

Opportunity and Challenge of Implementing the OHDSI System in Indonesia

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Background

Indonesia, a populous country with diverse ethnicities, has medical faculties like UKDW (Universitas Kristen Duta Wacana) with comprehensive healthcare systems. These faculties have publications utilizing EHR (Electronic Health Record) [1] [2], making them valuable for the OHDSI (Observational Health Data Sciences and Informatics) community. This feasibility study aims to assess OHDSI implementation potential in Indonesia, with UNNES (Universitas Negeri Semarang) providing new perspectives. Despite challenges, a new health faculty presents an opportunity to integrate OHDSI into the curriculum, foster research partnerships, and build a robust data platform. Overcoming barriers requires careful planning, resource allocation, and stakeholder involvement. The study evaluates healthcare readiness, technical requirements, market landscape, and identifies implementation barriers and opportunities.

Methods

We analyzed the utilization of Indonesia's national health insurance database (BPJS/ Badan Penyelenggara Jaminan Sosial) and its feasibility for implementing Observational Medical Outcomes Partnership (OMOP) Common Data Model (CDM) OHDSI. Using South Korea's NHIS-NSC (National Health Insurance System-National Sample Cohort) OMOP CDM Conversion [3] as an example, we compared variables between BPJS and OMOP CDM OHDSI. With our experience working with Taipei Medical University Clinical Research Data OMOP CDM, we classified Indonesia's BPJS dataset variables into NHIS-NSC OMOP CDM Conversion. We also conducted an observational study to assess the current state of the Indonesian healthcare system for OHDSI implementation. This included a SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis and an analysis of eight feasibility areas (Acceptability, Demand, Implementation, Practicality, Adaptation, Integration, Expansion, and Limited Efficacy Testing) based on

literature review and pilot studies at UNNES and UKDW.

Table 1. Variable Comparison across Indonesia BPJS, South Korea NHIS-NSC OMOP CDM Conversion, TMUCRD, and Indonesian Hospital Record Datasets

Indonesia BPJS	South Korea NHIS-NSC OMOP CDM Conversion	TMUCRD	Indonesian Hospital Record
NHI ID	PERSON	ID_No	NHI ID
-	DEATH	Death	DEATH
PHC VISIT Hospital Visit	VISIT	OPD/IPD FEE_No	Visit
PHC DIAGNOSIS Hospital Diagnosis	CONDITION	ICD9_Code/ICD10_Code	Diagnosis
Indonesian Case Based Group	DRUG	MED_Code	Drug
	PROCEDURE	OPD/IPD GROUP_Code/EXPER_No	Procedure
	DEVICE	-	-
	MEASUREMENT	EXPER_Code/R_Item	-
	OBSERVATION	-	-
	COST	TOT_AMT	-

Results

Indonesia Health Social Security Agency dataset consist of Main services (the registration process, the outpatient process (outpatient or inpatient) and the discharge process) and administrative activities (planning, purchasing/procurement, stock/inventory maintenance, asset management, HR (Human Resources) management, money management (debts, receivables, cash, ledgers and others). Indonesia Health Social Security Agency dataset contains 111 variables. OMOP CDM variables (Person, Death, Visit, Condition, Drug, Procedure, Device, Measurement, Observation and Cost), used as classifier for Indonesian BPJS dataset variables.

1. Acceptability

OHDSI's acceptability in Indonesia is crucial in healthcare and academia. UKDW's use of EHR data improves its acceptability by establishing infrastructure, expertise, and stakeholder engagement. UKDW can advocate for OHDSI and collaborate with others to enhance health data analysis. A new medical faculty

presents an opportunity to implement OHDSI effectively.

2. Demand

UKDW is an international innovator, promoting research collaboration and employing new approaches. UNNES's new medical school plans to use observational health data and can adopt OHDSI with their talented teachers and students through training and workshops. UNNES should seek partnerships and establish ethical frameworks for data sharing to support their OHDSI activities and promote innovation in healthcare practice and policy.

3. Implementation

UNNES, a new medical school, utilizes OHDSI to enhance research and analysis. Students participate through internships, research, and health data analytics. Challenges exist but can be addressed through innovation, evidence-based decision-making, and awareness campaigns. UKDW's partnership with Bantul Regency healthcare [4] facilities provides access to patient data, and their expansion plans for an academic hospital [5] will benefit OHDSI.

4. Practicality

The Indonesian National Health Insurance (NHI) program and OMOP-CDM have similar data formats, facilitating standardized healthcare data collection and interchange across settings. [3]. UKDW demonstrates commitment to responsible research and ethical practices in their OHDSI implementation. Their IRB registration and review process ensure ethical compliance, instilling trust in their research endeavors [6].

5. Adaptation

The Indonesian National Health Insurance (NHI) facilitates standardized data submission, improving interoperability and research capabilities [7]. UNNES may face resource constraints, such as finances and limited IT infrastructure, hindering OHDSI implementation. Training workshops and webinars can help faculty and staff familiarize themselves with OHDSI methodologies, tools, and data analysis techniques.

6. Integration

UKDW's strong IT team with EHR experience gives them an advantage in implementing the OHDSI system in Indonesia [8]. Their expertise ensures a smooth implementation and operation, enhancing research capabilities and evidence-based decision-making. Proactive measures, such as an internal server system, safeguard patient information and research data, demonstrating their commitment to data confidentiality and integrity.

7. Expansion

UKDW Faculty of Medicine has integrated Healthcare Informatics updates and is considering expanding into Health Data Science [9]. UNNES is establishing a new medical faculty that can incorporate OHDSI implementation into its curriculum and research, ensuring long-term sustainability. By integrating OHDSI into the new faculty's infrastructure, UNNES prepares future healthcare professionals and researchers to utilize OHDSI for evidence-based decision-making, supporting implementation in Indonesia.

8. Limited Efficacy Testing

Indonesia's OHDSI implementation's limited efficacy testing offers pros and cons. Data quality, completeness, privacy, ethics, and evaluation metrics are challenges. Research collaboration, continual progress, and knowledge development are possible. Overcoming obstacles and seizing opportunities will help Indonesia implement OHDSI.

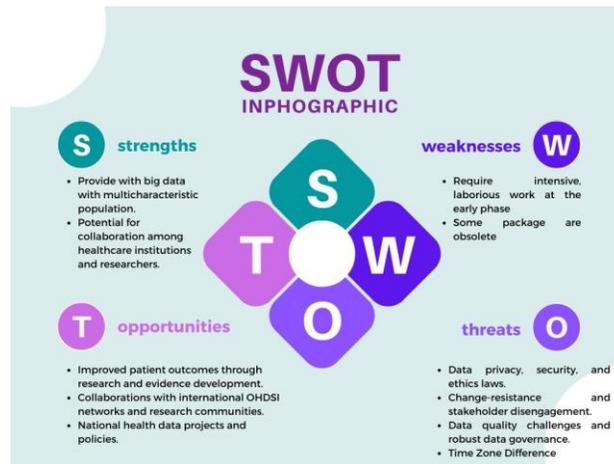


Figure 1. Analyzing the Opportunities and Challenges: Unleashing the Potential of OHDSI Implementation in Indonesia

Conclusion

In conclusion, the opportunity and challenge on OHDSI implementation in Indonesia, shows the following key findings:

- UKDW's infrastructure, knowledge, and stakeholder engagement improve OHDSI's acceptance.
- UKDW and UNNES want OHDSI, and UKDW's international partnership allows adoption.
- Innovation, evidence-based decision-making, and awareness campaigns can help implement.
- National health insurance data format and OMOP-CDM commonalities facilitate OHDSI implementation.
- Adaptation may involve UNNES training and resource management.
- UKDW's IT and EHR expertise aids OHDSI integration.
- UKDW and UNNES expansion promotes sustainability.
- Collaboration and improvement are possible despite limited efficacy testing.
- Integration requires planning, resource allocation, stakeholder interaction, and problem-solving. UKDW and UNNES' partnership supports Indonesia's OHDSI.

References

- [1] R. Padma and R. T. Pinzon, "A poor prognostic factor for clinical outcomes in ischemic stroke with dysphagia," *J. Neurol. Sci.*, vol. 381, p. 643, Oct. 2017, doi: 10.1016/j.jns.2017.08.1810.
- [2] R. P. Gitasari, T. A. R. Kusumosih, D. C. A. Nugroho, and H. Rahardjo, "Factors Associated with Retained Placenta: A Case-Control at Bethesda Hospital Yogyakarta," *Berk. Ilm. Kedokt. Duta Wacana*, vol. 7, no. 1, p. 11, Aug. 2022, doi: 10.21460/bikdw.v7i1.356.
- [3] S. Lee *et al.*, "OMOP-CDM Conversion and Anonymization of National Health Insurance Service-National Sample Cohort," in *OHDSI Symposium*, 2019, pp. 1–3.
- [4] S. Umaiya, "UKDW Akan Bangun Kampus II di Bantul," *TribunJogja.com*, 2019. <https://jogja.tribunnews.com/2019/11/01/ukdw-akan-bangun-kampus-ii-di-bantul>.
- [5] W. Pras, "Rencana Peruntukkan Lahan di Bantul Yang Telah Dapatkan Izin Prinsip," *Rumah Jogja Indonesia.com*, 2020. <https://www.rumahjogjaindonesia.com/isi-majalah/rencana-peruntukkan-lahan-di-bantul-yang-telah-dapatkan-izin-prinsip.html>.
- [6] UKDW, "Publication Ethics," *BIKDW*. <https://bikdw.ukdw.ac.id/index.php/bikdw/pages/view/ethics>.
- [7] G. Y. Sanjaya, A. Fuad, W. A. Baros, E. Dhanalvin, and N. Albab, "Database Riset Bersumber Data Jaminan Kesehatan Nasional untuk Mendukung Penelitian dan Publikasi Ilmiah di Indonesia," *J. Inf. Syst. Public Heal.*, vol. 2, no. 2, pp. 18–29, 2017.
- [8] C. R. Yusuf, D. C. A. Nugroho, K. Adisaputro, and M. A. Sigilipoe, "Analysis of Technical Readiness and Telehealth Service Usage in Bantul District Health Centers," 2023.
- [9] I. A. Triastuti and D. C. A. Nugroho, "Evaluation of Multidisciplinary Learning: A Case Study from The Application of Medical Technology Course," 2022.