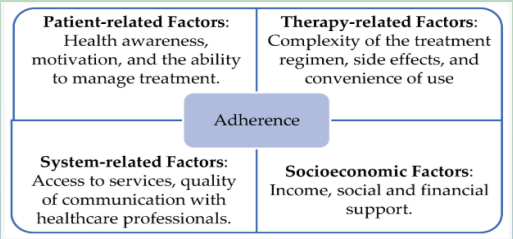
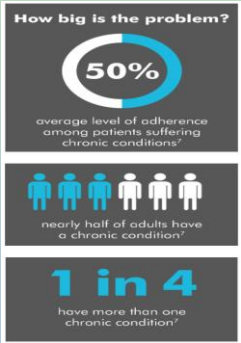


Using an NFC-Enabled Smart Pill-Tracking System to Improve Medication Adherence and Reduce Digital Health Inequality

Background

- One of the most existable global public-health concerns is medication non-adherence, which directly contributes to the reduction of effective treatment, avoidable hospitalisation, and increased expenditure in the health context (Achterbosch et al., 2025).
- It has been estimated that the adherence among patients with chronic situations averages only 50% and this represents a great barrier to controlling the disease (Pruitt et al., 2025).
- Approximately £500 million is the annual non-adherence cost to the NHS in the UK (Religioni et al., 2025).
- Traditional interventions like pill organisers, counselling, and SMS reminders present modest improvements while often fail to deliver reliable verification of adherence (Wang et al., 2025).
- Digital adherence tools that include NFC-PTS and connected apps have shown an increase in accuracy and availability to older people, while limited by the cost, user-dependent actions, not able to detect ingestion.



(Source: Religioni et al., 2025) (Source: Universityofgalway.ie., 2025)

Behavioural change theory



(Source: Muddu et al., 2021)

- The digital intervention is based on the sound behavioural foundation of the COM-B model (Capability, Opportunity, Motivation -Behaviour) (Hong et al., 2025). Such little adherence is commonly caused by poor psychological ability (forgetfulness), poor physical ability (complicated medication schedules), insufficient opportunity (the organisational support has not been provided), and low and high motivations. The NFC system enhances:
 - **Capability:** The tap-to-confirm system helps in making the process of adherence easier, which will lower the cognitive load and enhance accuracy.
 - **Opportunity:** The system is not online and does not require any technical skills to use, which makes it more accessible and less environmentally taxing.
 - **Motivation:** Good habit formation and developing intrinsic motivation can be reinforced by adherence charts, immediate feedback, and optional reminders.
- Recent findings indicate that digital adherence technologies based on COM-B attain better consistency in daily medication behaviour (Park, Ng, and Handley, 2023). The NFC system encourages sustainable long-term compliance by integrating simplicity and behavioural reinforcement.

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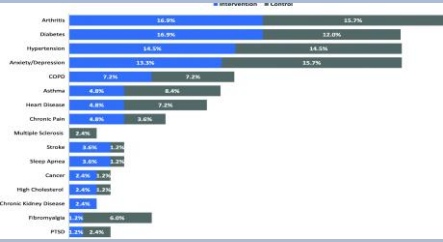
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Health promotion values and principles

- Health promotion has been grounded by the principles of equity, empowerment, intersectoral collaboration, participation, and support for enabling environments (Smith, Clavier, and Di Ruggiero, 2025). These values can be applied properly with a low burden, low cost, and user-controlled method in the healthcare sector (Aivalli et al., 2025; Cdhealthcare, 2025). The NFC-PTS aligns effectively with all these principles as it delivers low cost, burden to the healthcare sector to track medication intake.
- The NFC tag has been embedded in a blister pack which can be activated through a simple tap of a mobile device and this process can reduce literacy, digital skill and most importantly accessibility obstacles.
- Accessibility barriers, specifically for older people and in poor internet areas, have become one of the relevant reasons for non-adherence to medication (Stanly, Vilakkathala, and George, 2025).
- Through developing objectives, a timestamped adherence record, which patients can share with caregivers.
- This specific intervention can strengthen the autonomy, reduce digital health inequality among older adults, individuals who have a minimum income, and encourage collaborative decision-making.

Expected Outcomes

- It is expected that the NFC-based intervention will improve the accuracy of adherence, patient engagement, and provide the opportunity to implement clinical intervention earlier with the confirmed adherence data.
- The literature about digital adherence monitoring systems demonstrates a positive effect on medication-taking behaviour of 20-30 percent when real-time feedback and habit-reinforcing systems are employed (Araín et al., 2021).
- The tool will be suitable to reduce disparities in digital health inequality, particularly in older adults, people with multimorbidity, and those with low internet access due to the removal of digital-skill barriers.
- Better compliance would be expected to reduce the number of hospitalisations related to medication and increase the overall treatment outcome (Aremu et al., 2022).



(Source: Araín et al., 2021)

Conclusion

- NFC-medication tracking is an evidence-based, scalable model involving digital innovation to enhance the strength of the public-health outcomes.
- The economic nature of its infrastructure implies it can be implemented widely in primary care, community health, and remote care environments.
- The NFC system can also play a significant role in decreasing health disparities in the UK by addressing both adherence and digital disadvantage.