

The Role of Health Information Management Professionals in Information Continuity of Integrated Primary Health Care

Kori Puspita Ningsih^{1*}
Najwa Lyra Puspa Kamal²
Syafiqah Fankarinaswa³
Rizky Yuspita Sari⁴
Andi Karisma Nurdiansyah⁵
Sugeng Santoso⁶

^{1,4,5,6} Department of Medical Records and Health Information, Faculty of Health, Universitas Jenderal Achmad Yani Yogyakarta, Sleman, Special Region of Yogyakarta, Indonesia

^{2,3} Diploma III Program in Medical Records and Health Information, Faculty of Health, Universitas Jenderal Achmad Yani Yogyakarta, Sleman, Special Region of Yogyakarta, Indonesia

*Corresponding author email: puspitakori@gmail.com

Abstract

Primary Health Care Integration (ILP) requires continuity of information between facility-based and outreach services. This study examined how Health Information Management (HIM) professionals support this continuity across four Puskesmas in Bantul Regency, Yogyakarta, Indonesia. A descriptive qualitative multisite study involved ten purposively selected informants. Data were collected through semi-structured interviews, observations, and document review and analyzed thematically, with triangulation across sources. In facility-based services, HIM activities were concentrated in the Management Cluster and cross-cluster functions, covering registration, electronic health record (EHR) data distribution and processing, claims entry, storage, quality assurance, and record transfer. In contrast, outreach activities spanned Clusters 1, 2, and 3 and involved registration, data entry, validation, recapitulation, and reporting, often requiring reconciliation between manually recorded data and electronic systems. Across both contexts, HIM professionals supported information continuity by linking patient identity and service records through data validation, quality assurance, integration, storage, and traceable information transfer between settings. These findings indicate that continuity depends not only on digital connectivity but also on coordinated end-to-end information management and governance across facility-based and outreach workflows.

Keywords: primary health care integration; information continuity; health information management; electronic health record; community health center

1. Introduction

Primary health care transformation in Indonesia through Primary Health Care Integration (Integrasi Layanan Kesehatan Primer, ILP) has shifted community health centers (Puskesmas) from fragmented program-based services toward life-course and cluster-based care. Services are no longer confined to the Puskesmas building, but are linked with auxiliary health centers (Pustu), integrated health posts (Posyandu), home visits, mobile health

centers, free health screening activities, and other community-based services. This change means that successful integration cannot be assessed solely by the availability of service packages. Information generated at one point of care must remain traceable, trustworthy, and reusable at subsequent points of care if services are to be genuinely continuous (Kementerian Kesehatan RI, 2023).

Primary care continuity includes relational, managerial, and informational

dimensions. In the informational dimension, data from previous contacts must be available and usable at subsequent contacts, including when patients move between units or from community-based services to a Puskesmas. Khatri et al. (2023) showed that sharing and using information are a necessity for care coordination; hence, continuity is not just the presence of data, but also the ability to sustain the meaning, quality and linkage of information along the care pathway.

Digital technology can strengthen continuity through shared access, inter-team communication, and data exchange. Tahsin et al. (2023) showed that information and communication technologies support integrated primary care, although their benefits depend on workflow design, interoperability, and user capacity. In Indonesia, the ILP architecture positions electronic health records (EHRs)/Puskesmas Management Information Systems (SIMPUS), field applications, and SATUSEHAT within an ecosystem intended to enable information to move across service points (Kementerian Kesehatan RI, 2023).

Challenges are more apparent in community-based services because documentation may take place across different locations, devices, and actors. Pandya et al. (2024) showed that community data often operate in parallel with facility-based systems, limiting their use for subsequent care. Under these conditions, the transfer of data from field forms or applications into the EHR becomes a critical point in determining whether outreach services are truly connected to the patient's history at the Puskesmas.

In this context, Health Information Management (HIM) professionals occupy a strategic position as managers of the health information cycle. Minister of Health Regulation No. 24 of 2022 identifies registration, EHR data distribution, information processing, claims, storage, quality assurance, and EHR content transfer as activities performed by HIM

professionals and coordinated with other units where required (Kementerian Kesehatan RI, 2022). HIM literature likewise positions the profession at the core of data management, information systems, quality, and health information governance in increasingly digital environments (Wissmann et al., 2025).

Studies of ILP in Indonesia have mainly examined implementation readiness, organizational and infrastructure constraints, access, and service-cluster implementation (Rosita et al., 2025; Eda et al., 2025; Hartana et al., 2026; Irawan et al., 2025). However, the role of HIM professionals in maintaining information continuity across facility-based and outreach services remains insufficiently examined empirically. Little is known about how HIM activities connect community-generated data with Puskesmas information systems while preserving patient identity, data quality, availability, integration, and traceability. This multisite qualitative study addresses this gap by examining HIM professionals' roles across the seven non-clinical EHR administration activities specified in Minister of Health Regulation No. 24 of 2022.

The novelty of this study lies in its cross-context synthesis, which views the role of HIM professionals not merely as a series of administrative tasks but as a mechanism supporting information continuity between facility-based and outreach services. This focus is increasingly relevant because all Puskesmas included in the study used EHRs, while the national ILP architecture places SIMPUS/EHRs, field-service applications such as ASIK, and the SATUSEHAT Platform within a single data-exchange ecosystem. The central issue is therefore no longer simply the availability of applications, but the capacity to ensure that data recorded at different service points remain correctly identified, of sufficient quality, exchangeable, and available when needed. This study aimed to analyze the role of HIM professionals in maintaining

information continuity in ILP implementation across facility-based and outreach Puskesmas services.

2. Method

This study used a descriptive qualitative design with a multisite approach to explore the role of HIM professionals in supporting information continuity in ILP implementation across facility-based and outreach Puskesmas services. The study was conducted in 2026 in Bantul Regency, Special Region of Yogyakarta, Indonesia. Study sites were randomly selected from 27 Puskesmas in Bantul Regency. Four Puskesmas were selected: Kasihan I, Kasihan II, Pundong, and Sedayu 1.

Facility-based services were examined at Kasihan I, Kasihan II, and Pundong Puskesmas, whereas outreach services were examined at Sedayu 1 Puskesmas. Multiple sites were selected to provide a more comprehensive view of variation in HIM roles across different service contexts and to identify both consistent patterns and context-specific characteristics.

The study utilised ten informants who were purposefully selected based on their engagement, expertise, and understanding of ILP implementation and health information management. In the setting of facilities, five informants were HIM professionals with 9–17 years of work experience distributed throughout three Puskesmas. In the outreach setting, five informants included HIM professionals and people directly involved in ILP implementation and information management, including the head of medical records, the Management Cluster lead, a health promotion officer, and Puskesmas leadership. Informants were selected to represent views from staff who directly experienced the service workflows, documentation, processing and use of information in the implementation of ILP.

Formal data saturation was not assessed as a predefined stopping criterion. The adequacy of the dataset was instead

supported by purposive selection of informants with direct experience of ILP workflows across four Puskesmas and two service contexts, triangulation of interview data with observations and document review, and thematic comparison across sites. These procedures provided complementary evidence on recurring and context-specific patterns; however, they cannot confirm that saturation was achieved, and the absence of a formal saturation assessment is a limitation of this study.

Data were acquired through semi-structured interviews, observation and document analysis. Interviews investigated HIM professionals' experiences, roles and restrictions in supporting information management in ILP. Facility observations focused on patient registration, distribution and processing of EHRs, data input of claims, storage, quality assurance, transfer of information, and use of Puskesmas information systems. The outreach observations included service documentation and data management, use of ILP forms or assistance cards, Digital Government Service (DGS)/SIMPUS and Sehat Indonesiaku Application (ASIK), transfer of manually recorded data into electronic systems, and availability of devices and network connectivity. The review was based on the following: standard operating procedures, internal regulations, recording forms, service reports and recapitulations and outputs from information systems on the execution of ILP.

To ensure data trustworthiness, credibility, dependability, confirmability, and transferability were addressed through complementary strategies. Credibility was supported by triangulating semi-structured interviews, observations, and document reviews to examine consistency between informant accounts, observed practices, and documentary evidence within each service context. Dependability was supported by applying a consistent sequence of data familiarization, coding, categorization, and theme development at

each site before conducting cross-site and cross-context comparisons. Confirmability was strengthened by examining interpretations against evidence from interviews, observations, and document reviews rather than relying solely on participant statements. Transferability was supported by describing the four Puskesmas, the facility-based and outreach service contexts, and the roles of the informants, enabling readers to assess the relevance of the findings to other settings. These strategies supported the contextual grounding of the findings, although the study was not intended to achieve statistical generalization.

Data were analyzed thematically through familiarization, coding, grouping codes into categories, identifying patterns, and constructing themes. Analysis was first conducted within each site and then extended to cross-site and cross-context comparison to identify similarities, differences, and connections in the roles of HIM professionals in maintaining

information continuity. Analysis focused on five areas: (1) documentation and registration; (2) data processing and integration; (3) information quality assurance; (4) information transfer and reporting; and (5) barriers affecting information continuity. Analysis of outreach-service data was supported by OpenCode version 4.03. Findings were presented as thematic narratives and matrices comparing service contexts.

The study followed research ethics principles, including voluntary participation, informed consent, confidentiality, and de-identification of informants. All interview quotations were presented using informant codes to protect participant confidentiality.

Ethical approval for this study was granted by the Research Ethics Committee of Universitas Jenderal Achmad Yani Yogyakarta (Approval No. Skep/171/KEP/2026).

Table 1. Characteristics of study contexts and data sources

Context	Sites and informants	Observation focus	Systems/documents reviewed
Facility-based	Kasih I, Kasihan II, and Pundong Puskesmas; 5 HIM professionals	Registration; EHR distribution and processing; claims entry; storage; quality assurance; information transfer	EHR, DGS/SIMPUS, SOPs, internal regulations, and reports
Outreach	Sedayu 1 Puskesmas; 5 informants involved in ILP	Documentation, data entry, validation, recapitulation, reporting, and information-management coordination	ILP forms/assistance cards, DGS, ASIK, SOPs, and activity reports

registration, EHR distribution and

3. Result and Discussion

Cross-site analysis showed that HIM professionals occupied a consistent position in managing information flow during ILP implementation, although the form of their involvement differed between facility-based and outreach services. All participating Puskesmas used EHRs. In facility-based services, HIM activities primarily included

processing, claims data entry, storage, quality assurance, and EHR content transfer. In outreach services, the identified functions more commonly involved registration/documentation, data entry, completeness checking, validation, recapitulation, reporting, and management of data transfer from field media into

electronic systems.

These findings should be understood within the organizational changes introduced by ILP. The ILP Technical Guidelines position the Management Cluster as responsible for quality management, the Puskesmas network, and information systems, while Puskesmas, Pustu, Posyandu, and home-visit services are directed to use standardized and integrated information systems (Kementerian Kesehatan RI, 2023). Research on ILP implementation in several Indonesian settings also shows that the transition from program-based to life-course services requires changes in organization, human resources, workflows, infrastructure, and interprofessional coordination; these conditions have been reported in Cilegon, Wae Nakeng, Pekalongan, evaluations of health-promotion readiness, Cluster 2 services, and Ciwandan (Rosita et al., 2025; Eda et al., 2025; Mait et al., 2025; Irawan et al., 2025; Yuliwati et al., 2026; Hartana et al., 2026).

3.1 Roles of HIM Professionals in EHR Administration Across Facility-Based and Outreach ILP Services

Minister of Health Regulation No. 24 of 2022, it is stated that the administration of EHR consists of eight activities, namely patient registration, dissemination of EHR data, entry of clinical information, processing of EHR information, entry of claims data, storage of EHR, quality assurance of EHR, and transfer of EHR content. Activities outside the input of clinical information are within the scope of HIM professionals and can be done together with other work units (Kementerian Kesehatan RI, 2022). Results showed that the seven HIM-related dimensions varied in terms of their magnitude and mode of operation between facility-based and outreach programs.

a. Patient registration

In facility-based services, registration was consistently identified across all three Puskesmas. HIM professionals registered patients, matched identity information, and ensured that recorded identities corresponded with source documents and

the EHR. Their involvement was apparent from the earliest stage of establishing patient identity. One informant explained that an HIM responsibility was:

"Ensure that patient identity data are recorded completely and correctly and match the identity information in the EHR." (Informant DG-D)

The interview finding was reinforced by observations of DGS/SIMPUS use and review of the registration SOP, showing that identification and registration functioned as the information entry point before data became accessible to other service clusters.

In outreach services at Sedayu 1 Puskesmas, the role of HIM professionals showed different characteristics. They were involved in registration, service-data entry, completeness checks, validation, recapitulation, reporting, and data management through DGS/SIMPUS and ASIK. These roles were identified mainly in Cluster 1, Cluster 2, and Cluster 3 activities, including mobile health centers, free health screening, and Posyandu. One informant described how outreach episodes remained recorded in the Puskesmas information system:

"...the service is still registered in DGS. DGS is our Puskesmas information system; patients are registered there, and the services provided are then entered..." (Informant LG-1)

Registration in outreach services did not always follow the same pattern. Mobile health center encounters continued to be registered through DGS, allowing service episodes to be recorded within the Puskesmas system and distinguished by service location. In contrast, some Posyandu activities began with ILP forms or assistance cards and were entered into electronic systems at a later stage. Registration in ILP should therefore not be viewed solely as an administrative activity, but as the first mechanism for maintaining continuity of identity: ensuring that information generated at different points of care remains attached to the correct individual.

The significance of identity management is also apparent in Indonesian EHR studies. Mulyana et al. (2024) reported incomplete national identity numbers and

identity elements at Botania Puskesmas, while Masyufah et al. (2024) and Maharani et al. (2024) showed that identity completeness remains an important component of EHR quality assessment in Puskesmas. At community level, Uwase et al. (2025) analyzed more than 231,000 records in mUzima-OpenMRS in Rwanda and identified record uniqueness as an important data-quality dimension, with 88.8% of records uniquely identifiable. These findings reinforce the role of registration as a foundation for preventing community service episodes from becoming detached from an individual's longitudinal service history.

b. EHR data distribution

In electronic systems, distribution shifts from the physical movement of records toward the ability to make the correct data available to authorized users. In facility-based services, observations showed that patient data registered through DGS/SIMPUS could be made available to service clusters. HIM professionals therefore did more than 'send records'; they helped ensure that patient information was available at the point of care where it was needed.

In outreach services, EHR data distribution was not consistently identified as a separate activity because information became available in the system only after documentation or data entry had been completed. Empirically, a more accurate description of the function was ensuring that outreach data already entered into the system became available for information management and reuse at the Puskesmas. The same regulatory dimension may therefore be operationalized differently according to service context.

Primary care interoperability studies show that data availability is not equivalent to data usability. A survey of 2,088 family physicians found that information from other organizations was not always easy to access and use, particularly when it originated from different EHR products; only a minority of respondents considered all types of external information very easy to

use (Everson et al., 2024). More recent studies in the United States and England similarly showed variable interoperability experiences and highlighted how difficulty obtaining usable external information may disrupt care coordination (Everson et al., 2025; Li et al., 2025). The contribution of HIM professionals to EHR distribution should therefore extend beyond availability to ensuring that information can be located, understood, and reused.

c. EHR information processing

In facility-based services, information processing included monitoring completeness, processing visit and disease data, preparing reports, and using information for Puskesmas evaluation and planning. Processed EHR data were used for visit reports, lists of the ten most common diseases, Puskesmas profiles, program evaluation, and service planning.

Processing became more complex in outreach services because data originated from multiple media and applications. Data could be recorded through forms/assistance cards, DGS, spreadsheets, or ASIK and subsequently checked, entered, recapitulated, and reported. In this context, information processing involved data transformation and reconciliation to ensure that information moving between media continued to represent the same service episode without losing meaning.

Experiences with digital community data in other countries show similar patterns. Kirk et al. (2021), in a mixed-methods study in Mali, found that a digital reporting platform could improve the integration of community data into health information systems but still required management of reporting processes and user support. Studies of electronic community health information systems (eCHIS) in Ethiopia likewise showed that digitalization improved retrievability and traceability, while parallel paper-electronic documentation, workload, training, and infrastructure constrained use (Bogale et al., 2023; Hailemariam et al., 2023). Information processing by HIM professionals therefore transforms dispersed data into information

that can be reused for both service delivery and management.

d. Claims data entry

This activity was identified in facility-based services and was consistent across all three Puskesmas, but it was not identified as a specific function in outreach services. This difference indicates that not every EHR administration dimension has the same intensity in every context. Claims functions are more closely associated with individual service episodes that directly involve financing mechanisms, whereas outreach services in this study were predominantly promotive, preventive, screening, and community-based.

Conceptually, this finding prevents the assumption that HIM professionals should perform all functions in equal proportions across every cluster and service setting. ILP reorganizes services around the life course, and information-management activities consequently follow service needs. ILP implementation studies in Cilegon, Wae Nakeng, Ciwandan, and Cluster 2 services likewise show that activities and resource requirements vary across clusters and contexts.

e. EHR storage

In facility-based services, HIM professionals ensured that EHRs were stored electronically and remained available when needed. At one site, storage was also supported by a backup mechanism managed by the system provider. In the EHR environment, storage is no longer merely the placement of a record on a particular medium, but encompasses persistence, retrievability, and traceability of information.

Conditions were more dynamic in outreach services. ILP forms and assistance cards could act as temporary information sources before data were transferred to DGS or ASIK. This created transition points requiring management: when source documents were considered transferred, who verified correspondence between source and electronic data, and how loss or duplication after entry was prevented.

Studies of eCHIS in Ethiopia showed

that data retrievability and traceability are among the main benefits of electronic community systems, but these benefits diminish when paper and electronic documentation operate in parallel without adequate integration (Bogale et al., 2023; Hailemariam et al., 2023). An eCHIS acceptability study involving 587 health workers also showed a gap between high system acceptance and lower actual use, emphasizing that technology availability alone does not guarantee integration in practice (Bogale et al., 2023).

f. EHR quality assurance

Quality assurance was one of the most prominent functions in both settings. In facility-based services, it involved checking EHR completeness, verifying identity, monitoring data accuracy, and controlling information security and confidentiality. At Pundong Puskesmas, completeness-monitoring results were recapitulated and used for quarterly evaluation.

An important finding was awareness that completeness alone did not fully represent information quality. One informant explained that the monitoring available in the system still focused more strongly on quantitative completeness:

"...we can see there which records are incomplete. But it is still more about quantity, not yet about quality." (Informant DG-E)

This statement is important because EHR use does not automatically guarantee information quality. Completeness is one dimension, but information supporting continuity must also be accurate, consistent, timely, traceable, and appropriate to its clinical context. In evaluating routine health data in Indonesia, Sanjaya et al. (2024) used completeness, consistency over time, consistency between indicators, outliers, and external consistency as dimensions of data quality. Quality control in the EHR era therefore needs to move beyond completion checking toward multidimensional data quality assurance.

In outreach services, quality assurance occurred at different points. Data could originate from cadres, health workers, ILP forms, assistance cards, DGS/SIMPUS, or

ASIK. HIM professionals contributed to completeness checks, Posyandu data validation, integration into SIMPUS, recapitulation, reporting, and data-quality monitoring. Outreach quality assurance therefore also included reconciliation across data sources, particularly when information moved from manual documentation into electronic systems. These findings reinforce that technical interoperability and information continuity are related but not identical. Systems may be technically connected, yet continuity is achieved only when transmitted information retains correct identity, completeness, consistency, and sufficient meaning for reuse. HIM professionals thus connect EHR-SIMPUS/DGS-ASIK-SATUSEHAT through identity validation, quality assurance, source-data reconciliation, and monitoring of information transfer. This interpretation is consistent with the systematic review by Kemp et al. (2021), which found that HIM contributions to safety and quality are closely related to data quality, information governance, health-record standards, and information-management competencies. Information quality can therefore be understood as a principal mechanism through which HIM professionals support information continuity in ILP.

International empirical evidence supports multidimensional assessment. Fraser et al. (2024), comparing 3,467 patient records across 50 facilities in Rwanda, showed that EHR data quality was influenced by completeness, agreement with source records, timeliness, and system availability. Uwase et al. (2025) showed that completeness and uniqueness still require control even when community workers collect data electronically. In Indonesia, Sanjaya et al. (2024) highlighted the need to assess consistency over time, inter-indicator consistency, outliers, and external consistency in routine data, while Sangkot et al. (2026) found that community-data quality is shaped by verification structures, data literacy, entry burden, system design, integration, and interoperability. Quality assurance by HIM professionals should

therefore progress from completion checking toward multidimensional information quality assurance. Within ILP, this function acts as a safeguard whenever data move across people, media, applications, and care settings.

g. EHR content transfer

In facility-based services, information transfer was identified in relation to follow-up care and referrals. DGS was reported to be connected to an interoperability platform, while HIM professionals ensured that patient information was sufficiently complete before health professionals used it in the referral process.

In outreach services, findings did not consistently demonstrate formal EHR content transfer. What was more clearly observed was the flow of data from field service points to DGS, ASIK, or the Puskesmas information system. The term transfer should therefore be used cautiously to avoid claims beyond the empirical evidence.

The ILP Technical Guidelines require outreach-service data to be integrated with facility-based data and consolidated into a unified information base for area monitoring (Kementerian Kesehatan RI, 2023). In the national ecosystem, SATUSEHAT uses HL7 FHIR for exchange between systems. Faisal and Nakayama (2024) showed that data could be mapped to FHIR resources to support standardized exchange on SATUSEHAT, while Heryawan et al. (2025) found that EHR-SATUSEHAT integration still faced server issues, selection of FHIR profiles, and mapping to standardized terminology.

Astari et al. (2025), analyzing dashboard data from 33,901 health facilities, likewise showed that the existence of an interoperability platform did not automatically guarantee consistent data submission; the proportion of facilities meeting targets declined as implementation targets increased. Technical integration therefore cannot be equated with information continuity. Systems may be connected, but information is truly continuous only when transferred data are

correct, complete, identifiable, received, and reusable

Table 2. Synthesis of HIM Activities in EHR Administration Supporting ILP Information Continuity

EHR administration dimension	HIM activities in facility-based services	HIM activities in outreach services	Contribution to information continuity
Patient registration	Registers patients, verifies identity, and ensures consistency of patient identity data in EHR/DGS.	Registers services through DGS during mobile health center/free health screening activities and ensures that field-recorded identities are linked to the correct individual.	Maintains continuity of identity so that each service episode remains linked to the same patient (continuity of identity).
EHR data distribution	Ensures registered patient data are available and accessible to service clusters/units according to need and user authorization.	Ensures outreach-service data already entered into the system are available for information management and use at the Puskesmas.	Ensures information availability for personnel or units that need it to continue care (information availability).
EHR information processing	Processes EHR data into service information through completeness monitoring, visit-data processing, reporting, and provision of management information.	Enters, checks, validates, recapitulates, and processes service data from forms/assistance cards, DGS, and ASIK for reporting and monitoring.	Transforms data from multiple sources into consistent information that can be reused (information usability).
Claims data entry	Enters and manages data required for financing claims based on service information documented in the EHR.	Claims data entry was not identified as a specific HIM activity in outreach services.	Links service documentation with financing processes where applicable.
EHR storage	Ensures EHR data are stored electronically, retrievable when needed, and supported by data management and backup.	Ensures data initially recorded on forms/assistance cards are transferred to and stored in electronic systems according to workflow; source documents are retained until entry is complete.	Maintains information persistence, traceability, and availability throughout care processes (persistence, retrievability, traceability).
EHR quality assurance	Checks EHR completeness and accuracy, verifies patient data, monitors documentation compliance, and safeguards security and confidentiality.	Checks completeness, validates and reconciles service data, and monitors timeliness and consistency before recapitulation or system entry.	Ensures information remains accurate, complete, consistent, trustworthy, and fit for reuse (information reliability).
EHR content transfer	Ensures completeness of EHR information required for follow-	Directs and ensures the flow of service data from outreach points to	Supports movement of information across settings without loss of

up/referral care and supports information transfer through integrated electronic systems.

DGS/ASIK and the identity, content, or Puskesmas information service context system; formal EHR (continuity across content transfer was not settings). consistently identified.

3.2 HIM Professionals as Managers of Information Quality and Continuity in the EHR Ecosystem

The synthesis of the seven dimensions shows that the contribution of HIM professionals should not be understood as a collection of isolated tasks. Registration, distribution, processing, storage, quality assurance, and transfer form an information-management chain. If one point in this chain fails, information may lose its identity linkage, become unavailable when needed, lose reliability, or fail to move to the next service setting.

These findings extend the interpretation of HIM roles from medical record administration toward information stewardship. In an ecosystem where all participating Puskesmas used EHRs, HIM professionals were increasingly required to ensure information quality, accessibility, integrity, security, and reuse. Global digital-health workforce census data show that HIM professionals perform functions spanning functional, technological, and governance domains rather than purely administrative work (Butler-Henderson et al., 2024). Lee and Cho (2024), in a survey of HIM field experts in Korea, similarly demonstrated increasing competency needs in digital-data management, analytics, and information systems in EHR environments.

Based on the findings, the mechanisms through which HIM professionals contribute to information continuity can be understood through four interrelated functions. First, continuity of identity keeps information from different service episodes linked to the same person. Second, information quality assurance ensures completeness, accuracy, consistency, timeliness, and trustworthiness. Third, information integration and availability ensure that information from different sources enters the system and becomes available to those who need it. Fourth, persistence and traceability ensure

that information remains stored and that its movement can be traced.

This distinction is important because digitalization, integration, interoperability, and information continuity are not synonymous. Digitalization means that information is represented electronically; integration means that components or workflows are connected; interoperability refers to the capacity of different systems to exchange and use data; and information continuity emphasizes that meaningful information remains available and usable throughout a patient's care journey. Experience with health information exchange (HIE) in primary care shows that information exchange that is actually used can support care transitions. Sloan-Aagard et al. (2023) found an association between primary care physicians' HIE use after hospital discharge and patterns of subsequent hospital-service utilization. Query-based and directed HIE have also been shown to operate complementarily in obtaining additional information and supporting care transitions (Vest et al., 2020).

Thus, EHR use and connection to SATUSEHAT provide infrastructure, while information continuity continues to require human and organizational control. In this study, HIM professionals occupied a strategic position linking these elements.

3.3 HIM Roles by Cluster and Differences in Involvement Across Facility-Based and Outreach Services

Cross-context mapping showed that HIM roles in ILP were distributed across several clusters and differed between facility-based and outreach settings. In facility-based services, HIM activities were most apparent in Cluster 1 Management and cross-cluster functions, particularly through information-system management, EHR administration, registration, quality management, reporting, and provision of information to multiple service clusters. This

finding is consistent with the ILP Technical Guidelines, which place information systems and quality management within the Management Cluster (Kementerian Kesehatan RI, 2023).

In outreach services, HIM involvement was identified in Cluster 1, Cluster 2, and Cluster 3, particularly through registration, data collection/entry, validation, transfer to electronic media, recapitulation, and

reporting for Posyandu, free health screening, and mobile health center activities. Specific HIM roles in Cluster 4 were not strongly identified in the study data and therefore should not be assumed solely from the regulatory structure. The relationship between clusters, care settings, HIM activity dimensions, and information-continuity mechanisms is summarized in Figure 1.

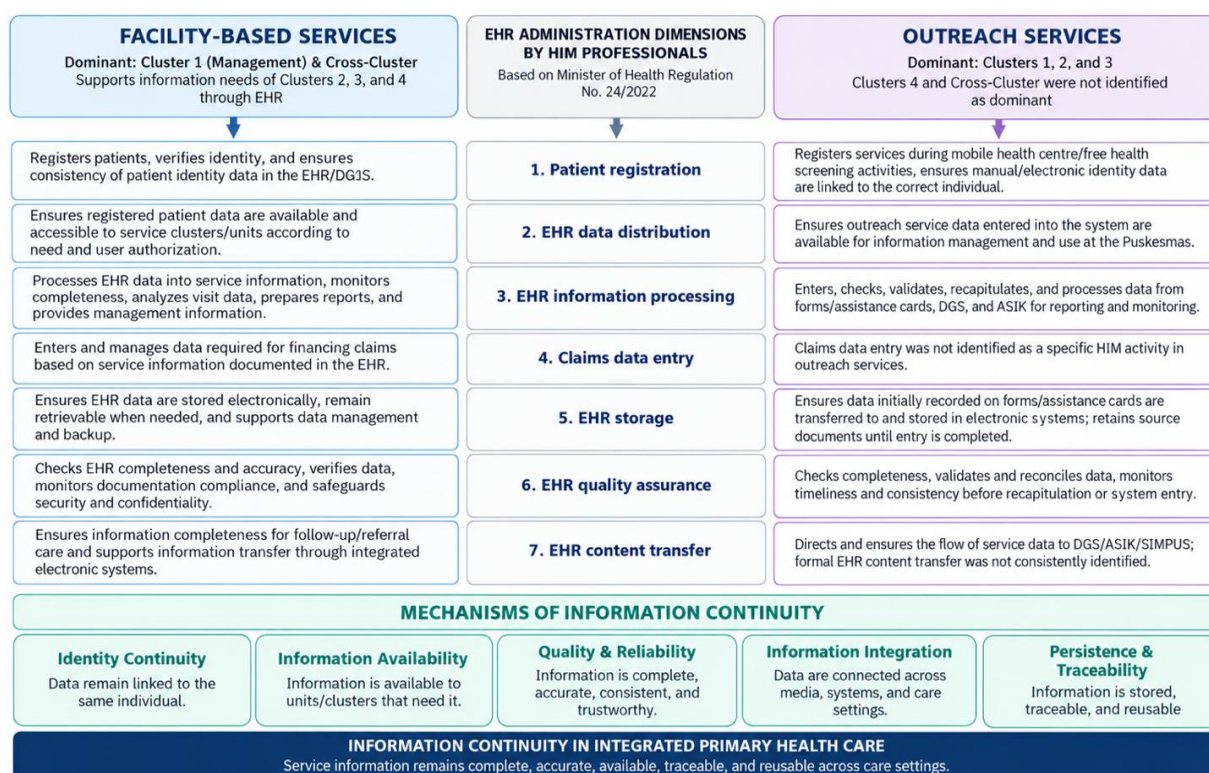


Figure 1. Map of HIM Professional Roles in ILP Implementation by Cluster, Care Setting, EHR Administration Dimension, and Information-Continuity Mechanism*

***Note:** The conceptual framework and content of this figure were developed by the authors based on the study findings. A generative AI tool was used to generate the visual layout and improve text legibility. The authors are responsible for the accuracy of the figure's content.

Another finding was that HIM involvement in outreach services was not always marked by physical presence at each service activity. Several informants explained that HIM professionals prioritized facility-based services, while personnel attending Posyandu could include health-promotion staff, nutritionists, physicians, nurses, or community cadres. Nevertheless, HIM professionals remained involved in information management after activities or in selected outreach services such as mobile health centers by performing registration

through DGS.

These findings suggest that the role of HIM professionals is not always identical to their physical presence at the point of care. In facility-based services, information-management functions generally occurred alongside service delivery (point-of-care information management). In outreach services, some functions occurred after field data had been generated (post-service information management). The key indicator is therefore not physical presence alone, but whether the information-management

system ensures that service results remain recorded, checked, integrated, and available for reuse.

Similar patterns have been reported in digital community systems in other settings. Bogale et al. (2023) and Hailemariam et al. (2023) showed that health-information personnel and supervisors provided important support for eCHIS implementation even when community services were delivered by field workers. Digitalization of community data in Mali likewise demonstrated that integration requires interaction among community workers, supervisors, and system managers at different levels rather than the activity of a single profession at the point of care (Kirk et al., 2021).

Hybrid documentation was another important characteristic of outreach services. ILP forms or assistance cards continued to be used when network connectivity, devices, or field conditions did not allow immediate electronic entry. Data were subsequently transferred to DGS or ASIK. This pattern can be understood as an adaptive mechanism to sustain service delivery, but it also creates new risks: delayed entry, duplication, discrepancies between source and electronic data, and potential loss of context.

Hybrid workflows should therefore not be viewed simply as 'not yet digital.' The more important issue is whether reconciliation mechanisms ensure that manually recorded data are ultimately entered completely and on time and can be traced back to their source. Experience with eCHIS in Ethiopia shows that parallel paper-electronic documentation is a major barrier to system use. In Indonesia, Sangkot et al. (2026) likewise showed that high data-entry burden, unclear verification structures, limited data literacy, and system-integration problems can reduce community-data quality.

3.4 Barriers to Information Continuity in ILP Implementation

The barriers identified in this study indicate that information continuity is a sociotechnical issue. In facility-based services, constraints included internet

disruption, system errors, server downtime, maintenance, power outages, adaptation to system changes, and the presence of registration personnel without an educational background in Medical Records and Health Information.

In outreach services, these issues were compounded by limited laptops/tablets, varying signal quality across areas, differences in user capacity, use of multiple applications, hybrid documentation, and data-entry work that had to be completed after returning to the Puskesmas. One informant described failed field entry as creating 'double work' because the data had to be brought back for completion.

National findings on ILP show similar problems. Rosita et al. (2025), Eda et al. (2025), Mait et al. (2025), Irawan et al. (2025), and Hartana et al. (2026) reported barriers involving human resources, infrastructure, workflow changes, staff understanding, and coordination in ILP implementation. EHR readiness studies in Bekasi and Susoh Puskesmas likewise indicate that digital transformation requires mutually supportive organizational, technological, human-resource, and infrastructural readiness (Khairunnisa & Adisasmito, 2024; Fitriyandina et al., 2024).

International evidence reinforces that technological disruption does not operate in isolation. Bogale et al. (2023) identified infrastructure, training, supervision, workload, and parallel documentation as barriers to eCHIS; Hailemariam et al. (2023) demonstrated links between individual, organizational, and contextual factors; and Fraser et al. (2024) showed that system uptime was associated with EHR data quality.

At the interoperability level, Heryawan et al. (2025) showed that SATUSEHAT challenges extend beyond connectivity to data mapping, selection of FHIR profiles, and semantic interoperability. Astari et al. (2025) identified challenges in consistent data submission, while Sanjaya et al. (2024) and Sangkot et al. (2026) demonstrated that routine data quality in Indonesia remains influenced by

organizational structures, verification processes, and user capacity.

Strengthening information continuity therefore requires more than additional bandwidth, devices, or application features. Governance must clearly define responsibility at each data-transition point, the authoritative data source, verification procedures, deadlines for delayed entry, methods for identifying duplicate data, and processes for correcting and tracing errors.

In this context, the position of HIM professionals within the Management Cluster should be strengthened as managers of information quality and continuity. Minister of Health Regulation No. 24 of 2022 provides a professional basis by assigning HIM professionals responsibilities across nearly the entire EHR administration cycle (Kementerian Kesehatan RI, 2022), while the ILP Technical Guidelines place information systems within the Management Cluster (Kementerian Kesehatan RI, 2023). Together, these frameworks support an HIM role extending beyond registration to data-quality governance, paper-electronic reconciliation, information-flow audits, interoperability monitoring, and user-capacity strengthening.

4. Conclusion

HIM professionals played a strategic role in supporting information continuity in ILP implementation across both facility-based and outreach Puskesmas services. In facility-based services, their roles were concentrated in the Management Cluster and cross-cluster functions through patient registration, EHR distribution and processing, claims data entry, storage, quality assurance, and EHR content transfer. In outreach services, HIM involvement was mainly identified in Clusters 1, 2, and 3 through registration, data entry, completeness checking, validation, recapitulation, reporting, and reconciliation of paper-based documentation with electronic systems.

Differences in service setting produced different patterns of involvement. In facility-

based services, information-management functions occurred more directly within the EHR workflow, whereas in outreach services some HIM functions occurred after services had been delivered, when field data were checked, validated, reconciled, and entered into DGS/SIMPUS or ASIK. The role of HIM professionals is therefore not defined solely by physical presence at the point of care, but by the continuity of information-management functions throughout the data journey.

Integratively, HIM activities supported information continuity by maintaining patient identity, information availability, data processing and use, storage and traceability, quality assurance, and information movement across settings. EHR use and integration with the SATUSEHAT ecosystem provide essential infrastructure, but information continuity still depends on governance, quality control, and professional HIM roles. Network and system disruptions, device limitations, user competencies, workload, hybrid documentation, and role distribution further demonstrate that information continuity in ILP is a sociotechnical issue requiring integrated strengthening.

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