# Nurse-led Care for Patients with Rheumatoid Arthritis: A Systematic Review of the Effect on Quality of Care

Stephanie Garner, Elena Lopatina, James A. Rankin, and Deborah A. Marshall

***ABSTRACT.*** ***Objective.*** In the nurse-led care (NLC) model, nurses take on the primary responsibility for patient management. We systematically assessed the effect of NLC for patients with rheumatoid arthritis (RA) on multiple dimensions of quality of care from the Alberta Quality of Care Matrix for Health.

***Methods.*** We searched MEDLINE, EMBASE, and CINAHL from 1950 to January 2015. English-language studies were included if they reported on NLC for patients with RA and assessed 1 or more dimensions of quality (effectiveness, acceptability, efficiency, accessibility, appropriateness, and safety). Data were synthesized using narrative analysis.

***Results.*** We included 10 studies. The NLC models varied in terms of nurses' professional designation (clinical nurse specialists or nurse practitioners); however, their role in the clinic was fairly consistent. Disease activity was the most common measure of effectiveness, with NLC being equal (n = 2) or superior (n = 3) to the comparator. NLC was equal (n = 1) or superior (n = 5) versus the comparator in terms of patient satisfaction (i.e., acceptability of care). NLC was equally safe as other models (n = 2). Regarding efficiency, results varied across studies (n = 6) and did not allow for conclusions about models' cost-effectiveness. In qualitative studies, patients found NLC to be superior in terms of accessibility [i.e., continuity of care (n = 3) and appropriateness measured with education and support (n = 4)]; however, no quantitative measures were found.

***Conclusion.*** NLC for patients with RA is effective, acceptable, and safe as compared with other models. However, current evidence is insufficient to draw conclusions about its efficiency, accessibility, and appropriateness. (First Release February 15 2017; J Rheumatol 2017;44:757–65; doi:10.3899/jrheum.160535)

*Key Indexing Terms:*
RHEUMATOID ARTHRITIS ARTHRITIS HEALTH SERVICES NEEDS AND DEMAND

Rheumatoid arthritis (RA) is a chronic disease and its prevalence is increasing because of aging and increasing survival of patients[1]. This is escalating the demand for rheumatology care. The traditional model of care for patients with RA primarily relies on rheumatologists. A shortage of rheumatologists nationwide is stressing the healthcare system's capacity[2,3,4]. This resource gap necessitates that we reevaluate the traditional model of care and review alternatives.

Internationally, healthcare authorities have addressed this shortage by introducing models that rely on other healthcare providers in expanded clinical roles (e.g., physiotherapists, nurses, occupational therapists, and pharmacists). One of these models, nurse-led care (NLC), has been defined as a practice in which nurses (e.g., registered nurses, clinical nurse specialists, or nurse practitioners) working in collaboration with physicians and other team members have their own patients for whom they provide services such as monitoring, educating, and support[5].

A previous systematic review of 4 randomized controlled clinical trials (RCT) of NLC focused on disease activity and patient satisfaction, which are measures of effectiveness and acceptability of care[5]. However, complex healthcare interventions such as NLC affect multiple dimensions of quality[6,7]. Moreover, the need for the mix-method approach in the evaluation of complex healthcare interventions (e.g., NLC) has been previously discussed in the literature because of the limited ability of RCT to establish the effectiveness of such interventions[7,8]. To our knowledge, the effect of NLC on multiple dimensions of quality of care incorporating various study designs has never been systematically assessed before.

*From the Department of Medicine, McMaster University, Hamilton, Ontario; Department of Community Health Sciences, Cumming School of Medicine, University of Calgary; Faculty of Nursing, University of Calgary; Department of Medicine, Cumming School of Medicine, University of Calgary; McCaig Institute for Bone and Joint Health; Alberta Bone and Joint Health Institute, Calgary, Alberta, Canada.*

*Dr. Lopatina's work was supported by the Arthur J.E. Child Chair in Rheumatology Outcomes Research. D.A. Marshall's work was supported by a Canadian Institutes of Health Research Canada Research Chair in Health Services and Systems Research and the Arthur J.E. Child Chair in Rheumatology Outcomes Research.*

*S. Garner, MD, MSc, Department of Medicine, McMaster University; E. Lopatina, MD, MSc, Department of Community Health Sciences, Cumming School of Medicine, University of Calgary; J.A. Rankin, NP, PhD, Faculty of Nursing, University of Calgary; D.A. Marshall, PhD, Department of Community Health Sciences, Cumming School of Medicine, University of Calgary, and Department of Medicine, Cumming School of Medicine, University of Calgary, and McCaig Institute for Bone and Joint Health, and Alberta Bone and Joint Health Institute.*

*Address correspondence to Dr. D.A. Marshall, University of Calgary, Health Research Innovation Centre (HRIC) – 3C56, 3280 Hospital Drive NW, Calgary, Alberta T2N 4Z6, Canada. E-mail: damarsha@ucalgary.ca*

*Accepted for publication December 21, 2016.*

Personal non-commercial use only. The Journal of Rheumatology Copyright © 2017. All rights reserved.



Downloaded on April 19, 2024 from www.jrheum.org

The objective of our systematic literature review was to assess the effect of NLC on the quality of care in patients with RA using a comprehensive framework for quality of care: the Alberta Quality of Care Matrix for Health (AQCMH)[9].

## MATERIALS AND METHODS

The protocol for the review was registered with PROSPERO (identification number CRD42015024430X). Ethics approval was not required in accordance with the policy of the Conjoint Health Research Ethics Board at the University of Calgary, Calgary, Alberta, Canada. A literature search (Supplementary Tables 1A–C are available from the authors on request) was performed using the electronic databases MEDLINE, EMBASE, and CINAHL from 1950 to January 2015. The reference lists of articles included in the review were hand-searched and experts in the field were consulted to identify other relevant literature.

All articles were independently screened for eligibility by 2 reviewers (SG, EL). Articles were included in the systematic review if they reported on original data from an original study, assessed NLC for patients with RA, reported on at least 1 measure of quality of care, and were available in English. The κ statistic, calculated using Stata 11 software, was used as a measure of interrater agreement for the full-text review[10]. The National Institute for Health and Care Excellence Methodology checklists for qualitative studies[11] and RCT[12], and the Economic Evaluation study quality checklist by Drummond and Jefferson[13] were used to assess the quality of studies.

*Data synthesis and analysis: defining quality of care outcome measures*. We used the AQCMH, which was developed from the United States Institute of Medicine Report "Envisioning the National Health Care Quality Report" and is recognized as a comprehensive framework for assessing quality of care[9,14]. The AQCMH defines quality of care in 6 dimensions: acceptability, accessibility, appropriateness, effectiveness, efficiency, and safety[9].

We identified all measures of quality of care used as outcomes in the studies. Subsequently, using the definitions for the AQCMH dimensions, we mapped each outcome measure to the dimensions of quality (Table 1)[9,15,16,17]. To assess change in quality in each dimension, we counted the number of studies reporting NLC being superior, equal, or inferior to the comparator. When assessing magnitude of change, only statistically significant differences in quantitative measures, as defined by p values ≤ 0.05 and/or 95% CI/OR, were considered meaningful evidence of a change. However, differences in quantitative measures that were not statistically significant were also synthesized and reported with a statement indicating that the observed difference was not statistically significant.

## RESULTS

Out of 2018 citations identified, 17 articles were selected for analysis (Figure 1). The agreement on article selection for the full-text review was moderate (κ statistic = 0.53)[18]. The 17 publications (10 RCT, 4 qualitative studies, and 3 economic evaluations; Table 2[19-28,29,30,31,32,33,34,35,36]) represented 10 unique studies. According to design-specific quality assessment checklists (Supplementary Tables 2A–C are available from the authors on request), 40% and 60% of RCT, 100% and 0% of qualitative studies, and 100% and 0% of economic evaluations were of high and moderate quality, respectively.

*Description of models*. The implementation of the model varied. In every model, nurses provided patient education, and in all models except for the one implemented by the Tijhuis group[32,33,34,35], nurses took on the responsibility for toxicity monitoring. The nurse was often responsible for clinical assessment[19,20,21,22,26,27,28,29,30,36] and making referrals[19,20,21,22,31,32,33,34,35]. Two models specified that the nurse was to suggest[29] or make medication changes[30]. While the professional designation of the nurses differed from study to study, all had rheumatology experience except for Bala, *et al*'s study, which involved both nurses with basic training and nurses who specialized in rheumatology[26].

*Effectiveness*. The 28-joint Disease Activity Score (DAS28)[15] was used as an effectiveness measure in 5 studies[19,20,29,30,31,33]. Hill, *et al* reported NLC being superior to trainee rheumatologist–led care (RLC), but did not provide the mean DAS28 scores, making these data hard to interpret[29]. The *AMBulant opfølgning for patienter med stabil Reumatoid Artrit* (AMBRA) group reported no statistically significant difference between NLC and RLC at 12 months, but found NLC to be superior at 24 months ($p < 0.05$)[19,20]. Using a noninferiority design, Ndosi, *et al* found NLC noninferior to RLC[30]. Ryan, *et al* also found NLC superior with patients in the NLC arm, who showed improvements in their DAS28 scores compared with traditional care (–0.9 vs 0.1,

*Table 1*. Outcome measures reported in the included studies mapped with the dimensions of quality of the Alberta Quality Matrix for Health[9].

| Dimension | Definition | Examples of Outcome Measures |
|---|---|---|
| Effectiveness | Health services are provided based on scientific knowledge to achieve desired outcomes. | DAS28 (n = 5), HAQ (n = 4), pain (n = 4), fatigue (n = 3), morning stiffness (n = 3), AIMS (n = 3), self-efficacy (n = 2) |
| Acceptability | Health services are respectful and responsive to user needs, preferences, and expectations. | Satisfaction (n = 7), clinic attendance (n = 1) |
| Efficiency | Resources are optimally used in achieving desired outcomes. | No. conferrals (n = 4), referrals (n = 4), appointment length (n = 3), cost (n = 4) |
| Safety | Mitigate risks to avoid unintended or harmful results. | Out-of-range blood tests (n = 2), adherence to required monitoring (n = 2), healthcare contacts (n = 5), hospitalizations (n = 4), death (n = 2) |
| Appropriateness | Health services are relevant to user needs and are based on accepted or evidence-based practice. | Relationship with care provider (n = 5), holistic care (n = 3), provision of information (n = 5) |
| Accessibility | Health services are obtained in the most suitable setting in a reasonable time and distance. | Continuity of care (n = 3), access to care (n = 3) |

n: no. studies reporting an outcome of interest (note: not no. publications); DAS28: 28-joint Disease Activity Score[15]; HAQ: Health Assessment Questionnaire[16]; AIMS: Arthritis Impact Measurement Scale[17].

Personal non-commercial use only. The Journal of Rheumatology Copyright © 2017. All rights reserved.



Downloaded on April 19, 2024 from www.jrheum.org

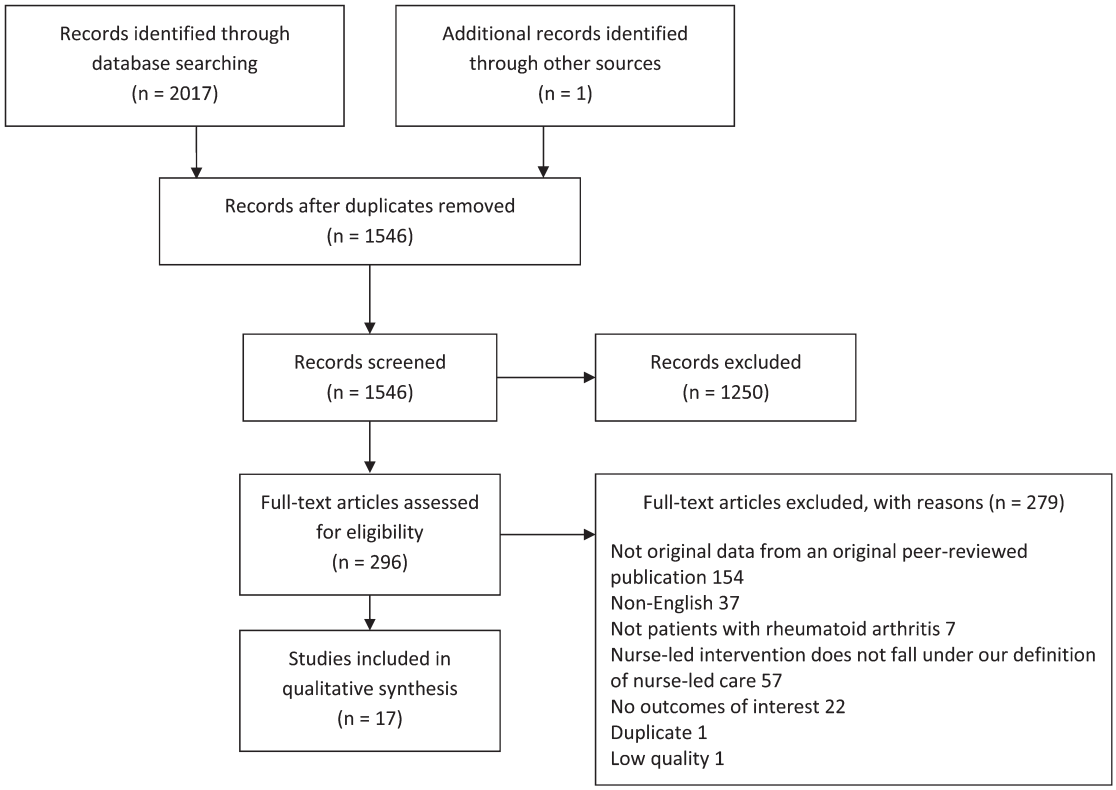


*Figure 1*. Flow diagram of preferred reporting items for systematic reviews and metaanalyses.

$p < 0.05$)[31]. In the study by Tijhuis, *et al*, which compared NLC to inpatient and day-patient team care, patients receiving NLC had improvements in their DAS28 scores (mean decrease of 1.1, $p < 0.001$); however, this was not compared with traditional care[33].

The Health Assessment Questionnaire (HAQ)[16] was used in 4 studies[19,20,30,32,33,36]. The AMBRA study found no difference between NLC and RLC at 12 months or 24 months[19,20]. This was consistent with work by Ndosi, *et al*, which found that NLC was noninferior to RLC[30]. The Tijhuis, *et al* publications demonstrated that HAQ scores improved compared with baseline at 12 months (mean change 0.17, $p < 0.05$) and 24 months (mean change 0.20, $p < 0.01$) in patients receiving NLC, but this was minimally clinically relevant[32,33]. At 12 months of followup, Watts, *et al* noted higher HAQ scores in patients receiving NLC compared with patients receiving RLC[36], but they were not clinically significant.

Pain was measured using a Likert or visual analog scale (VAS) in 4 studies[19,20,27,29,30]. Three authors found NLC superior to RLC ($p < 0.05$)[27,29,30] and the AMBRA study found no statistically significant difference between NLC and RLC at 12 months or 24 months[19,20].

Fatigue was reported in 3 studies[19,20,29,30]. Hill, *et al* measured fatigue in minutes and found patients with NLC had less fatigue than those with trainee RLC ($p = 0.02$)[29]. Ndosi, *et al*, using a fatigue VAS, found NLC superior to RLC ($p < 0.001$)[30]. However, the AMBRA study, again using a VAS, found no statistically significant difference between NLC and RLC at 12 months or 24 months[19,20].

In the work by Hill, *et al* and Ndosi, *et al*, NLC was inferior regarding morning stiffness compared with RLC or trainee RLC, but this was only statistically significant in the work by Ndosi, *et al* (RLC change 6.67 vs NLC –5.98, $p = 0.01$)[29,30]. Earlier work by Hill, *et al* had shown no statistically significant difference between NLC and RLC in this outcome[27].

Three studies included the Arthritis Impact Measurement Scale as an effectiveness measure and none of those studies found a difference between NLC and RLC or trainee RLC[17,27,29,31].

In the AMBRA study, NLC was found to be superior to RLC regarding self-efficacy at 12 months, but this was not statistically significant at 24 months[19,20]. Arvidsson, *et al*'s phenomenographic study noted that NLC patients were empowered to solve their own problems[25].

*Acceptability*. When NLC was compared with RLC or trainee RLC using a satisfaction VAS questionnaire or interviews, NLC was found to be superior in 3 studies[22,28,29] and no difference in 1 study[30]. A survey by Arthur and Clifford found that NLC had the most effect on satisfaction with continuity of care, general satisfaction, the provision of information, and empathy[23,24]. In Tihjuis, *et al*, patients were less satisfied with NLC, but this was compared to day-patient or inpatient

Personal non-commercial use only. The Journal of Rheumatology Copyright © 2017. All rights reserved.



Downloaded on April 19, 2024 from www.jrheum.org

*Table 2*. Characteristics of included studies.

| Study | Country | Type of Study | Size, n | Patients | Intervention: Visit Frequency | Intervention: Nurse Experience | Intervention: Role of Nurse | Intervention: Role of Physician | Comparator | Duration | Dimension Measured |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AMBRA | | | | | | | | | | | |
| Primdahl, *et al*[19] | Denmark | RCT[19,20] | 287[19,20,21] | RA for minimum of 18 mos. No changes to DMARD in past 3 mos and DAS28 < 2.8 and HAQ < 3.2. No biologic therapy patient[19,20,21] | 3-h information session, then randomized to NLC (30-min visit every 3 mos), shared care (yearly review with rheumatologist, regular followup with GP), or RLC (20- to 30-min visit every 3–12 mos) | Rheumatology outpatient nurse | Patient followup including joint assessment, reviewing blood work, HAQ, referrals (GP/PT/OT), and teaching self-management techniques | Rheumatologist available for referral. If significant changes in HAQ or DAS28, referral to rheumatologist | Rheumatologist (or resident), GP | 12 mos[19] | Effectiveness, acceptability, safety[19,20] |
| Primdahl, *et al*[20] | | | | | | | | | | 24 mos[20] | |
| Sørensen, *et al*[21] | | Economic evaluation[21] | | | | | | | | 24 mos[21] | Efficiency[21] |
| Primdahl, *et al*[22] | | Qualitative (focus group)[22] | 33[22] | Patients participating in AMBRA study who had attended clinic for > 1 yr[22] | | | | | | | Acceptability, appropriateness[22] |
| Arthur and Clifford[23,24] | UK | Qualitative (survey) | 80 | RA recently started receiving DMARD and whom nurse had followed for at least 3 mos | Not reported | Rheumatology nurse specialist | Monitoring toxicity, education, and support. Once stabilized on medication, discharged back to GP for monitoring | Available if concerns | GP | N/A | Acceptability |
| Arvidsson, *et al*[25] | Sweden | Qualitative (phenomenography) | 16 | RA receiving DMARD attending NLC | 30 mins 1–4× per yr | Rheumatology nurse | Education, support, administration of biologics/DMARD, and toxicity monitoring | Guide and advise for treatment and referral | Patients previous experience with other model of care | N/A | Appropriateness |
| Bala, *et al*[26] | Sweden | Qualitative (thematic content analysis) | 18 | RA with at least 3 contacts with NLC | Not reported | Rheumatology nurse and nurse with basic training | Patient followup, monitoring of disease activity, initiation, and monitoring of DMARD/biologics, education, support, and consideration of mental well-being. Telephone hotline | Not reported | Patients previous experience with other model of care | N/A | Acceptability, appropriateness |
| Hill, *et al*[27], and Hill[28] | UK | RCT | 70 | RA who had been seen at least 3× previously at clinic and diagnosis and management plan established | 6 visits in 12 mos | Nurse practitioner (rheumatology) | Followup, monitoring, education, and support | Available for conferrals or referrals | Rheumatologist | 12 mos | Effectiveness safety[27]; acceptability[28] |





Personal non-commercial use only. The Journal of Rheumatology Copyright © 2017. All rights reserved.

Downloaded on April 19, 2024 from www.jrheum.org

*Table 2*. Continued.

| Study | Country | Type of Study | Size, n | Patients | Intervention | | | | Comparator | Duration | Dimension Measured |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Visit Frequency | Nurse Experience | Role of Nurse | Role of Physician | | | |
| Hill, *et al*[29] | UK | RCT | 80 | RA who had been seen at least 3× previously at clinic | 6 visits in 12 mos | Nurse practitioner (rheumatology) | Followup including assessing disease status, suggesting management changes, referrals as needed to physicians and allied health professionals, and addressing patients' physical, social, and knowledge deficits | Available for conferrals or referrals | Junior hospital doctor undergoing training in rheumatology | 12 mos | Acceptability, effectiveness, efficiency, safety |
| Ndosi, *et al*[30] | UK | RCT including economic evaluation | 181 | RA who were not under the care of involved practitioners, concomitant disease, or awaiting surgery | Five visits per yr. Intervention arm 30-min appointments, control arm 15 min | Clinical nurse specialist (rheumatology) | Assessed patients and were responsible for pain management, ordering radiographs and blood work, medication changes, and referrals. They provided psychosocial support and patient education | Rheumatologist available if concerns | Rheumatologist | 12 mos | Acceptability, accessibility, appropriateness, effectiveness, efficiency, safety |
| Ryan, *et al*[31] | UK | RCT | 71 | RA starting a new DMARD | Patients in both arms were reviewed weekly for 1 mo and then every mo for a yr. Visit length was 10 min | Clinical nurse specialist (rheumatology) | In addition to monitoring drug toxicity, provided education (pain management, pacing, goal setting, and fatigue) and referrals to allied health as needed | Rheumatologist available if concerns | Outpatient staff nurse working with rheumatologist | 12 mos | Effectiveness, efficiency, safety |
| Tijhuis Tijhuis, *et al*[32] | the Netherlands | RCT[32] | 210[32,33,34] | RA with increasing difficulty with ADL over prior 6 weeks | Nurse determined frequency and duration of care. Average was three 1-h visits with nurse over 12 weeks | Clinical nurse specialists (rheumatology) | Provided information about RA and made referrals (PT/OT/SW). In consultation with rheumatologist, prescribed adaptive equipment, joint splints | Patients saw their attending rheumatologist for the duration of the study | Inpatient care and day-patient team care | 12 mos[32] | Effectiveness[32,33] |
| Tijhuis, *et al*[33] | | RCT[33] | | | | | | | | 24 mos[33] | |
| van den Hout, *et al*[34] | | Economic evaluation[34] | | | | | | | | 24 mos[34] | Efficiency, safety[34] |
| Tijhuis, *et al*[35] | | RCT (survey)[35] | 174[35] | | | | | | | 6 weeks (DP/IP care), 12-week NLC[35] | Acceptability[35] |
| Watts, *et al*[36] | UK | Observational including economic evaluation | 349 | "Stable RA": established RA for > 1 yr, could not have severe or uncontrolled disease or severe functional impairment | Not reported | Nurse practitioners (rheumatology) | Assess disease activity and drug therapy for efficacy and complications | Rheumatologist available if concerns. GP signed prescriptions for nurse | Rheumatologist (with trainees) | 12 mos | Effectiveness, efficiency |

AMBRA: *AMBulant opfølgning for patienter med stabil Reumatoid Artrit* group; RCT: randomized controlled trial; RA: rheumatoid arthritis; DMARD: disease-modifying antirheumatic drugs; DAS28: 28-joint Disease Activity Score; HAQ: Health Assessment Questionnaire; NLC: nurse-led care; ADL: activities of daily living; GP: general practitioner; RLC: rheumatologist-led care; PT: physiotherapist; OT: occupational therapist; SW: social worker; DP: day-patient team care; IP: inpatient team care; N/A: not applicable.



Personal non-commercial use only. The Journal of Rheumatology Copyright © 2017. All rights reserved.

Downloaded on April 19, 2024 from www.jrheum.org

care with nurses included in the team[33,35]. In addition to greater satisfaction with NLC, Hill, *et al* found that clinic attendance was better in the NLC arm[27].

*Efficiency*. Measures of efficiency included number of referrals or conferrals, length of consultation, overall costs, and cost-effectiveness.

Hill, *et al* found that 3.8% (8/210) of visits resulted in a 11.9% (25/210) referral or conferral to a rheumatologist; usually related to changes in therapy[27]. In later work comparing NLC with trainee RLC, Hill, *et al* found that there were 24% (58/234) of conferrals in the NLC arm compared with 18% (42/246) in the trainee RLC arm. The relative risk of a conferral in the NLC arm was 1.45 (95% CI 1.0–2.1; $p = 0.04$)[29]. Sixty percent of these conferrals were for changes in therapy and 33% for steroid injections[29]. In the study by Ndosi, *et al*, the relative risk of conferrals in patients attending NLC was 3.22 (95% CI 2.1–5.0; $p < 0.001$)[30]. Watts, *et al* reported a higher number of visits to a rheumatologist in the NLC arm than in the RLC arm (mean 1.63 and 1.53, respectively), which was attributed to the restriction in a nurse's ability to prescribe and perform joint injection, and more rheumatology nursing visits (mean 2.28 and 1.5, respectively)[36].

Hill, *et al* found that nurses made more referrals to other healthcare providers (relative risk 5.3, 95% CI 3.4–8.2; $p < 0.0001$)[27]. In Hill, *et al*'s later work comparing NLC with trainee RLC, the number of referrals was again higher in the nursing group (relative risk 2.8, 95% CI 1.8–4.2; $p < 0.0001$), but the trainee ordered more laboratory investigations (relative risk 0.46, 95% CI 0.2–0.9; $p = 0.03$)[29]. Ndosi, *et al* documented referrals and found no statistically significant difference between NLC and RLC[30]. Ryan, *et al* found that the number of referrals by NLC and RLC to rheumatologists or family physicians was similar[31].

Ndosi, *et al* found that the median consultation time in the NLC group was 20 min [interquartile range (IQR) 15–30 min] compared with 15 min in RLC (IQR 10–15 min)[30]. Hill, *et al* reported that the nurse saw 8.3 patients per clinic compared with the rheumatologist who saw 17.9 patients per clinic[27]. The AMBRA study group noted that nurse visits were 30 min compared to RLC visits, which were 20–30 min long[19,20].

Cost of NLC was assessed in 4 studies[21,30,34,36]. Ndosi, *et al* identified that the difference in mean overall cost (including costs of clinic and specialist visits, diagnostic procedures, hospitalizations, and medications) was not statistically significantly different between NLC and RLC, although consultation costs in NLC group were lower[30]. Incremental cost-effectiveness ratio, which estimates the cost for an additional unit of health benefit from NLC versus the other model of care[13], varied depending on the health benefit chosen to measure effectiveness, cost assessed, and the type of statistical analysis used. For instance, with willingness-to-pay of £50,000 for an additional unit of benefit, NLC was found to be cost-effective when health benefit was measured as RA disease activity (e.g., DAS28), but not cost-effective when health benefit was measured with a generic health-related quality of life measure [HRQOL; e.g., quality-adjusted life-yrs (QALY), which accounts for the quality and the quantity of life][30].

Tijhuis, *et al* found that the costs of the initial treatment (e.g., costs of staff, medications, equipment, and material directly attributable to inpatient and day-patient hospitalizations) and total societal care costs (e.g., other hospitalizations, home care, unpaid labor) were statistically significantly lower in the NLC compared with inpatient and day-patient team care by at least €4900[34]. Incremental cost-effectiveness ratio was not calculated in the study.

In the AMBRA 2-year followup study, NLC was not significantly different from RLC and general practitioner care in costs and health benefit [disease activity (e.g., DAS28, C-reactive protein)], functional status (e.g., HAQ), and HRQOL (e.g., QALY)[20]. Overall, in terms of both health benefit (measured with QALY) and costs, the difference between NLC and RLC was not statistically significantly different. Similarly, in the Watts, *et al* study, no statistically significant difference in cost and health benefit measured with QALY was found between NLC and RLC[36].

*Safety*. Two studies reported on adherence to mandatory laboratory monitoring and found no statistically significant difference between NLC and RLC in patient adherence[19,20,36]. Two of the studies further found no statistically significant difference between the 2 models regarding out-of-range blood tests (e.g., abnormal alanine aminotransferase)[20,27].

Five studies reported on healthcare contacts and found no statistically significant differences in the number of hospitalizations in NLC[27,30,32,33,36]. The AMBRA study noted that there was no difference in the number of unplanned family physician visits at 12 months and 24 months[19,20].

Regarding mortality, 3 studies documented no difference between NLC and RLC[20,29,30].

*Appropriateness*. Using qualitative methods of phenomenography and thematic content analysis, Arvidsson, *et al* and Bala, *et al* documented that patients receiving NLC said they gained attention, empathy, and holistic person-centered care[25,26]. A recurring theme throughout was the relationship formed between nurse and patient[25,26]. In Arthur and Clifford, patients identified the nurse's positive attitude toward the patient, and the patient/nurse relationship, as the most important aspects of nursing care[23,24]. Patients in other studies also found that the positive attitude of the nurses coordinating their care was important[22,25,26]. Ndosi, *et al* noted that nurses provided psychosocial support more frequently than did RLC (relative risk 3.3, 95% CI 2.6–4.3; $p < 0.0001$)[30]. Primdahl, *et al* found that rheumatologists focused more on disease control than the patient's problems[22]. They also noted that patients were reluctant to talk about nonmedical issues with the physician[22]. Impor-

Personal non-commercial use only. The Journal of Rheumatology Copyright © 2017. All rights reserved.



Downloaded on April 19, 2024 from www.jrheum.org

tantly, patients trusted the nurses and felt confident in their knowledge and skill[22,25].

Two studies used the Patient Knowledge Questionnaire to assess disease knowledge[37]. Hill, *et al* found patients receiving NLC more knowledgeable than those attending RLC (67.3% and 52.3%, respectively, $p < 0.0001$)[27]. However, their later study found no knowledge difference between the 2 groups[27]. Ndosi, *et al* noted that nurses documented educating patients more frequently than rheumatologists (relative risk 1.7, 95% CI 1.4–2.1; $p < 0.0001$)[30]. In Arvidsson, *et al* and Bala, *et al*, patients said that NLC clinics improved their knowledge and skills through education[25,26].

*Accessibility.* Three qualitative studies reported on the patient's perception of continuity of care and access[19,22,25,26]. Patients reported that nurses provided regular, accessible care that ensured continuity[19,25,26] and allocated sufficient time to address patients' thoughts, feelings, and social situations[22,25,26].

## DISCUSSION

To our knowledge, ours is the first systematic review comprehensively assessing the effect of NLC for patients with RA on multiple dimensions of quality. Our findings suggest that NLC is highly acceptable to patients, equally effective, and safe in the short term (12–24 mos). NLC seems to be appropriate and accessible from the patient perspective, but no quantitative measures of these dimensions were reported. Regarding efficiency of care, most studies suggested that NLC is equal in cost or less costly than other models. However, there is limited evidence to support this at present and/or to draw any conclusions about cost-effectiveness of this model.

These findings are consistent with the previous systematic review of effectiveness of NLC in patients with RA by Ndosi, *et al*, which reported that although some disease activity and patient-reported outcomes (e.g., functional status, coping, and satisfaction) supported NLC, there was insufficient evidence to draw conclusions[5]. Our review adds to the existing evidence by showing that NLC is acceptable, effective, and safe. This review was more comprehensive because we used a multidimensional quality-of-care framework and included a breadth of qualitative and quantitative study designs. In doing so, we noted that the evidence in several dimensions such as efficiency, appropriateness, and accessibility is incomplete. In addition to this, we included 7 papers, which represented 4 unique studies, published after 2010[19,20,21,22,26,30,36].

NLC has also been evaluated in patients with inflammatory arthritis such as RA, psoriatic arthritis, juvenile idiopathic arthritis, ankylosing spondylitis, and undifferentiated polyarthritis[38], and in patients with these conditions who were receiving biologic therapy[39,40,41]. Although we excluded those papers because they did not report disaggregated results on patients with RA, their results were consistent with our findings. NLC for patients with inflammatory arthritis has been shown to be effective and acceptable[38,39,40]. One study reported lower costs of NLC for patients with inflammatory arthritis compared with RLC; however, the cost-effectiveness ratio was not calculated and conclusions about the efficiency of this model cannot be made[41].

Our inclusive methodological approach was feasible because of the multidisciplinary expertise of the study team (i.e., a physician, a nurse practitioner, and health economists and researchers) and was strengthened by a rigorous approach to the literature and quality assessment of included studies following validated study design–specific quality assessment checklists.

Nonetheless, our approach resulted in several limitations. Because of the heterogeneity of study designs and outcome measures, a metaanalysis could not be completed. Although agreement between reviewers as calculated by the κ statistic was moderate, the observed agreement between reviewers was very high (94% for the full-text review). This discrepancy could be explained by the limitations of the κ statistic due to assumptions around the calculation of expected agreement[42]. While the studies' qualities were mostly moderate to high, only 1 study was powered to detect noninferiority.

Given healthcare resource constraints, our findings on the dimension of efficiency (i.e., usage of healthcare resources in relation to the outcomes achieved) is of particular interest. The lower costs associated with nurses compared with physicians is often used as a rationale for expected savings with the NLC model[43]. However, the lack and overall low quality of evidence on the cost-effectiveness of the nursing model of care[44,45,46] raise questions regarding expected savings. Through consideration of cost as just one of the measures of efficiency, and efficiency as just one of the dimensions of quality, our systematic review further supports these concerns. Although 3 out of 4 studies reported some lower costs, NLC was associated with longer appointments and frequent conferrals with the physician[27,30,36], and may result in higher costs[36]. To account for this and to understand whether increased resource consumption within NLC was worth an additional health benefit, studies on the cost-effectiveness of NLC should incorporate the cost of the nurses' time and conferral/re-referral time. Studies should also consider the characteristics of nurses' roles and responsibilities, and whether nurses substitute for or supplement physicians' care. The AMBRA study also raised the interesting issue of the patient population for which this type of intervention would be best suited, such as patients with low disease activity, where changes to therapy would be less frequent[20].

Nevertheless, despite a lack of evidence to support expectations for improved efficiency and access to care associated with NLC models, their success seems to be rooted in the nurses' holistic approach to care. While the nurses'

Personal non-commercial use only. The Journal of Rheumatology Copyright © 2017. All rights reserved.



Downloaded on April 19, 2024 from www.jrheum.org

experience and professional designation varied in each study, the role of the nurse within the clinic was fairly consistent. According to our findings, patients were highly satisfied with NLC and this seemed to be related to education, empathy, continuity, and accessibility[28].

NLC for patients with RA is promising and is effective, acceptable, and safe compared with other models. However, current evidence is insufficient to draw conclusions about the model's efficiency, accessibility, and appropriateness. Future work should address these gaps to ensure NLC delivers quality care according to all dimensions of quality. In addition, liability, funding arrangements, and the relationship between the nurse and the conferring physician need to be delineated.

## ACKNOWLEDGMENT

The authors thank Dr. Sharon LeClercq, a rheumatologist, who designed, implemented, and is leading the first nurse-led clinic for patients with established RA in Calgary, Alberta, Canada, for her input in the development of the research question and assistance with the Discussion section.

## REFERENCES

1. Widdifield J, Paterson JM, Bernatsky S, Tu K, Thorne JC, Ahluwalia V, et al. The rising burden of rheumatoid arthritis surpasses rheumatology supply in Ontario. Can J Public Health 2013;104:e450-5.
2. Arthritis Alliance of Canada. Pan-Canadian approach to IA models of care. [Internet. Accessed January 10, 2017.] Available from: www.arthritisalliance.ca/en/pan-canadian-approach-to-ia-models-of-care
3. Bombardier C, Hawker G, Mosher DP. The impact of arthritis in Canada: today and over the next 30 years. [Internet. Accessed January 10, 2017.] Available from: www.arthritisalliance.ca/images/PDF/eng/Initiatives/20111022_2200_impact_of_arthritis.pdf
4. Qian J, Ehrmann Feldman D, Bissonauth A, Ménard HA, Panopalis P, Stein M, et al. A retrospective review of rheumatology referral wait times within a health centre in Quebec, Canada. Rheumatol Int 2010;30:705-7.
5. Ndosi M, Vinall K, Hale C, Bird H, Hill J. The effectiveness of nurse-led care in people with rheumatoid arthritis: a systematic review. Int J Nurs Stud 2011;48:642-54.
6. Campbell M, Fitzpatrick R, Haines A, Kinmonth AL, Sandercock P, Spiegelhalter D, et al. Framework for design and evaluation of complex interventions to improve health. BMJ 2000;321:694-6.
7. Blackwood B. Methodological issues in evaluating complex healthcare interventions. J Adv Nurs 2006;54:612-22.
8. Lindsay B. Randomized controlled trials of socially complex nursing interventions: creating bias and unreliability? J Adv Nurs 2004;45:84-94.
9. Health Quality Council of Alberta. Alberta quality matrix for health. [Internet. Accessed January 10, 2017.] Available from: d10k7k7mywg42z.cloudfront.net/assets/56a00bd2d4c9612e3610b6ce/HQCA_11x8_5_Matrix.pdf
10. Byrt T, Bishop J, Carlin JB. Bias, prevalence and kappa. J Clin Epidemiol 1993;46:423-9.
11. National Institute for Health and Care Excellence. Appendix G Methodology checklist: qualitative studies [Internet. Accessed January 10, 2017.] Available from: www.nice.org.uk/process/pmg10/chapter/appendix-g-methodology-checklist-qualitative-studies
12. National Institute for Health and Care Excellence. Appendix C Methodology checklist: randomised controlled trials. [Internet. Accessed January 25, 2016.] Available from: www.nice.org.uk/process/pmg10/chapter/appendix-c-methodology-checklist-randomised-controlled-trials
13. Drummond MF, Jefferson TO. Guidelines for authors and peer reviewers of economic submissions to the BMJ. The BMJ Economic Evaluation Working Party. BMJ 1996;313:275-83.
14. Corrigan JM, Swift EK, Hurtado MP. Envisioning the national health care quality report. Washington: National Academies Press; 2001.
15. Leeb BF, Andel I, Sautner J, Nothnagl T, Rintelen B. The DAS28 in rheumatoid arthritis and fibromyalgia patients. Rheumatology 2004;43:1504-7.
16. Bruce B, Fries J. The health assessment questionnaire (HAQ). Clin Exp Rheumatol 2005;23 Suppl 39:S14-8.
17. Meenan RF, Gertman PM, Mason JH. Measuring health status in arthritis. The arthritis impact measurement scales. Arthritis Rheum 1980;23:146-52.
18. Viera AJ, Garrett JM. Understanding interobserver agreement: the kappa statistic. Fam Med 2005;37:360-3.
19. Primdahl J, Wagner L, Holst R, Hørslev-Petersen K; AMBRA Study Group. The impact on self-efficacy of different types of follow-up care and disease status in patients with rheumatoid arthritis—a randomized trial. Patient Educ Couns 2012;88:121-8.
20. Primdahl J, Sørensen J, Horn HC, Petersen R, Hørslev-Petersen K. Shared care or nursing consultations as an alternative to rheumatologist follow-up for rheumatoid arthritis outpatients with low disease activity—patient outcomes from a 2-year, randomised controlled trial. Ann Rheum Dis 2014;73:357-64.
21. Sørensen J, Primdahl J, Horn HC, Hørslev-Petersen K. Shared care or nurse consultations as an alternative to rheumatologist follow-up for rheumatoid arthritis (RA) outpatients with stable low disease-activity RA: cost-effectiveness based on a 2-year randomized trial. Scand J Rheumatol 2015;44:13-21.
22. Primdahl J, Wagner L, Hørslev-Petersen K. Being an outpatient with rheumatoid arthritis—a focus group study on patients' self-efficacy and experiences from participation in a short course and one of three different outpatient settings. Scand J Caring Sci 2011;25:394-403.
23. Arthur V, Clifford C. Rheumatology: the expectations and preferences of patients for their follow-up monitoring care: a qualitative study to determine the dimensions of patient satisfaction. J Clin Nurs 2004;13:234-42.
24. Arthur V, Clifford C. Rheumatology: a study of patient satisfaction with follow-up monitoring care. J Clin Nurs 2004;13:325-31.
25. Arvidsson SB, Petersson A, Nilsson I, Andersson B, Arvidsson BI, Petersson IF, et al. A nurse-led rheumatology clinic's impact on empowering patients with rheumatoid arthritis: a qualitative study. Nurs Health Sci 2006;8:133-9.
26. Bala SV, Samuelson K, Hagell P, Svensson B, Fridlund B, Hesselgard K. The experience of care at nurse-led rheumatology clinics. Musculoskeletal Care 2012;10:202-11.
27. Hill J, Bird HA, Harmer R, Wright V, Lawton C. An evaluation of the effectiveness, safety and acceptability of a nurse practitioner in a rheumatology outpatient clinic. Br J Rheumatol 1994;33:283-8.
28. Hill J. Patient satisfaction in a nurse-led rheumatology clinic. J Adv Nurs 1997;25:347-54.
29. Hill J, Thorpe R, Bird H. Outcomes for patients with RA: a rheumatology nurse practitioner clinic compared to standard outpatient care. Musculoskeletal Care 2003;1:5-20.
30. Ndosi M, Lewis M, Hale C, Quinn H, Ryan S, Emery P, et al. The outcome and cost-effectiveness of nurse-led care in people with rheumatoid arthritis: a multicentre randomised controlled trial. Ann Rheum Dis 2014;73:1975-82.

Personal non-commercial use only. The Journal of Rheumatology Copyright © 2017. All rights reserved.



Downloaded on April 19, 2024 from www.jrheum.org

31. Ryan S, Hassell AB, Lewis M, Farrell A. Impact of a rheumatology expert nurse on the wellbeing of patients attending a drug monitoring clinic. J Adv Nurs 2006;53:277-86.
32. Tijhuis GJ, Zwinderman AH, Hazes JM, Van Den Hout WB, Breedveld FC, Vliet Vlieland TP. A randomized comparison of care provided by a clinical nurse specialist, an inpatient team, and a day patient team in rheumatoid arthritis. Arthritis Rheum 2002; 47:525-31.
33. Tijhuis GJ, Zwinderman AH, Hazes JM, Breedveld FC, Vlieland PM. Two-year follow-up of a randomized controlled trial of a clinical nurse specialist intervention, inpatient, and day patient team care in rheumatoid arthritis. J Adv Nurs 2003;41:34-43.
34. van den Hout WB, Tijhuis GJ, Hazes JM, Breedveld FC, Vliet Vlieland TP. Cost effectiveness and cost utility analysis of multidisciplinary care in patients with rheumatoid arthritis: a randomised comparison of clinical nurse specialist care, inpatient team care, and day patient team care. Ann Rheum Dis 2003; 62:308-15.
35. Tijhuis GJ, Kooiman KG, Zwinderman AH, Hazes JM, Breedveld FC, Vliet Vlieland TP. Validation of a novel satisfaction questionnaire for patients with rheumatoid arthritis receiving outpatient clinical nurse specialist care, inpatient care, or day patient team care. Arthritis Rheum 2003;49:193-9.
36. Watts RA, Mooney J, Barton G, MacGregor AJ, Shepstone L, Irvine L, et al. The outcome and cost-effectiveness of nurse-led care in the community for people with rheumatoid arthritis: a non-randomised pragmatic study. BMJ Open 2015;5:e007696.
37. Hill J, Bird HA, Hopkins R, Lawton C, Wright V. The development and use of Patient Knowledge Questionnaire in rheumatoid arthritis. Rheumatology 1991;30:45-9.
38. Koksvik HS, Hagen KB, Rødevand E, Mowinckel P, Kvien TK, Zangi HA. Patient satisfaction with nursing consultations in a rheumatology outpatient clinic: a 21-month randomised controlled trial in patients with inflammatory arthritides. Ann Rheum Dis 2013;72:836-43.
39. Larsson I, Bergman S, Fridlund B, Arvidsson B. Patients' experiences of a nurse-led rheumatology clinic in Sweden: a qualitative study. Nurs Health Sci 2012;14:501-7.
40. Larsson I, Fridlund B, Arvidsson B, Teleman A, Bergman S. Randomized controlled trial of a nurse-led rheumatology clinic for monitoring biological therapy. J Adv Nurs 2014;70:164-75.
41. Larsson I, Fridlund B, Arvidsson B, Teleman A, Svedberg P, Bergman S. A nurse-led rheumatology clinic versus rheumatologist-led clinic in monitoring of patients with chronic inflammatory arthritis undergoing biological therapy: a cost comparison study in a randomised controlled trial. BMC Musculoskelet Disord 2015;16:354.
42. McHugh ML. Interrater reliability: the kappa statistic. Biochem Med 2012;22:276-82.
43. Safriet BJ. Health care dollars and regulatory sense: the role of advanced practice nursing. Yale J on Reg 1992;9:417-88.
44. Marshall DA, Donald F, Lacny S, Reid K, Bryant-Lukosius D, Carter N, et al. Assessing the quality of economic evaluations of clinical nurse specialists and nurse practitioners: a systematic review of cost-effectiveness. Nursing Plus Open 2015;1:11-7.
45. Laurant M, Harmsen M, Wollersheim H, Grol R, Faber M, Sibbald B. The impact of nonphysician clinicians: do they improve the quality and cost-effectiveness of health care services? Med Care Res Rev 2009;66 Suppl:36S-89S.
46. Richardson G. Identifying, evaluating and implementing cost-effective skill mix. J Nurs Manag 1999;7:265-70.

Personal non-commercial use only. The Journal of Rheumatology Copyright © 2017. All rights reserved.



Downloaded on April 19, 2024 from www.jrheum.org