



Photomapping hospitals from a major surgical randomised controlled trial

Theophilus Teddy K Anyomih¹, Maria Picciochi¹, Adesoji O Ademuyiwa^{2,3,4}, Adewale Adisa^{4,5,6}, Aneel Bhangu¹, Dhruv Ghosh^{7,8}, James Glasbey¹, Parvez D Haque^{8,9}, JC Allen Ingabire¹⁰, Lawani Ismail¹¹, Antonio Ramos de la Medina¹², Dmitri Nepogodiev¹, Faustin Ntirenganya¹⁰, Stephen Tabiri¹³

Correspondence: Dr Maria Picciochi, NIHR Global Health Research Unit on Global Surgery, Institute of Applied Health Research, University of Birmingham, Birmingham B15 2TH, UK. Email: m.picciochi@bham.ac.uk

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Introduction

No two hospitals around the world are the same, so being able to accurately describe them within research studies is critical to provide context and generalisability of research results. Most multicentre studies collect hospital level data to make such comparisons. These are usually objective basic data characterising the hospital such as number of beds, level of care provided (first-referral, secondary, tertiary hospitals), public or private funding, and other facilities.

Photos are a potentially useful, easy to gather, but uncommon way of describing hospitals during clinical research. They can complement traditional objective data that is usually collected at the hospital level. Photos of the hospitals and their surroundings might help to give some context to the data collected for research purposes. Furthermore they could be employed in photo elicitation interviews to prompt and guide participants to provide appropriate context¹. They could potentially be useful in planning health systems including infrastructural, enhancing emergency response as responders can easily locate and verify facilities available².

The CHEETAH randomised controlled trial showed that changing gloves and instruments before abdominal wound closure was associated with a reduction in SSI rate (adjusted risk ratio: 0.87, 95% CI 0.79–0.95; $p=0.0032$)³. Additionally, when evaluating the economic impact of the intervention, it was proven to be cost-effective⁴. We set out to collect pictures from each hospital that took part in the CHEETAH trial to better characterise hospital diversity. This adds information that is rarely captured in hospital questionnaires.

Methods

CHEETAH (Routine sterile glove and instrument change at the time of abdominal wound closure to prevent surgical site infection) was a pragmatic, cluster-randomised trial in seven low- and middle-income countries where 13,301 patients were recruited. Hospital-level data including number of beds, level of care provided (referral and non-referral hospitals),

1. NIHR Global Health Research Unit on Global Surgery, Institute of Applied Health Research, University of Birmingham, Birmingham B15 2TH, UK
2. Faculty of Clinical Sciences, College of Medicine University of Lagos
3. Paediatric Surgery Unit, Lagos University Teaching Hospital
4. NIHR Global Health Research Unit on Global Surgery, Nigeria Hub
5. College of Health Sciences, Obafemi Awolowo University, Ile Ife, Osun State
6. Obafemi Awolowo University Teaching Hospital Complex (OAUTHC)
7. Pediatric Surgery at Christian Medical College & Hospital
8. NIHR Global Health Research Unit on Global Surgery, India Hub
9. Department of Surgery, Christian Medical College and Hospital, Ludhiana
10. NIHR Global Health Research Unit on Global Surgery, Rwanda Hub
11. NIHR Global Health Research Unit on Global Surgery, Benin Hub
12. NIHR Global Health Research Unit on Global Surgery, Mexico Hub
13. NIHR Global Health Research Unit on Global Surgery, Ghana Hub

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and number of theatres taking part were collected using a structured questionnaire to characterise hospitals that took part in the trial, as reported in the protocol⁵.

The main aim of this paper was to prove that a collection of comparative photos of hospitals in a trial network could be gathered. The secondary aim was to conduct an exploratory discussion of the hospital photos by the authors of this paper, to discuss whether groupings and similar characteristic identification could be performed in the future (i.e. is this a useful resource). This was intended to remain informal and without definitive results.

Photos of each hospital involved in the trial were collated and were published in the supplement of the trial³. We described in more detail the processes and analysis of these photos. The pictures collation was done initially by downloading the pictures from each main hospital entrance that were available online. These were then confirmed with the national leads for each participating country, ensuring the validity of each picture collected. For hospitals where this was missing, we contacted the hospital lead to obtain a photograph of the main hospital and when this was not possible, we arranged for a representative photograph to be taken of the hospital. These were collated as a descriptive panel matched with the number of beds in each hospital.

Results

Overall, 80 hospitals/clusters participated in the CHEETAH trial and it was possible to obtain a photo of each hospital. There was hospital participation across the seven countries involved in the trial representation from each country with 11 from Benin, 11 from Ghana, 21 from India, 6 from Mexico, 16 from Nigeria, 13 from Rwanda and 2 from South Africa 2 as shown in the panel. There were 16 non-referral hospitals and 65 referral hospitals. The number of beds across the hospital types ranged between 20-3400.

The authors discussed the similarities and differences in hospital photographs. Comparing the pictures collated, there were differences between hospitals located in different continents. The hospitals located in the same continent (e.g. hospitals located in Benin, Ghana, Nigeria and Rwanda) shared more similarities than hospitals located in others (Mexico and India).

The privately funded hospitals seem to have differences to public funded hospitals. The authors identified that to better define the differences, understand whether these could be made more objective, and what the characteristics based on resources were, future research would be needed. Comparing referral and non-referral hospitals, the pictures showed the referral hospitals were generally in larger buildings and with a more complex infrastructure.

Discussion

This study showed photomapping of hospitals within a trial network is feasible and potentially useful. It has the potential to give subjective information that cannot be captured by objective measures and raises the profile of each hospital. It may become an efficient way to digitally analyse hospital type and resources, that can contribute to description and analysis.

This also showed that it is possible to deliver multicentre trials in a variety of hospitals even where the infrastructure and characteristics are different. The differences across different continents might reflect the variability in building styles, materials used for constructions and the general layout of hospital grounds. The differences in pictures from referral and non-referral hospitals seem to be related with the dimensions of the hospitals.

The use of this type of data in the advent of artificial intelligence (AI) can positively impact patients and health systems. For example during disaster responses, AI could be used to analyse and compare current and previous images of the hospital to ascertain whether there is damage to the hospital. AI can also assist with deployment of help during disasters by helping with deployment of resources to specific areas⁶.

This picture collation exercise can pose security concerns and approvals should be sought before adapting a similar strategy. These need to be carefully navigated to ensure privacy, especially for patients. Additionally, it might require regular updates, as hospitals change over time. Some of the information presented in this report may be out of date. Future projects could benefit from photo-characterisation of the surroundings of the hospital to provide more information about how well they are connected.

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