the country to understand the potential confounding effect of education, income, and medication in the treatment outcomes.

Acknowledgments

The authors acknowledge the assistance of the following participants of the SMPA Study Group: Heidi Reichert, MA (University of Michigan), Lorraine A. Zellers, CRC (Curtis National Hand Center), Mary J. Bradley, MSc (Pulvertaft Hand Centre) and the referring rheumatologists in Michigan, Derby and Baltimore. The authors also greatly appreciate the assistance of Jeanne M. Riggs, OTR, CHT, Kurt Hiser, OTR, Carole Dodge, OTR, CHT, Jennifer Stowers, OTR, CHT, Cheryl Showerman, OTR, Jo Holmes, OTR, Victoria Jansen, PT and Helen Dear, OTR in taking measurements for the study patients. The PI appreciates the kind assistance of the Observational Study Safety Monitoring Board convened by Dr. James S. Panagis, Medical Officer, NIAMS. The members of the Board are Andrew N. Pollak, M.D., University of Maryland, Chair; Philip E. Blazar, M.D., Brigham and Women's Hospital; William F. Rosenberger, Ph.D., George Mason University; Nicholas B. Vedder, M.D, University of Washington; Richard J. Looney, M.D, University of Rochester.

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Table 1

United States (US) versus United Kingdom (UK) in Baseline Patient Demographic Data

	US	UK	p-value
Age (Mean (Range))	60.5 (22–80)	62.0 (44–75)	0.30
Female (N (%))	82 (76)	37 (67)	0.27
Caucasian (N (%))	81 (75)	54 (98)	<0.001
≥ **High School Education (N (%))**	92 (85)	17 (31)	<0.001
Income < $50,000/year (N (%))	61 (56)	46 (84)	<0.001

* Race, education, and income are optional questions that some patients chose not to answer. Numbers missing are: race (n=11), education (n=10), and income (n=15).

Table 2

United States (US) versus United Kingdom (UK) in Disease Severity and Joint Deformity at Baseline

Outcome	US (mean ± standard deviation)	UK (mean ± standard deviation)	p-value
Michigan Hand Outcomes Questionnaire Overall Score	49 ± 21	48 ± 20	0.78
Grip strength (kg)	6.8 ± 7.3	8.4 ± 5.4	0.10
2-point pinch strength (kg)	2.9 ± 1.6	2.6 ± 1.4	0.29
Ulnar drift (degree)	34 ± 16	38 ± 13	0.11
Extensor lag (degree)	54 ± 23	55 ± 19	0.76

Table 3

United States (US) versus United Kingdom (UK) in Medication Use at Baseline

Medication Type	US N (%)	UK N (%)	p-value
Biologics	50 (47)	9 (16)	<0.001
Cytotoxic DMARDs	67 (63)	40 (73)	0.23
Non-Cytotoxic DMARDs	31 (29)	13 (24)	0.45
Steroids	42 (40)	12 (22)	0.02
Cox-2 Inhibitors	14 (13)	1 (2)	0.02
NSAIDs	23 (22)	33 (60)	<0.001

DMARDs=Disease Modifying Anti-Rheumatic Drugs

NSAIDs=Non-Steroidal Anti-Inflammatory Drugs

*Some patients take medications from more than one medication type