

## KEY CONCEPTS

# Simulated asset tracking study in a diabetes clinic

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## Declarations

### Authors' contributions

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### Availability of data and materials

None declared.

### Ethics approval and consent to participate

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### Competing interests

None declared.

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# Simulated Asset Tracking Study in a Diabetes Clinic

## Overview

The misplacement of portable devices wastes staff time, disrupts clinical workflows, and delays patient care [1]. This is particularly common in diabetes clinics, where small demonstration tools like glucometers and insulin pumps are shared between rooms for educational purposes, increasing the risk of loss.

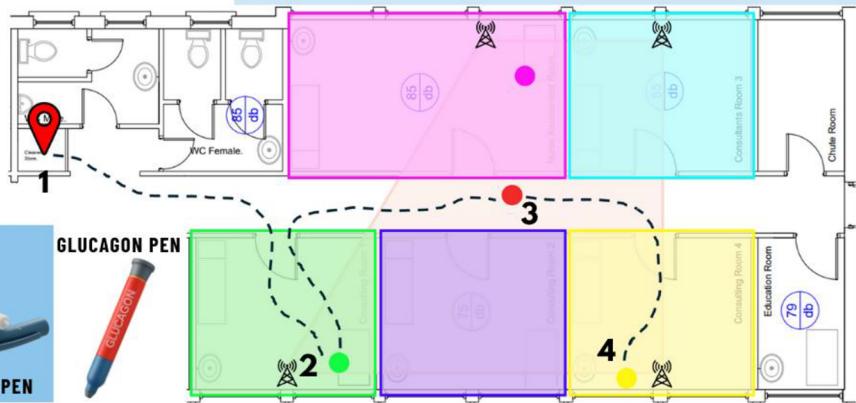
We evaluated ultra-wideband (UWB) tracking to improve real-time visibility of essential tools in a simulated diabetes clinic.

## Simulated Use Case

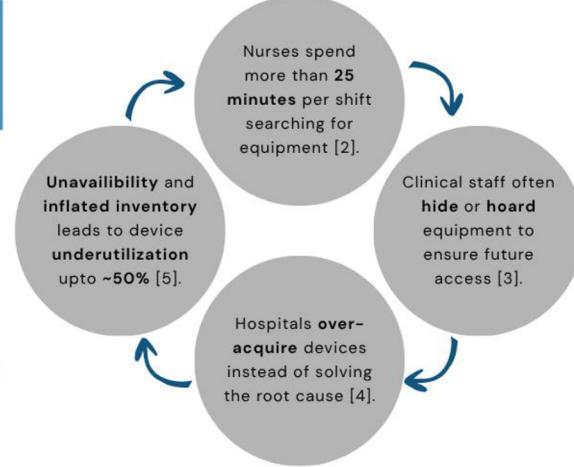
A walk-through was conducted in the diabetes clinic to simulate typical device relocation without involving patients or staff. The predefined route included:

1. Device collection from **Storage Room**
2. Moved to **Consulting Room 1**
3. Random placement on a table in the **corridor**
4. Transferred to **Consulting Room 4**

Location and zone-based alerts were tracked to assess system responsiveness.



**Strengths:** Accurate real-time tracking; Easy setup; User-friendly interface with heat maps, movement history, and times per zone metrics; Power efficient; Flexibility for different settings.



## Innovation

Four diabetes-related devices used at clinic for patient education: glucometer, insulin pump, insulin pen, and glucagon pen, were equipped with UWB trackers [6]. Their live locations were displayed on a digital floorplan, with zone-based alerts triggered as device moved between key areas like storage and consultation rooms.

**Considerations:** Reliance on WiFi 6; Absence of patient workflow during testing; Potential limitations in larger facilities.

## Learning Reflections

Live updates, zone alerts, and device traceability were achieved. The test shows how simulation can be used to pilot new technologies while demonstrating transferability. In this case, the system has potential to be used in high-device clinical settings like ICUs and HDUs, where devices like infusion pumps or ventilation machines are often misplaced yet urgently needed. Further testing in dynamic clinical workflows will help assess usability, integration challenges, and actual time savings.

## Summary

We demonstrated that UWB technology can effectively track diabetes-related tools during a simulated clinical workflow, offering accurate location data, real-time alerts, and user-friendly interface. The approach holds promise for optimizing logistics in clinical settings.

## References

1. Westbrook JI, Duffield C, Li L, Creswick NJ. How much time do nurses have for patients? A longitudinal study quantifying hospital nurses' patterns of task time distribution and interactions with health professionals. *BMC Health Services Research.* 2011;11:319. doi: [10.1186/1472-6963-11-319](https://doi.org/10.1186/1472-6963-11-319)
2. Hendrich A, Chow MP, Skierczynski BA, Lu Z. A 36-hospital time and motion study: how do medical-surgical nurses spend their time? *The Permanente Journal.* 2008;12(3):25–34. doi: [10.7812/TPP/08-021](https://doi.org/10.7812/TPP/08-021)
3. Tucker AL, Heisler WS, Janisse LD. Designed for workarounds: a qualitative study of the causes of operational failures in hospitals. *The Permanente Journal.* 2014;18(3):33–41. doi: [10.7812/TPP/13-141](https://doi.org/10.7812/TPP/13-141)
4. Donahoe G, King R. Estimates of Medical Device Spending in the United States [Internet]. Washington (DC): Advanced Medical Technology Association (AdvaMed); 2021 Jun. Available from: <https://www.advamed.org/wp-content/uploads/2021/12/Estimates-Medical-Device-Spending-United-States-Report-2021.pdf> [Accessed August 2025].
5. Horblyuk R, Kaneta K, McMillen GL, Mullins C, O'Brien TM, Roy A. Out of control: how clinical asset proliferation and low utilization are draining healthcare budgets. *Healthcare Financial Management.* 2012 Jul;66(7):64–8. PMID: 22788039.
6. Danalto Limited. Solutions [Internet]. Dublin (IE): Danalto Limited; c2025. Available from: <https://www.danalto.com/solutions/> [Accessed August 2025].