



Mayes, J., Hamilton, A. J., Greenwood, S., & al, E. (2021). The rapid development of a novel kidney-specific digital intervention for self-management of physical activity and emotional wellbeing during the COVID-19 pandemic and beyond: Kidney Beam. *Clinical Kidney Journal*. <https://doi.org/10.1093/ckj/sfab239>

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The rapid development of a novel kidney-specific digital intervention for self-management of physical activity and emotional wellbeing during the COVID-19 pandemic and beyond: Kidney Beam

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Individuals living with chronic kidney disease (CKD) report high levels of physical inactivity, and poor emotional wellbeing (1). Despite disease-specific guidelines promoting physical activity (PA) participation (2), people living with CKD do not routinely receive PA or emotional wellbeing support as part of their clinical care (3).

The challenge to engage people living with CKD with PA and emotional wellbeing interventions was exacerbated by the COVID-19 global pandemic. Specifically, CKD was identified as a significant risk factor for more severe COVID-19 infection (4, 5), and people with CKD were advised to shield at home. The resultant impact on the physical and emotional wellbeing of these individuals was captured in a Kidney Care UK patient survey, which revealed that 41% of respondents felt anxious, lonely, or isolated during the pandemic (6).

The COVID-19 pandemic led to an increase in the use of digital technology, and 'eHealth' interventions that could deliver aspects of usual and enhanced CKD care. This context led to the current authors rapidly developing and rolling-out a kidney-specific PA and emotional wellbeing platform, Kidney Beam (promotion was by social media only; no additional technical or clinical support was offered).

The Kidney Beam programme (<https://beamfeelgood.com/home>) is a contextually appropriate, theory-informed intervention that was designed to promote digital delivered PA and emotional wellbeing self-management in people living with CKD, as guided by the Behaviour Change Wheel (7). The multi-faceted digital intervention package was composed of online live and on-demand exercise training videos; careful selection of healthcare

professional and patient champions; use of email feedback, action planning; and online educational videos and blogs.

A six-month prospective feasibility project was approved by King's College Hospital Research and Innovation team to allow rapid design, delivery, and evaluation of Kidney Beam during the COVID-19 pandemic. The project was funded by Kidney Research UK. All people in the UK living with CKD aged ≥ 18 years were eligible to sign-up to the platform. Participants consented to complete a voluntary electronic survey on sign-up to the platform, and at 6-months, to establish whether participants were meeting current PA guidelines, investigate perceptions of health, and collect usability and acceptability data about the platform. Data was collected between 1st June 2020 and 30th November 2020.

In total, 959 adults signed up to use the platform within the 6-month time period (see Table 1.0). There was a 43% activation rate (people who sign-up to the platform completing one or more classes), which is higher than the UK national average for digital healthcare interventions. More than 1,900 movement classes were completed during the 6-month time period. 276 participants completed the voluntary survey at baseline, with 85 completing the follow-up survey at 6 months. Results suggest an increase in those participants achieving recommended PA guidelines, and in those participants who perceived their energy levels to be good or very good by the end of the 6-month project (See Table 2.0). Promisingly, 96% of participants surveyed would recommend Kidney Beam, with the biggest reported benefit being that the intervention was kidney-specific and delivered by specialist kidney healthcare professionals.

Digital health interventions that are co-designed with people living with a long-term health condition may result in better clinical and person-centred outcomes (8, 9). The Kidney Beam programme was rapidly co-developed and delivered with minimal resource during the COVID-19 pandemic. Despite known challenges around digital and health literacy, this digital self-management programme attracted 736 participants living with CKD to sign-up to the platform. A randomised controlled waitlist trial is underway to evaluate feasibility, clinical value and cost-effectiveness of the Kidney Beam programme delivered as part of clinical care (NCT04872933).

ACKNOWLEDGEMENTS

We thank Kidney Research UK for rapidly funding this feasibility project and enabling the platform to be free at the point of access for all individuals living with CKD.

CONFLICT OF INTEREST STATEMENT

The results presented in this article have not been published previously in whole or part.

AUTHORS' CONTRIBUTIONS

S.A.G and J.M., contributed to acquisition of data; analysis and interpretation of data. S.A.G, J.M, R.E.B, N.V, H.M.L.Y, E.M.C, N.C.B, A.H, Z.L.S, J.C, FP, J.Mc, K.B, A.C.N, T.J.W contributed important intellectual content during manuscript drafting or revision and accepts accountability for the overall work by ensuring that questions pertaining to the accuracy or integrity of any portion of the work are appropriately investigated and resolved. The funders did not have any role in study design; collection, analysis and interpretation of data; writing the report; or the decision to submit the report for publication.

FUNDING

The pilot study was a collaboration between King's College Hospital, Kidney Research UK (KRUK) and Beam, a health-technology platform supporting people with health conditions to stay physically active.

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Table 1.0- Demographic data of participants who signed up to use the Kidney Beam platform

Age (years)	Total Users (n)	Percentage (%)
0-18	0	0
18-25	35	4
25-35	155	16
35-45	205	21
45-55	231	24
55-65	209	22
65-75	86	9
75+	35	4
Total:	956	100
User type		
Living with condition	736	77
Exercise or healthcare practitioner	127	13
Care giver	34	4
Other	50	5
Unknown	12	1
Gender		
Male	249	26
Female	707	74
Other	0	0
Kidney Care Clinic		
GP	121	25
General Nephrology Clinic	122	25
Low Clearance Clinic	15	3
Peritoneal Dialysis Clinic	23	5
Haemodialysis Clinic	34	7
Kidney Transplant Clinic	153	32
Other	14	3
Total	482	100

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Table 2.0- Pre and Post 6 month participation voluntary survey results

	Baseline <i>n</i> (%)	6 months <i>n</i> (%)	Percentage change baseline to 6 months ($\Delta\%$)
Achieving 150 minutes of moderate-intensity physical activity per week	83 (30)	43 (60)	100%
Achieving 75 minutes of vigorous-intensity physical activity, per week	97 (35)	36 (42)	20
Achieving twice weekly strength training	86 (31)	46 (54)	74
Perceived energy levels to be good or very good	55 (20)	26 (30)	50

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