

Building a case for digital transformation in rheumatology: Suitability of innovation in the 21st century

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Abstract

Rheumatology stands out as a unique specialty filled with possibilities for digital innovation. A recent review entitled "Exploring digital health technology in rheumatology: a scoping review on benefits, challenges, and future possibilities" (EULAR Rheumatology Open. 2026 Mar;2(1):172-98. doi:10.1016/j.ero.2026.01.001) was the first of its kind to collectively explore digital tools being utilized specifically in rheumatology within the last 10 years. This commentary aims to expand on this framework by highlighting the inherent characteristics which render rheumatology as a uniquely positioned specialty for digital innovation in the 21st century. The reasons for leaning into digital transformation are clear: managing chronic conditions requires continuous monitoring and input from various healthcare professionals, patients are often required to handle multiple complex medications, and there exists a solid network of organizations that set clear diagnostic and treatment guidelines for conditions within the specialty as well as standardized disease activity scores. Rheumatology is even well-represented in ICD coding, making data collection, representation and analysis more straightforward. Additionally, the increasing global demand for rheumatologists alongside increasing healthcare costs and workforce shortages create a necessity for bridging widening care gaps which can be addressed via digital innovation. Bearing in mind the inherent characteristics which position the specialty towards digital transformation, overcoming the challenges in incorporating digital solutions into rheumatology practice must be addressed to reap projected benefits. Once executed thoughtfully, rheumatology could potentially set the pace for digital change across medicine.

Keywords: Digital innovation, Rheumatology, Shared decision-making, Therapeutics, Remote monitoring, eHealth, mHealth

Abbreviations: AI: Artificial Intelligence; ACR: American College of Rheumatology; ePRO: Electronic Patient Reported Outcome; EULAR: European Alliance of Associations for Rheumatology; GDPR: General Data Protection Regulation; HIPAA: Health Insurance Portability and Accountability Act; ICD: International Classification of Disease

The Chronic Nature of Rheumatological Diseases

The chronic nature of rheumatological diseases often requires patients to manage their conditions independently for extended periods between infrequent clinic visits, highlighting the need for continuous support and remote monitoring capabilities [1]. This requirement for sustained management is further complicated by the fact that long-term treatment effectiveness cannot be reliably inferred from isolated laboratory results, as is common in other chronic conditions. Patients and physicians need a steady stream of information to adjust treatment and make decisions. Digital health technologies offer a solution by enabling the collection of patient data whilst keeping patients engaged outside of the traditional clinic setting [2]. Such technological solutions enable personalized treatment regimens and symptom tracking through mobile applications and connected medical devices, thereby enhancing patient self-management and adherence to complex medication schedules [3].

A Multidisciplinary Approach

The complexity of rheumatic diseases often necessitates a coordinated effort amongst various healthcare professionals including rheumatologists, specialized nurses, physiotherapists, and occupational therapists, to provide comprehensive care. Digital platforms can streamline communication and data sharing among these diverse providers, ensuring integrated pathways of care and optimization of therapeutic outcomes for patients [4]. The multidisciplinary management of rheumatological conditions also requires shared decision-making involving patients themselves. In this context, digital health solutions can empower patients by providing them with accessible information about their condition and treatment options, thereby facilitating their active participation in clinical decisions [5]. This is particularly crucial given the often-subjective nature of symptom reporting and the long-term impact of these conditions on quality of life, which can benefit from patient-reported outcome measures integrated into digital health solutions e.g. the electronic health record [6].

Polypharmacy in Therapeutics

The frequent necessity for polypharmacy in rheumatological care also positions digital solutions as crucial for optimizing medication management, enabling precise adherence/compliance tracking, monitoring for potential drug-drug interactions, and facilitating real-time assessment of adverse events. This ultimately enhances therapeutic efficacy and patient safety. Furthermore, the complexity of medication regimens associated with polypharmacy in rheumatology can be simplified and made increasingly manageable for patients through digital platforms. This can be facilitated via the provision of reminders and educational content, leading to improvements in adherence and overall treatment outcomes [2]. Digital health solutions can also identify treatment effectiveness between clinic visits, detect disease flares early, accelerate clinical re-evaluation, and facilitate timely treatment modification when disease activity escalates [7]. Additionally, digital tools that keep track of disease activity and encourage regular patient-physician communication are critical for enabling 'treat to target' strategies advocated for by international societies, thereby rendering digital solutions crucial for optimizing therapeutic outcomes and patient engagement [8]. The management of rheumatological conditions largely hinges on early diagnosis and intervention, further highlighting the utility of digital solutions in expediting diagnostic pathways and enabling timely therapeutic adjustments, which can be more cost-effective than the development of new pharmaceutical agents [9].

Established Disease Activity Scores and Guidelines

Rheumatology has benefitted from well-developed diagnostic and therapeutic guidelines with global acceptance. International groups like EULAR and ACR have set clear guidelines and disease activity scoring systems. This standardization smoothens the path for digitizing clinical workflows: it enables the collection of accurate data and allows for the generation actionable insights, whilst leading to a reduction in guesswork [10]. By the inclusion of standardized metrics, rheumatology avoids the interpretive ambiguity prevalent in other medical fields, facilitating the development of validated digital therapeutics that provide consistent, reliable clinical decision support [11].

Furthermore, the American College of Rheumatology has been a frontrunner in developing structured electronic clinical quality measures, demonstrating an early institutional commitment to digitizing rheumatological care pathways compared to other medical subspecialties [12,13]. EULAR has also developed guidelines regarding digital transformation that emphasize the necessity of integrating patient-reported outcomes with clinical data, thereby formalizing the transition toward data-driven, longitudinal disease management [14]. The EULAR points to consider for the use of big data in rheumatic and musculoskeletal diseases cover the ethical implications, data privacy concerns, and methodological standards necessary for leveraging large datasets to advance research and clinical practice in the field. An important point is the additional interdisciplinary training required by healthcare professionals, data and computer scientists to harmonize the implementation of digital tools within rheumatology, ensuring both clinical relevance and technological robustness [15].

Strong Representation in ICD Classification

Rheumatic diseases have a solid presence in ICD classification codes [16–18]. This provides a structured nomenclature that enhances the interoperability of digital health platforms with established national registries and large-scale healthcare databases, facilitating comprehensive longitudinal research and accurate outcome tracking [19]. This structured framework allows for the efficient extraction of quality indicators directly from electronic health records, enabling providers to monitor pharmacological side effects and clinical courses with greater transparency [20]. This systematic approach to data coding uniquely positions the specialty to leverage big data analytics for predictive modelling and the evaluation of long-term safety, far exceeding the diagnostic capabilities of specialties that rely on less standardized or symptomatic-based reporting [21].

Shortage of Healthcare Professionals

The increasing gap between the supply of rheumatologists and the rising prevalence of rheumatic diseases necessitates the implementation of smart disease management systems to augment workforce capacity [22]. This critical workforce shortage, coupled with an aging patient population, creates widening gaps in care, thus rendering digital health solutions essential for maintaining health-care delivery in the 21st century. Digital health solutions can step in, allowing for remote consultations, better patient flow, and task-shifting to nurses or allied health professionals. Smart digital triage and management systems are not to remain merely elective enhancements but are essential components for sustaining functional healthcare delivery [23].

What the Evidence Shows

A thorough examination of existing digital health technologies and their applications within rheumatology is crucial for identifying pathways to optimize patient outcomes and healthcare delivery. This includes evaluating the efficacy of mobile applications for symptom tracking and self-management, assessing the utility of telemedicine for remote consultations, and exploring the potential of artificial intelligence for diagnostic support and predictive analytics [24]. The recent scoping review revealed that digital tools are already making a difference: telemedicine, digital health records, self-monitoring apps, cloud-based diagnostics, and ePROs (electronic patient-reported outcomes) are all being trialed within rheumatology [25]. Several

digital health innovations have produced positive results e.g. improved patient-reported health outcomes, increased patient satisfaction and compliance and a reduction in disease activity scores [25,26]. These advancements suggest a tangible benefit for integrating digital tools into routine rheumatological practice, thereby enhancing efficiency and potentially mitigating the diagnostic delays often encountered in the absence of such technologies [27]. The evidence shows that digital and physician-reported outcomes usually correlate and that remote monitoring can lessen the workload on clinics whilst maintaining quality of care [25]. In terms of studies conducted to investigate cost effectiveness of digital health innovations, the available literature indicates that while initial investment can be substantial, the long-term benefits in terms of reduced hospitalizations and improved chronic disease management often outweigh these costs, leading to overall healthcare system efficiencies [28]. A recent systematic review also showed cost effectiveness associated with telehealth and telemonitoring in rheumatology practice [26].

Although there is a need for further high-quality studies investigating the incorporation of digital technology in the field, existing and ongoing evidence is sufficient to support the realization of the projected benefits associated with the digitization of care within the specialty [25,26].

Overcoming the Challenges

Despite these foundational advancements, pervasive challenges related to data privacy, interoperability, and the substantial initial investment required for sophisticated digital infrastructure continue to hinder comprehensive digital transformation within rheumatology [29]. For example, in terms of interoperability challenges, integrating diverse digital health solutions such as telemedicine, mobile apps, artificial intelligence, and electronic health records, often presents significant hurdles due to a lack of standardized data exchange protocols and disparate technological platforms [30]. This can lead to subsequent issues e.g. with EHR fragmentation, which can impede seamless data flow across different healthcare settings and compromise the holistic view of patient information essential for effective chronic disease management. There is also the issue of varying regulatory barriers e.g. between GDPR and HIPAA compliance, thus creating legal and ethical complexities that must be navigated for widespread adoption of digital health solutions [31]. These challenges are further complicated by the necessity for rigorous validation of new digital tools across diverse patient cohorts and the development of adaptable workflows that integrate these technologies without disrupting existing clinical practices, further emphasizing the need for comprehensive strategic planning [32]. Addressing these barriers necessitates tactical investment in secure, standardized digital platforms and robust regulatory frameworks to ensure ethical data utilization and seamless integration into clinical practice.

There is the additional challenge of digital innovation leading to the perpetuation of the great 'digital divide'. This disparity arises from socioeconomic factors, limited access to technology, and varying levels of digital literacy among patient populations, which can exacerbate existing health inequities rather than alleviate them. This can be seen from the lack of research on digital health innovation in low- and middle-income countries, where there's often a shortage of rheumatologists and weak digital infrastructure [33,34]. In these regions, limited internet access and reliance on others for tech use

make the adoption of digital health solutions increasingly difficult [35]. Concerning the applicability of digital health solutions in low- to middle-income countries, there's still a chance to move beyond traditional healthcare systems by using mobile-first strategies and scalable cloud-based platforms, creating opportunities for wider adoption and real impact. Designing digital health solutions that fit the specific health needs and resources of these areas is key to making sure access is fair and use is effective [36].

Even with these ongoing issues, rheumatology is well-positioned to move ahead given its unique suitability with objective metrics, proven guidelines, and the growing role of AI in care. Such challenges are surmountable through concerted efforts [37].

What's Next for 2026 and Beyond

In rheumatology, future advancements are expected to focus on using advanced AI models for personalized medicine, tapping into large language models to improve communication, and broadening the use of digital therapeutics to boost patient outcomes [38]. Efforts to bring AI into rheumatology have shown positive results, for example, the Digital Rheumatology Network has played a key role in developing and implementing AI tools for disease prediction and digital biomarkers, whilst also hosting workshops on machine learning and large language models [39,40]. Furthermore, large language models like ChatGPT-4 show promise in supporting differential diagnosis and triage, helping identify inflammatory rheumatic diseases, though they still face challenges with specificity [41]. Nonetheless, ongoing research is dedicated to refining these models to achieve greater precision and reliability in clinical settings [42].

Conclusion

Rheumatology as a specialty can be described as almost custom-made for the digital era, given its unique needs. With chronic diseases requiring continuous data collection, solid metrics, coordinated care teams, and a shortage of specialists, the push for digital solutions is strong. Unlike fields with messy classification systems, rheumatology's adoption of a patient-focused, standardized digital infrastructure offers a roadmap to close workforce gaps and expedite diagnoses. The use of established scoring tools and reliable ICD coding makes creating scalable, digital-first interventions not just achievable but practical, positioning the specialty as a leader in chronic disease management. Further research is warranted to comprehensively evaluate the economic implications and return on investment for various digital health solutions in rheumatology to inform sustainable implementation strategies.

Declarations

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Author contributions

ER: Conceptualization, Writing—original draft, Writing—review & editing.

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