RA Case Study: Update

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Rheumatoid Arthritis

- 1% UK Population
 - F>M 3:1
 - Peak incidence 40-60
- Heterogenous clinical syndrome
 - Persistent Synovitis → chronic inflammatory Arthritis
 - No single diagnostic test/ biomarker
- Treatable











RA: Treatment & Monitoring:





Treatment: Challenges







Cost

- Biologic = £10,000 pp/pa
- 1200 patients on biologics at BAC alone
- Rheumatology 2nd biggest drug spend in Barts Health
- ?Drug tapering



Remote monitoring in RA Care: Needs



UK Smartphone Ownership 2012-2018

Remote monitoring e.g. via smartphone

- opportunity to deliver frequent disease activity measures
- Engage patients in disease management
- Endorsed by European League Against Rheumatic Diseases (EULAR)
- Potential research tool



Note: United Kingdom; 2012 to 2018; 16 years and older; 3,730*; Mobile phone owners Further information regarding this statistic can be found on <u>page 8</u>. **Source(s):** Ofcom<u>ID</u> 271851



Remote monitoring in RA: Drive

Press release

Artificial Intelligence to help save lives at five new technology centres

The UK's Artificial Intelligence revolution gets new backing, as the Business Secretary announces five new centres of excellence for digital pathology and imaging, including radiology, using AI medical advances.



The NHS Long Term Plan 91

Health Secretary Matt Hancock said:

" Artificial intelligence will play a crucial role in the future of the NHS – and we need to embrace it by introducing systems which can speed up diagnoses, improve patient outcomes, make every pound go further and give clinicians more time with their patients.

Chapter 5: Digitally-enabled care will go mainstream across the NHS



Review of Commercially Available Apps

- Unregulat
 - 7/20 rev
- Dichotomy
 - Patient a
 - ₃ Symp
 - Apps
 - Physicial
- Security
 - Fewer the protection
- No Apps di





Remote RA monitoring: the challenges

- No simple biomarker for disease activity e.g. Capillary Blood Glucose, Blood Pressure, Peak Flow
- TTT Monitoring based on **validated** composite disease activity measures, e.g.
- DAS28: **Required** to escalate and continue Biologic therapy in UK

Validated Outcome Measures

- Patient + Clinician + Laboratory
 - DAS28
 - SDAI
- Patient + Clinician
 - CDAI
- Patient Reported Outcomes (PROs)
 - PAS
 - PAS-II
 - RAPID-3
 - RAID*
 - RADAI-5*





Remote RA monitoring: Approaches

Patient Reported Outcome measures

- Validated....
 - However not to escalate/change therapy- would still require documented DAS28
- Requires regular & persistent patient data inputs e.g. PROs, joint counts etc.
- Attrition
 - GSK's PARADE study: fewer than 25% of participants in study active by 10 weeks

Accelerometers/ Motion Sensors

- Unvalidated
- Logistics:
 - Patient Factors
 - Comorbidities affecting movement e.g. stroke, PD, OA, CTS exclusions
 - Device Factors
 - Battery: accelerometer and GPS may be de-activated in low power mode





Remote RA Monitoring: The EMR approach



Arthritis Care & Research Vol. 62, No. 8, August 2010, 1112–1119 DOI 10.1002/acr.20178 © 2010, American College of Rheumatology

ORIGINAL ARTICLE

Reliability of Patient Self-Evaluation of Swollen and Tender Joints in Rheumatoid Arthritis: A Comparison Study With Ultrasonography, Physician, and Nurse Assessments

PETER P. CHEUNG, ADELINE RUYSSEN-WITRAND, LAURE GOSSEC, SIMON PATERNOTTE, CATHERINE LE BOURLOUT, MARYSE MAZIERES, AND MAXIME DOUGADOS









BioT App Pilot Study

- Initially targeting patients with controlled disease (DAS28 <5.1) on injectable biologics
- Patients submit self-scored Tender and Swollen joint counts in line with their biologic medication schedule
- Currently Recruiting: 30 App patients, 30 controls
 - 6 month observational study
 - 6 enrolled; 4 awaiting first visit
- Aim to roll out to wider RA patient group following pilot







BioT DAS App

webclinica

smart IT solutions for healthcare



University of London

BioT DAS App: Database

webclinica

smart IT solutions for healthcare

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BioT App Pilot Study

Primary Objective: Evaluate the App as a reliable disease activity monitoring tool

Secondary Objective:

- Evaluate patient care with App compared with standard NHS care
- Health Economic Impact
 - Tapering biologics
 - Patient Access to OP resource
- Patient Satisfaction questionnaire
- Assess App interface/usability with MARS score







BioT App: Research Tool

- Integration of App within Phospho-Tof RA study
- 12 week study investigating whether synovial pathotype predicts response to Tofacitinib
- Patients who consent to using Bio-T app will input TJC + SJC + VAS weekly + ESR/CRP checks every 2-4 weeks
- Outcomes:
 - Validate remote DAS monitoring via BioT as research tool
 - Capture rapid treatment response digitally







Bayesian Networks/Care Plans







- Using data from Pathobiology of Early Arthritis Cohort:
 - 300 patients with EIA
 - 140 with RA
 - Visits at baseline, 3, 6, 9, 12 months with joint counts, medication changes, USS and XR scores
- Diagnostic BN complete
- Care map for Initial management in progress





Patient/ Clinician Involvement: Qualitative Study





Qualitative Study: Patient and Clinician needs



In Summary: Progress

- BioT App clinical trial underway:
 - demonstrate validity as monitoring tool
 - Integration of BioT into other research studies
- Patient and Clinician Qualitative study to ensure that eventual product aligns with key stakeholder needs
- Collaborative BN development using PEAC data
- Future Steps:
 - Analysis of BioT trial results
 - New PPI tech group based on BioT patients
 - Further work on BN/care map development





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