**AUTHOR CONTRIBUTIONS (listed alphabetically by last name):**

Colin F. Camerer (C.F.C.): Co-investigator; provided guidance and expertise on user study design and data analysis; reviewed and provided feedback on the manuscript.

Rani Gera (R.G.): Major contributor to data analysis and interpretation of the user study; provided technical guidance and expertise on selecting statistical models (e.g., linear mixed-effect regressions using dummy coding) and the analysis of every user data set; contributed to data presentation with statistical results in Figs. 3c-d, 4-6, and Extended Data Figs. 2e-f, 4, 6, and 7; reviewed and provided feedback on the manuscript.

Rustem F. Ismagilov (R.F.I.): Principal investigator; conceptualized the study with M.L.; provided technical guidance, oversight of all studies and analyses, including device development, the user study, and the device validation study with clinical STH samples, and was responsible for obtaining the primary funding for the study.

Si Hyung Jin (S.H.J.): Contributed to the device design; major contributor to the design and manufacturing of polypropylene device-protective trays using vacuum-forming technology; provided expertise on designs for easy-to-understand language-agnostic graphics, device module architectures for contamination-preventive hand movements, and error-preventive device pooling procedure; contributed to designs of device modules compatible with trays; contributed to the visualization of Fig. 1; reviewed and provided feedback on the manuscript.

Minkyo Lee (M.L.): Conceptualized the study with R.F.I.; major contributor to all device development and demonstrations with input from R.F.I. and S.H.J., including the device layout design and module fabrication, the system architecture (hardware and software) design, integration, and demonstrations for instructional guidance, real-time error monitoring, weight measurement, documentation, and wireless data transmission; major contributor to all device designs with input from R.F.I., N.S., S.H.J. and A.V.W., including language-agnostic graphics, device color-coding, and device module shapes compatible with device-protective polypropylene trays; major contributor to the selection of laboratory materials (e.g., specimen tubes, individually wrapped dual-bulb pipettes) with input from R.F.I., S.H.J., and A.V.W.; major contributor to the user study design and implementation with input from R.F.I., N.S., C.F.C., and A.V.W., including optimization and preparation of artificial respiratory and stool samples, development of a customized data logger and a barcode scanner, preparation of original draft of paper instructions with texts and graphics for action diagrams, preparation of original drafts of quick info sheet and handling error check sheet, preparation of original drafts of modified versions of user surveys (i.e., PSSUQ, KTEQ, PTEQ), establishment of the eligibility criteria of participants, participant recruitment, enrollment, random assignment, compensation, and follow-up, and user data acquisition and extraction from the error sheet, data logger, and instructional device; major contributor to the user data analysis and interpretation with input from R.F.I., R.G., C.F.C., N.S., and A.V.W.; wrote original drafts of SOPs with biosafety guidelines for clinical STH stool homogenization, pooling, and extraction; collaborated with R.F.I., N.P., S.A.W., and X.P.P. on the design and implementation of clinical STH pooling for the device validation clinical study at Caltech; co-designed the clinical STH pooling and extraction procedures for the device validation study with X.P.P.; determined the random selection of clinical samples for the device validation study; performed all clinical STH sample

homogenization and pooling on the device for the device validation study; acquired and extracted all weight data measured by the device during the clinical pooling; contributed to securing funding; generated and edited all figures, tables, notes, and videos in the Main text, Expanded Data, and Supplementary Information with input from all authors; outlined and wrote the original draft of manuscript with input from R.F.I.; edited the manuscript with input from all authors.

Xinyue (Penny) Pei (X.P.P.): Major contributor to all clinical STH sample processing (i.e., storage, homogenization, DNA extraction, and qPCR analysis) at Caltech; modified the STH stool homogenization and DNA extraction protocols for biosafety at Caltech; edited and finalized SOPs with biosafety guidelines for clinical STH stool homogenization, pooling, and extraction at Caltech; wrote and established SOPs with biosafety guidelines for qPCR analysis from clinical stool elution at Caltech; introduced the Beadbug6 homogenizer and evaluated its performance for the modified homogenization and extraction protocols at Caltech; evaluated extraction yields of the modified protocols at Caltech; performed preliminary individual STH stool homogenization and extraction protocols, tested the detection of *Ascaris lumbricoides* DNA on qPCR, and established the correlation of Cq values between Caltech and Smith College; established storage process of clinical stool suspensions and elutions and thawing protocols for the device validation study; collaborated with R.F.I., M.L., N.P., and S.A.W. on the design and implementation of clinical STH pooling for the device validation clinical study at Caltech; co-designed the clinical STH pooling and extraction procedures for the device validation study with M.L.; performed all nucleic acid extractions and qPCR analysis for the device validation study; extracted and analyzed all qPCR data; contributed to visualization of Supplementary Fig. 14a,c; wrote 'qPCR analysis' in the Methods section; reviewed and provided feedback on the manuscript.

Nils Pilotte (N.P.): Co-investigator; major contributor to clinical sample characterization, development of DNA extraction and sample pooling protocols, and qPCR analysis for pre-screening clinical samples at Smith College; collaborated with S.A.W. and M.R. on sample shipment from Bangladesh to Smith College; collaborated with R.F.I., M.L., X.P.P., and N.P. on the design and implementation of clinical STH pooling for the device validation clinical study at Caltech; provided technical guidance and expertise on sample extraction and pooling experiments performed at Caltech; reviewed and provided feedback on the manuscript.

Mahbubur Rahman (M.R.): Co-investigator; major contributor to all research work regarding clinical sample acquisition and management in Bangladesh; contributed to design and plan for the WASH Benefits Bangladesh trial; prepared IRB protocols for the study in Bangladesh; managed the field implementation and trained local researchers for sample/data collection from children in rural Bangladesh; managed quality assurance and tracking of collected clinical samples; developed protocols for sample preservation, storage, and transport; collaborated with N.P. and S.A.W. on sample storage and shipment to Smith College; reviewed and provided feedback on the manuscript.

Natasha Shelby (N.S.): Provided feedback on designs of language-agnostic graphics; contributed to the user study design; collaborated with M.L. on recruitment strategies; wrote the original and revised IRB protocols; contributed to editing paper instructions, quick info sheet, handling-error check sheet, and modified versions of user survey questionnaires (i.e., PSSUQ, KTEQ, and

PTEQ); established demographic questionnaire and enrollment questionnaire; collaborated with R.F.I. and M.L. to establish the eligibility criteria of participants for the user study; managed questionnaires in Qualtrics; contributed to user data management; contributed to data interpretation of the user study; assisted with securing funding; managed the overall study budget; created the original **Supplementary Fig. S6**; contributed to making the device demonstration video **(Supplementary Movies 1 and 2)**; major contributor to writing and editing all sections of the manuscript.

Steven A. Willams (S.A.W.): Co-investigator; major contributor to clinical sample characterization, development of DNA extraction and sample pooling protocols, and qPCR analysis for pre-screening clinical samples at Smith College; collaborated with N.P. and M.R. on sample shipment from Bangladesh to Smith College; collaborated with R.F.I., M.L., X.P.P., and N.P. on the design and implementation of clinical STH pooling for the device validation clinical study at Caltech; provided technical guidance and expertise on sample extraction and pooling experiments performed at Caltech; contributed to establishing the eligibility criteria of participants for the user study; reviewed and provided feedback on the manuscript.

Alexander Viloria Winnett (A.V.W.): Provided guidance on clinical microbiology laboratory processes and sample handling for the device design (including device layout, language-agnostic graphics, color coding, specimen collection tube compatibility, device features) and pooling procedure (including sample homogenization and transfer, contamination avoidance, biosafety); pilot user for iterations of device design; contributed to the design of the user study (including cross-over design to assess assistive vs. training functions of the device, measures to collect, participant compensation scheme, artificial human sample selection, and analysis approach with selection of statistical models for analyses shown in Fig. 3a-b and Extended Data Fig. 2a-b); assisted M.L. in interpretation of user study results; major contributor to the visualization of Fig. 1a; contributed to data presentation in Figs. 4, 5, and 8b-c,f and Extended Data Fig. 2c; major contributor to the outline of the Introduction section, including relevant background literature; contributed to editing Introduction, Results, Discussion, and Outlook of the manuscript.