

Improving Healthcare Quality with an LHS

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Abstract. The Learning Health System (LHS) is an important tool to help healthcare professionals solve problems by collecting, analyzing, interpreting and comparing health data, with the objective of helping patients make the best decision based on their own data, given the best evidence available. [1]. We believe partial oxygen saturation of arterial blood (SpO₂) and related measurements and calculations can also be candidates for predictions and analysis of health conditions. We intend to build a Personal Health Record (PHR) that can exchange data with Electronic Health Records (EHRs) from hospitals, propose enhanced self-care, seek a support network, or look for healthcare assistance, (primary care or emergency service).

Keywords. Learning Health System, Interoperability, Vital signs, Personal Health Record

1. Introduction and Problem Description

This poster is a preview of a thesis that will be submitted to the Health Data Science PhD Program from the Faculty of Medicine of the University of Porto, Portugal. The thesis will be the first step in the long journey of developing a **streaming data platform to back the building of a Learning Health System (LHS)** in order to improve healthcare quality and its perceived value. The main idea behind LHS is the continuous improvement of outcomes through the generation and employment of knowledge during healthcare delivery by the use of informatics, science and enhancement of education, training and performance [1]. The LHS is an important tool to help healthcare professionals solve problems by collecting, analyzing, interpreting and comparing health data, with the objective of helping patients make the best decision based on their own data, given the best evidence available. **Clinical Decision Support Systems (CDSS)** are just one of the main purposes of an LHS. Interoperability: has the power to integrate the structure and semantics of health data and prevent loss of meaning of conceptual domains, knowledge in context and formal representation of data [2]. Besides data transportation (HL7 V2, V3 and FHIR), security (HTTPS) and structure and format (CDA, OMOP), health data standards involve vocabulary (SNOMED-CT), terminologies (LOINC) and classifications (ICD-10 and 11) used to **describe the real world in healthcare** [1]. **Vital signs:** as reported by Hirten, RP. [3] in 2020 regarding COVID-19 infections in healthcare professionals through **heart rates measured by smartwatches**, participants

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wore Apple Watch and an app on their smartphones. We believe **partial oxygen saturation of arterial blood (SpO₂)** and related measurements and calculations can also be candidates for predictions and analysis of health conditions, as so **body temperature** and others that are yet to become measurable through smart devices.

Literacy: self-care measures may be proposed to the patient through **self-learning**, and consequently avoid the clinical condition worsening and seeking help sooner, at a smaller economic and social cost, which can be measured by proper indicators, giving adequate data. This will help increase the number of patients that are able to self-manage and improve their health conditions through literacy and self-knowledge. Patients responsive to suggested education can reduce or avoid presential medical appointments for prescriptions (mainly reissuing), taking vital signs, simple orientations, feedback and follow-up with no or minor reportable events reducing the number of unnecessary medical appointments at primary care (and many times at emergency services), but also avoid treatments and hospitalizations, as the patients improve their health conditions.

2. Aim and Method

The cycle of care, research and knowledge discovery and its application into healthcare begins with the patient, as the history and the evolution of the pathophysiology of the disease itself (and its related signs and symptoms) are **translated into changes in vital signs (prior to lab and image exams)**, and those can be recorded into exchangeable, semantically interoperable and meaningful data.

3. Results

We intend to build a Personal Health Record (PHR) that can exchange data with Electronic Health Records (EHRs) from hospitals, propose enhanced self-care, seek a support network, or look for healthcare assistance, (primary care or emergency service).

4. Conclusions and Future Work

Still missing and to be addressed at the systematic review are GDPR and Medical Devices Regulation, as so is defining the unique identifier for each patient.

References

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