Pre-read 3. Integration of Next-Generation Blood Pressure Monitor Outputs into Electronic Health Records

Leveraging Digital Technology to Enhance Clinical Decision-Making and Drive Innovation

Integrating outputs from next-generation blood pressure (BP) monitors into electronic health records (EHRs) in a standardized manner is essential to support clinical decision-making, enable performance monitoring of BP systems, and foster ongoing technological innovation.

Currently, most wearable BP monitors provide patients with personal summaries of their readings, but there is no standardized mechanism for communicating these data to healthcare professionals and/or healthcare systems. Data formats and summaries vary widely, particularly for wearable devices that capture continuous or trend-based information. There is also limited integration with concurrent antihypertensive therapy data or linkage to EHRs. As a result, hypertension management remains inefficient, and valuable opportunities for digital innovation and system performance monitoring are lost.

An ideal system would enable standardised BP data from devices to be summarized for patients on their personal devices (e.g., phone, tablet) and securely transferred—subject to patient consent - into EHRs. Within the EHR, this data could then be integrated with treatment plans and presented to clinicians in ways that best support shared decision-making. Furthermore, linking EHRs with real-world clinical outcome data would enable performance monitoring at local and national levels, while supporting continuous improvement and innovation (see accompanying briefing paper on innovation).

Key Considerations for Implementation

1. **Data Outputs:**
   Define which data elements should be transferred to EHRs. In addition to time-stamped BP and heart rate (HR) values, devices should provide identifying information (device class, manufacturer, model number) to ensure data interpretation reflects the underlying technology and its validation status. For research and innovation, inclusion of raw sensor (transducer) signals would be particularly valuable.

2. **Data Presentation:**
   Standardized graphical displays and summary metrics for 24-hour BP monitoring are already established for conventional cuff-based systems. Extending these standards to cuffless and wearable technologies is feasible but requires further work, especially to ensure integration of BP trends with treatment plans for effective hypertension management. Developing clear, standardized methods for long-term BP data visualization and trend analysis is critical. Incorporation of AI-assisted algorithms represents a logical next step, though this lies beyond the scope of the current summit.

3. **Software Solutions:**
At present, wearable BP devices typically provide summaries through manufacturer-specific apps, or through broader health platforms such as **Apple HealthKit**, **Google Fit**, or **Samsung Health**. Middleware solutions—such as **Validic**, **Xealth**, or **Redox**—can normalize and transmit device data into EHRs. The **HL7 FHIR (Fast Healthcare Interoperability Resources)** is an open international standard that supports electronic exchange of healthcare data, including BP and other physiological data into EHRs. Within the UK, an optimal approach might involve transferring device or app data to the **NHS App** via APIs for FHIR (e.g. https://digital.nhs.uk/developer/guides-and-documentation/our-api-technologies#fhir), from which it could flow securely into EHR systems. This would be a relatively simple technical solution that would minimise potential risks and the requirement to update frequently and would reduce dependency on 3rd party software and middleware.

4. **Data Linkage and Outcomes:**
Linking EHR BP data with wearable-derived data and clinical outcomes enables performance monitoring and supports innovation. Real-time feedback could identify which systems and interventions achieve optimal BP control. To ensure reliability, periodic use of validated cuff-based BP monitors should remain the benchmark - particularly for **Quality and Outcomes Framework (QOF)** targets - until cuffless BP technologies reach full clinical maturity.

5. **Data Protection:**
All data transfer and integration processes must comply with applicable data protection regulations and ethical standards, ensuring patient privacy, consent, and security throughout the data lifecycle.

6. **Clinical governance**
The management of electronic BP data flows requires integration with an appropriate clinical management pathway to provide timely management of treatment changes and unexpectedly high or low BP values.