

APARITO'S TIMELY RESPONSE TO COVID-19 FOR AT RISK ONCOLOGY PATIENTS

WHITE PAPER

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EXECUTIVE SUMMARY

Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) has had a devastating impact on healthcare providers across the world and their ability to meet the needs of patients.

Digital health solutions deployed as part of virtual care hubs offer a scalable solution to support patients while protecting hospital and clinical capacity.

Co-development with patients and clinicians, supported by easy configuration and rapid deployment offers an immediate solution to address both the acute immediate challenges faced with COVID-19 but also a more patient centric long term care pathway.

In this whitepaper we:

- ▶ *Explore the impact of COVID 19 on clinical services,*
- ▶ *Recognise the importance of adaptable and low risk approaches to healthcare for vulnerable patient groups*
- ▶ *Explore the feasibility of Atom5™ as a remote patient monitoring tool for oncology patients*
- ▶ *Assess the capabilities of Atom5™ technology for the response to the COVID 19 pandemic*

This whitepaper provides insight into how a digitised approach can contribute to both a supportive and a preventative public health approach for vulnerable populations during a pandemic.

RAPIDLY RESPONDING TO SUPPORT PATIENT SAFETY IN UNCERTAIN TIMES

COVID-19

Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) is a recently identified virus which is responsible for the COVID-19 disease. Much is still yet to be understood with regards to the mode of contagion and the pathophysiological and immunological particulars. However, since being declared a pandemic on the 11th of March this year by the World Health Organisation (WHO), (1) the virus has caused upwards of 500,000 deaths, and infected over 10 million individuals worldwide. (2)

Currently identified symptoms include: the presence of a fever, cough, sore throat, headache, mild dyspnoea, and impaired sense of taste and smell, with asymptomatic incidences also being recorded. (1) (3) (4) Individuals who have been noted as being at high risk of succumbing to the disease include: those with pre-existing respiratory conditions such as Chronic Obstructive Pulmonary Disease (COPD), severe asthma and cystic fibrosis; and individuals who are pregnant or have been recent recipients of an organ transplant, and cancer patients. (5)

Identifying COVID-19 in the absence of diagnostic tools such as the reverse transcription polymerase test (RT-PCR) is challenging due to the nature of some of the symptoms exhibited. Symptoms of COVID-19 that include the presence of a fever, sore throat or an acute cough are ubiquitous indications for infections such as the common cold or influenza. As a result, the ambiguity of symptoms may yield unjustified anxieties or on the other hand, careless behaviours which may cause the spread of the disease, hence the need for effective remote patient monitoring.

The impact of COVID-19 on healthcare and pharmaceutical industries

The COVID-19 pandemic has posed major challenges for the healthcare and pharmaceutical sectors. The currently hazardous global environment has resulted in the suspension of clinical trials, drug shortages, and the suboptimal reordering of clinical services required by individuals suffering from chronic diseases, as room is made for COVID-19 patient admissions. All aforementioned factors have the potential to exacerbate pathological fatalities.

Recent publications have highlighted the extent to which the pandemic has affected healthcare and pharmaceutical industries. GlobalData have reported that approximately 69.9% of clinical trials worldwide have been affected by the pandemic, due to patient recruitment being postponed. (6) In addition, a survey of 22 investigators that are currently active in oncology clinical trials conducted by the Cancer Research Institute (CRI) and IQVIA showed that only 14% of responders in Europe and 20% in the USA had continued to operate as normal. (7) Furthermore, analysis of a YouGov survey conducted by The Health Foundation identified a general decrease in patient accessibility to health care services in the UK between the junctures of January-February, and late February-May; a reduction of 60% to 38% was recorded for oncology patients in this period.(8)

The impact of COVID-19 on oncology patients

Oncology patients have been recognised as one of the principal groups of patients who may be at a significantly

higher risk of developing severe COVID-19 complications, relative to the general population. The likelihood of succumbing to COVID-19 for this cohort has been thought to be compounded by the administration of anticancer therapies. This proposition however is founded upon findings from limited data sets. Moreover, the analysis of data obtained from UK oncology patients thus far has not identified any distinguishing factor in risk of mortality, between patients receiving anticancer treatments and those who were not. (9) Nevertheless, as much is not yet known about the disease and its effect, swift and actionable precautionary measures for oncology patients are warranted, in order to anticipate potentially life-threatening risks.

Navigating through the pandemic

The current global landscape presents a particularly distressing and potentially fatal conundrum for vulnerable populations. Many may seek to shield at home to decrease the probability of contracting the COVID-19 disease, which may be at the expense of their health and wellbeing. On the other hand, to access such services may also yield the contraction of the disease, thus emphasising the need for an appropriate medium.

NHSX issued a call to all innovators to support the elderly, vulnerable and self-isolating individuals during the COVID-19 pandemic with the support of government funding to test their solution.

The nature of the COVID-19 crisis necessitated a rapid deployment of available technology solutions. In the interests of speed, a set of minimum mandatory requirements were introduced and addressed in the call by Aparito.

Aparito's platform - Atom5™ consists of a mobile application that is available for download on Android and iOS platforms and paired with a wearable device. The technology is capable of remote, real-time, patient-specific data aggregation which has been displayed in a multiplicity of prior studies. Aparito's platform allows for remote communication and data exchanges between multiple parties. This positions the technology as an apt healthcare tool which can facilitate the operations of clinicians during this pandemic, where social distancing is required to maintain patient safety. The technology has been deployed by Techforce19 in response to the COVID-19 pandemic for oncology patients, where its feasibility as a remote patient monitoring tool was assessed.

RAPID DEPLOYMENT FOR AT RISK ONCOLOGY PATIENTS

Dr Pasquale Innominato, Consultant Oncologist at Ysbyty Gwynedd: *"Cancer patients – especially those who are immunosuppressed, are feeling particularly vulnerable to serious complications of infection and of side effects of chemotherapy. Our efforts to supply appropriate surveillance at home with minimal impact of patient's routine will mean that our triage team, led by myself and Dr Nicholas Wreglesworth will be able to provide the best advice and minimise unplanned clinical visits to those really required. This digital solution could moreover pave the path to a more proactive, precise and home-based approach to management of patients receiving anticancer treatment".*

Aparito's timely contingency

Aparito's technological offerings are highly configurable, hence the ability to respond quickly to the current pandemic. Five weeks and two days after the COVID-19 pandemic was announced by the WHO, Aparito had successfully secured the Techforce19 NHSX contract which allowed for the deployment of the remote patient

monitoring technology. By the 26th of April, the first oncology patient at Betsi Cadwaladr University Health Board (BCUHB) was onboarded onto the system.

The configuration deployed within Aparito's platform allows for the remote collating of patient-specific metrics on a longitudinal basis, irrespective of the disease. The metrics measured are both qualitative and quantitative, and as a result provide a well rounded and in-depth portrayal of each patient's experience. The addition of a clinician portal and dashboard also allows clinicians and all individuals invested in the care of a patient to monitor metrics remotely, and in real-time.

COVID-specific configurations were made for this deployment, which was in keeping with the current scientific evidence available. This allowed for the development of a "Symptoms Checker" comprising identified COVID-19 symptoms, which was accessed through the mobile application with an alert and notification to patients to complete. Additional metrics were aggregated by the Garmin wearable device which was selected for this deployment because of its availability, cost and easy to use approach which appeals to patients. Data capture is made easy as Aparito is a Garmin Partner and benefits from the SDK Companion allowing us access to raw data such as:

- ▶ *Oxygen saturation within blood (SPO2 [spot check in the day time and and continuous while asleep])*
- ▶ *Heart rate (per minute)*
- ▶ *Proportion of light and deep sleep*
- ▶ *Number of steps taken*
- ▶ *The type of motion carried out and the intensity*

The following three parameters were reported manually by patients through the mobile application:

- ▶ *Respiratory rate*
- ▶ *Temperature*
- ▶ *Blood pressure*

Engagement and Patient Demographics

Ysbyty Gwynedd hospital, which is a part of Betsi Cadwaladr University Health Board in North Wales (BCUHB) was the medical facility from which patients were recruited. The hospital's services cover a large radius, and public transport links are limited. As a result, accessing Ysbyty Gwynedd can prove to be inconvenient for patients, with the average duration of travel to the facility being 1.5 hours long.

A total of 60 patients from Ysbyty Gwynedd hospital were onboarded onto the platform. 71.7% of this patient cohort provided data.

Mean age (years)	64
Age range	31-79
M:F	23:19

Table 1. Summary demographics of patients who took part.

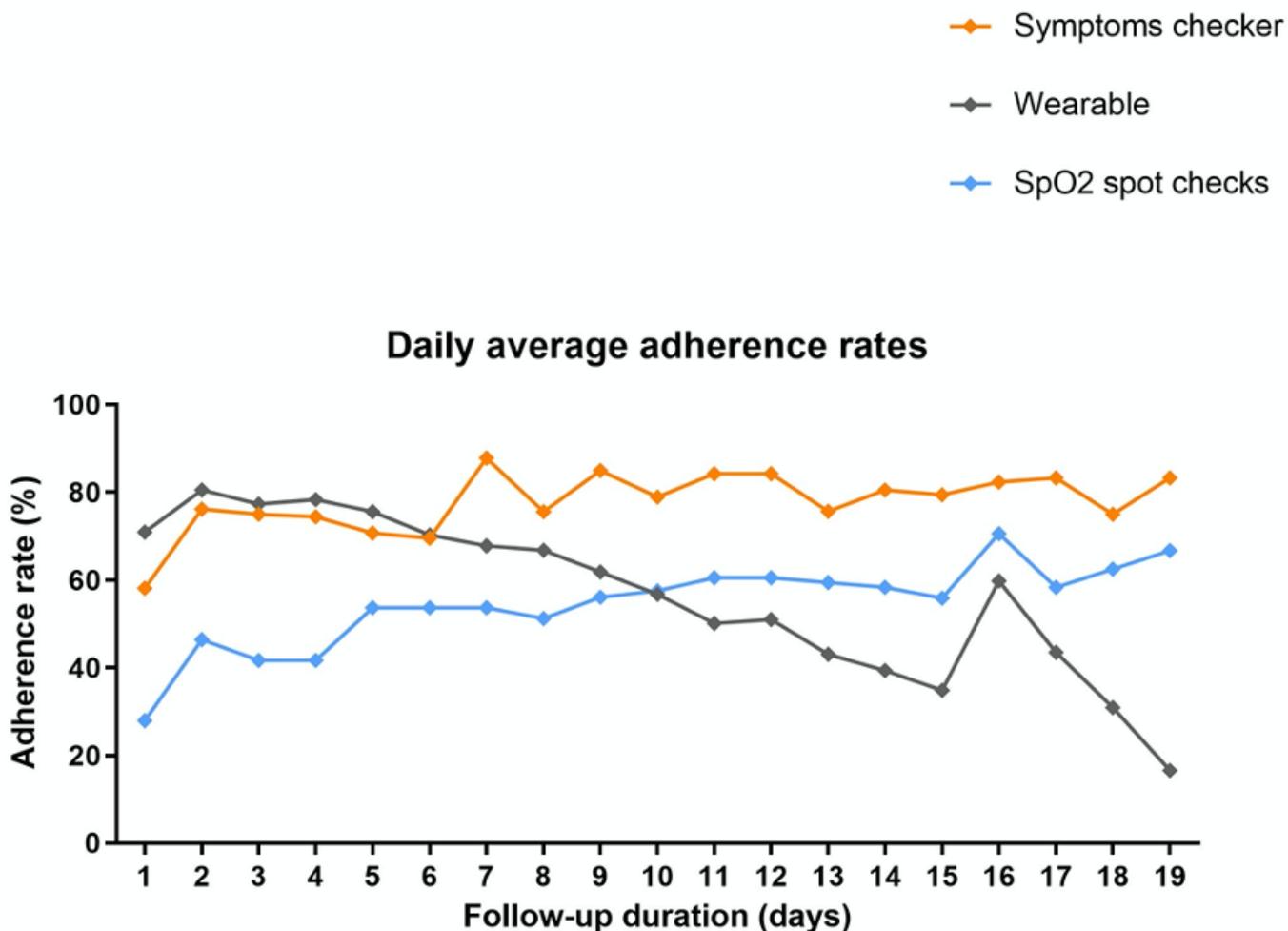


Figure 1. Daily average adherence rates recorded over a 19 day period.

Patients feedback

The response to Aparito’s technology has been positive thus far, as indicated by the high proportion of patients who were engaged with the Symptom Checker twice per day and the wearable device. Active engagement of SpO2 spot checks required at day time was observed but with a lower engagement rate. A patient feedback survey conducted after two weeks included positive feedback from patients:

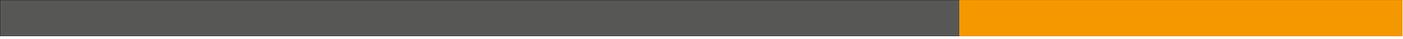
“I have gained so much knowledge about myself and health”.

“It gave a good reason to get up and get fitter trying to improve each day”.

Feedback for additional features to be included have also been utilised for the next iteration.

Adaptable healthcare technology for an ever changing world

Aparito’s technology has been successfully deployed as an early response to the COVID-19 pandemic for oncology patients. The configuration utilised within the technology has allowed for the remote, multidimensional assessment of oncology patients, which has provided a detailed physiological profile for each



individual within this cohort. The accessibility of the wearable device and the application interface also allowed patients who were onboarded to make full use of the technology conveniently. In addition, the swiftness with which the technology was deployed is a testament to the highly configurable nature of the platform. As a platform that is malleable, the technology can be tailored to suit the specific demands required of various pathophysiological dilemmas, which in this case is the COVID-19 pandemic. With both patient affinity for the Atom5™ platform and its feasibility being displayed, and considering that a “second wave” of infections is looming, broader deployment of this technology could serve to reduce the level of risk faced by various vulnerable patient populations. Additionally, deployment of this technology has the potential to ease the pressures currently being faced by primary, secondary and tertiary health care centres. Vulnerable patients being monitored from their home may provide medical centres with the leeway they require to disseminate limited resources over the course of this pandemic.

In partnership with BCHUB clinicians Aparito's Atom5™ platform is now being further co-developed to support two separate virtual hubs - one for oncology patients with cancer specific symptoms and metrics to be monitored, and one for patients recovering from/suspected to be diagnosed with COVID-19.

As there is much yet to discover about the COVID-19 disease, and in the current absence of a vaccine, it is imperative that lives are not risked unduly, and that the necessary safeguards are put in place. Scalable and highly configurable solutions such as Atom5™ can contribute to both a supportive and a preventative public health approach which will see vulnerable populations and clinicians/carers shielded from this pandemic, while still receiving care and support for their underlying health needs.

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Aparito provides innovative, patient-centric drug development solutions, integrating specialist clinical and regulatory knowledge with the technology to gather highly relevant patient-generated data outside of the hospital setting, to streamline the drug development process. We are transforming healthcare by unlocking real world patient data through mobile apps and wearable devices. For more information visit www.aparito.com