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5072 A Virtual Hospital Approach in Sickle Cell Disease | Remote Biometric, Quality of Life, and Hospitalisations Monitoring

Program: Oral and Poster Abstracts
Session: 904. Outcomes Research: Hemoglobinopathies: Poster III
Hematology Disease Topics & Pathways:
Sickle Cell Disease, Artificial intelligence (AI), Adult, Research, Clinical Practice (Health Services and Quality), Translational Research, Hemoglobinopathies, Diseases, Emerging technologies, Technology and Procedures, Human, Study Population

Monday, December 9, 2024, 6:00 PM-8:00 PM

Kim Summers, PhD, MSc, BSc[1*], *Orlando Agrippa, BSc MBA*[1*], *Kofi A. Anie, PhD, MBE*[2*], *Paul Telfer, MD, FRCP*[3*] *and Sanne Lugthart, MD*[4*]

[1]*Sanius Health, London, United Kingdom*
[2]*Central Middlesex Hospital, London, United Kingdom*
[3]*Royal London Hospital, Barts Health NHS Trust, London, United Kingdom*
[4]*University Hospitals Bristol and Weston NHS Foundation Trust, Bristol, GBR*

Background

Sickle Cell Disease (SCD) presents ongoing challenges in patient access to hospital care, including long wait times, fragmented services, and inadequate pain management linked to stigma and misconceptions held by non-specialist healthcare teams. Consequently, many patients manage care at home, only attending hospital when this is no longer possible. Given the advent of clinically validated wearable monitoring devices and growing patient engagement with their health, remote and virtual models of tracking patient vital signs, symptoms, and medications are poised to be crucial in future approaches to care, disease management, and early detection.

Aims

To identify key changes in digitally captured patient biometric and self-reported quality of life (QoL)-linked outcomes (ePROs) from pre- to post-hospitalisation, exploring the feasibility of virtual methodologies in monitoring patient health outside of hospital settings.

Methods

Data was extracted for 93 patients with SCD who had provided informed consent to enrol in a digital ecosystem and had self-recorded a hospitalisation over the past 12 months. Biometrics (activity, heart rate, sleep, blood oxygen saturation, temperature, and ECGs) were recorded through an FDA-cleared smartwatch. A specialised mobile app captured daily ePROs, including EQ-5D (5-Level domain and Health State (0-100) scores); symptom scores; and self-reported hospitalisations. Data was combined and analysed using a linear mixed model (age, sex, and genotype covariates) comparing variables: 1, 3, and 7 days pre-hospitalisation; the day of hospitalisation; and post-hospitalisation to patient baselines.

Results

The mean age was 33±13 years, 73% were female, and 84% were HbSS genotype. Wearable-captured steps fell from a mean of 3,407 7 days pre-hospitalisation to 1,868 at hospitalisation, before rising again over the 7-day post-hospitalisation period (2,891). Statistically significant differences in activity were seen at baseline in comparison to the day of hospitalisation regarding steps (3,315 vs. 1,868, $p<0.001$) and distance (2,455 vs. 1,362, $p<0.001$).

From an ePRO perspective, significant differences in EQ-5D-5L scores were identified between baseline (0.811) and all time points: 7 days before (0.721, $p=0.002$), 3 days before (0.711, $p<0.001$), 1-day before (0.640, $p<0.001$), hospitalised (0.425, $p<0.001$), 1 day after (0.664, $p<0.001$), 3 days after (0.704, $p<0.001$), and 7-days after (0.707, $p<0.001$). Significant differences were also reported between the date of hospitalisation and all other time points ($p<0.001$).

Similarly, from a baseline of 71, Health State decreased on average to 69 at 7 days, 64 at 3 days, and 60 at 1 day pre-admission, with a nadir of 53 on the day of hospitalisation. This increased to 64, 66, and 65 at 1, 3, and 7 days post-admission, respectively. Significant differences ($p<0.001$) were seen between hospitalisation and all time points, as well as between baseline and 1-day pre-admission.

Fatigue scores demonstrated significant differences ($p<0.05$) between the days of hospitalisation (6.3) and each timepoint: baseline (4.4); 7- (5.1), 3- (4.9) and 1-day (5.2) pre-hospitalisation; and 1- (5.1), 3- (4.8), and 7-days post-hospitalisation (4.3). Differences in sleep were similarly seen only on dates of hospitalisation, including a higher number of wakeups compared to baseline (3.2 vs. 2.3, $p=0.006$), and longer wakeup durations compared to all pre-admission time points, 7 days post-admission, and baseline ($p<0.05$).

Conclusions

Our data revealed trends in QoL measures over the 7-day pre- and post-hospitalisation period, including both EQ-5D components. The initial associations with QoL-linked metrics suggest that future work will benefit from the integration of additional hospitalisations captured within medical records, to prevent the potential influence of patient-reported hospitalisations on ePRO trends. This will explore additional breakdowns for readmissions, and expand the current analysis around potential biometrics of interest for remote monitoring.

Ultimately, such approaches seek to empower patients to manage their condition and thereby improve their health outcomes. They also support healthcare providers under significant capacity and demand constraints, through the remote assessment of key markers pre-hospitalisation, and measures of recovery that can be tracked in the days post-discharge.

Disclosures: Summers: *Sanius Health:* Current Employment. **Agrippa:** *Sanius:* Current Employment; *Pfizer Ltd:* Consultancy. **Anie:** *Novo Nordisk:* Consultancy, Honoraria; *Novartis:* Honoraria, Research Funding; *Pfizer:* Consultancy, Honoraria; *Vertex Pharmaceuticals Europe:* Honoraria. **Telfer:** *Celgene:* Other: Clinical Trial Activity ; *Bluebird Bio:* Membership on an entity's Board of Directors or advisory committees, Other: Investigator-led funding; *Napp Pharmaceuticals:* Other: Clinical Trial Activity; *[illegible]:* Honoraria, Other: Clinical Trial Activity; *Kyowa Kirin Limited:* Other: Clinical Trial Activity; *Novartis:* Membership on an entity's Board of Directors or advisory committees, Other: Clinical Trial Activity ; *Pfizer:* Membership on an entity's Board of Directors or advisory committees, Other: Clinical Trial Activity, Data Monitoring Committee ; *Terumo:* Honoraria. **Lugthart:** *MSD:* Research Funding.

AMERICAN SOCIETY OF HEMATOLOGY

2021 L Street NW, Suite 900,
Washington, DC 20036

CONTACT

Phone 202-776-0544
Toll Free 866-828-1231
Fax 202-776-0545

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