Power System Technology
ISSN:1000-3673

Received: 16-03-2025 Revised: 05-04-2025 Accepted: 02-05-2025

Bridging Administrative Workflows and Clinical Data Systems

Nuri Rawaf Alenazi[1], Wejdan Amein Abdullah[2], Reem Sultan Alshaibani[3], Ali Mutlaq Alsubaie[4], Nourah Thani Mashal Alrasheedi[5], Noura Abdullah Alkharji[6], Manar Ibraheem Alwehaibi[7], Norah Mohammed Aldosary[8], Duaa Ali Alyami[9] and Faisal Barjas Alharbi[10], Salma Ibrahim Suleiman Al-Quhaidan[11] and Zaid Mohammed Al-Ruwaili[12]

[1] Corresponding Author, Health informatics technician, National guard health affairs

[2,3,6,7,8,9,11] Health informatics technician, National guard health affairs

[4,10] Health Administration Technician, National guard health affairs

[5] Neurophysiology Technician, National guard health affairs

[12] Patient Care Assistance, King Abdulaziz Medical City

Abstract

Administrative workflows denote the established procedures through which tasks are accomplished during an episode of care. Such workflows are prevalent in various sectors including finance and healthcare, involving multiple responsibilities and actors. Multiple administrative workflows can be active concurrently and in sequence. When documentation or data capture is embedded within these workflows, systems and professionals must account for clinical care priorities. Currently, a gap exists between these workflows and clinical data systems, hindering effective data capture and transfer, which ultimately jeopardizes patient safety and timely care delivery (Cofiel et al., 2013).

Keywords: Administrative workflows, clinical data systems, interoperability, workflow optimization, healthcare integration, data management, process improvement, patient care.

1. Introduction

Administrative workflows comprise the sequence of hierarchical tasks performed by staff to deliver care at the organizational level in the healthcare sector, including the recording of appointments, admission and discharge of patients, and financial reporting. They are often intricate, complex, and compounded by cutting-edge medical technologies (Cofiel et al., 2013). Clinical data systems consist of software designed to manage and streamline information related to patient care and clinical workflows. They typically offer modules for scheduling, registration, patient care, clinical documentation, and billing, commonly existing as standalone applications with limited interoperability with other healthcare systems. The absence of effective coordination between these definitions hampers the potential of Clinical Data Systems to optimize care.

Power System Technology
ISSN:1000-3673
Received: 16-03-2025 Revised: 05-04-2025 Accepted: 02-05-2025

2. Understanding Administrative Workflows

Administrative workflows define how patients move through a hospital and the worklists within patient pathways. They determine the order, time allocated, and role responsibilities for each activity. A failure to execute an administrative workflow correctly will invariably cause delays and extra costs. When a hospital admits a patient, a route is determined by relevant disease, location of the hospital, and other factors. Each hospital may have more than 500 different routes, and each route is linked to a patient pathway with several hundred activities that represent the care and diagnostic plan based on clinical guidelines and the hospital's own protocols. An administrative workflow specifies the order, time allocation, and roles for the activities within the pathway (Gooch & Roudsari, 2011). Administrative workflows focus on the activities required to move patients through hospital wards, departments, and units, as well as the worklists that hospital staff use. Administrative procedures are often registered manually and are sometimes augmented by an electronic form that is integrated into a clinical data repository or document management system (Cofiel et al., 2013).

2.1. Definition and Importance

Administrative workflows are sets of repeatable, definable activities relying on an organized sequence of tasks. In a healthcare context, such workflows include a number of activities related to financing, appointments, service clarification/authorization, insurance coverage, payments, check-ins/outs, scheduling, and informed consent. Activities in healthcare workflows go hand-in-hand with the flow of clinical data, reports, and documents. A significant gap between administrative workflows and clinical data systems can lead to patient admissions being delayed by pre-authorization issues from insurance organizations. In another case addressing a radiation safety reporting process, MediaWiki was identified as a desirable platform to properly support both documenting and tracking the incident-related administrative workflows. A bespoke wiki-based tool was created which provides a fully-customisable environment and rich collaboration features capable of supporting the complex process. The paper closes by presenting a wiki-based prototype designed to support workflow enactment and discusses its potential advantages compared to traditional workflow management systems (Gooch & Roudsari, 2011).

2.2. Key Components of Workflows

Workflow can be broadly defined as a set of steps or activities needed to carry out a particular task. In an administrative context, a workflow describes the sequence of tasks and associated activities for acquiring, processing, and storing administrative data. This process typically applies to business transactions such as registration, appointments, triage, admission, discharge, and billing, all of which produce operational data that must be

Power System Technology
ISSN:1000-3673
Received: 16-03-2025 Revised: 05-04-2025 Accepted: 02-05-2025

monitored to assess quality and identify opportunities for improvement. The key components of a workflow include activities, actors, artifacts, and contexts. Activities correspond to the steps of the workflow, which can be arranged sequentially, in parallel, or iteratively. Activities are performed by actors (e.g., administrative staff, clinical staff, management personnel, or patients), either independently or in collaboration, and they make use of artifacts such as documents, physical objects, or computer systems. These actors operate within specific contexts—the social, organizational, and physical environments and conditions under which the activities are performed (Gooch & Roudsari, 2011) (Cofiel et al., 2013).

2.3. Challenges in Administrative Processes

Health organizations invest in systems for admission, day-to-day operations, content management, specialized clinical tasks, and follow-up assessments. The disconnected nature of these systems at different stages causes poor follow-through, delays that may occur when necessary forms are forwarded, and incomplete data—ultimately impeding patient care. When clinical workflow is not viewed as a system with boundaries, but rather as a set of discreet tasks distributed across a spectrum of people and clinical stages, “dissonance” arises (Cofiel et al., 2013).

Though models of pre-admission and admission workflow exist, treatment stages remain less defined. Along the treatment cycle, there is no clear consensus about which steps should be mandatory and which optional before progressing. Nor is there an established mechanism to monitor an encounter in order to prevent the omission of forms that may be logically required at a given stage. Though comprehensive documentation is legally mandated (Rohner, 2018) , the volume of documents and details needed to preserve records inhibits physicians and practitioners from prioritizing forms. Rather, emphasis is placed on delivering care quickly, potentially at the expense of ensuring all details are entered completely. Psychiatrists also tend to believe that clinical narrative supersedes paperwork, reinforcing this disposition to shift attention elsewhere. Clinicians furthermore view the detailed information already captured at referral, admission, and triage as an incentive not to replicate the same information.

3. Overview of Clinical Data Systems

There are many interrelated clinical data systems, such as laboratory and pharmacy systems, that provide updated clinical data on healthcare patients. Commonly, clinical data systems are implemented with a focus on management tasks rather than bridging the gap between administrative workflows and clinical tasks. Although clinical data systems provide methods to communicate patient data, this approach does not necessarily optimize workflow (H. AlHazme et al., 2014). The mismatch between workflow and data system hampers

Power System Technology
ISSN:1000-3673
Received: 16-03-2025 Revised: 05-04-2025 Accepted: 02-05-2025

KlinikManager, as information must be copied and pasted from KlinikManager to the clinical data system, increasing the likelihood of errors (Gooch & Roudsari, 2011).

3.1. Types of Clinical Data Systems

Clinicians have developed numerous clinical data-management systems that manage both textual and image-related data, ranging from structured data entry to free-text processing with image annotation (Gooch & Roudsari, 2011). Many of these systems employ XML to represent both data and procedural knowledge, striving to achieve interoperability through the use of architecture-independent archetypes or openEHR format models. These systems typically focus on the acquisition and management of clinical data within a limited context, lacking comprehensive models of interrelated non-clinical and clinical processes and workflows.

The relative absence of workflow-based process models has created a mismatch between administrative and clinical domains, impeding interoperable communication—especially when this gap is emphasized by a stringent separation between short- and long-term data-maintenance policies on either side. Experiences in electronic document-delivery systems demonstrate that harmonizing clinical and administrative policy differences in a generic, model-driven fashion can yield virtual clinical repositories with no visible border between local and foreign systems.

Past and current clinical data systems do not yet constitute an integrated clinical platform; their operational scope tends to be limited, preventing organizations from exploiting a genuinely shared information system. This limitation constitutes a major obstacle to demonstrable improvements in clinical service organization, efficiency, and quality, underlining the critical need for a clinical data-system approach that is more closely oriented towards clinical and organizational workflows and processes.

3.2. Data Management in Healthcare

Managing clinical data presents an ongoing challenge to healthcare organisations because it is a core source of information for assessing quality and outcomes of care and for research (Marés et al., 2014).

Organisations are under increasing pressure to reduce clinical and administrative costs through improved processes and information systems. Many data management systems deal with clinical trial, experimental or image data, but do not support the full range of enterprise clinical data resources. Moreover, the capture of these resources is not integrated to clinical or administrative workflows throughout healthcare (Green et al., 2022). This leads to a considerable gap between information capture and use across all administrative groups, clinicians, and patients.

Power System Technology
ISSN:1000-3673
Received: 16-03-2025 Revised: 05-04-2025 Accepted: 02-05-2025

3.3. Interoperability Issues

Interoperability refers to the ability of two or more systems to logically share a particular information object (D. Knight, 2004). Its importance lies in the fact that no unit of work is fully self-contained; organizational entities must interact to fulfill their duties. Without interoperability, such systems cannot communicate, rendering cooperative work impossible. The problem of interoperability thus comprises two facets: agreeing on a suitable mechanism for transferring information and understanding the shared meaning of that information.

The healthcare industry exemplifies the challenges of interoperability. Different facilities tend to adopt distinct systems for creating and storing information, complicating immediate interoperability. Many smaller providers rely extensively on paper-based documentation, exacerbating gaps in timely access to patient information. Obtaining records from these entities involves manual requests, physical document transfer, and manual data entry into local information systems, processes that are both time-consuming and costly.

The openly debated problem of heterogeneous data formats is only a minor element of the broader issue. A larger, more obdurate problem concerns organizations' pronounced preference to meticulously control the manner and extent of information disclosure. Numerous proposals exist to improve interoperability between public and private healthcare providers, yet none fully address the complexities of data-sharing agreements, including associated legal obligations, privacy concerns, and reliance on external authorities to determine data dissemination.

Current clinical data systems appear incapable of bridging the relevant communications gap between hospital administration (HA) and clinical departments (CDs). Administrative managers must coordinate resources such as beds, theatre time, and clinical staff and monitor numerous referral contracts with other organizations and public agencies. These concerns superficially relate to direct clinical information but rarely culminate in an integrated information-management perspective that allows consideration of workloads strictly in terms of the type, complexity, and urgency of disease being experienced by present and future in-patients.

4. The Intersection of Workflows and Data Systems

Bringing together administrative workflows and clinical data systems exposes significant gaps between representative processes and the management of clinical information. Clinical data systems employed by administrative personnel describe the types of data recorded during a particular workflow, as opposed to the workflow itself. Reconciling administrative workflows with clinical data systems enhances the overall system and helps avoid unnecessary data entry.

Power System Technology
ISSN:1000-3673
Received: 16-03-2025 Revised: 05-04-2025 Accepted: 02-05-2025

The administrative realm offers insight into the 'whys' of various modalities, while clinical data systems specify the 'whats' of the required recording. Hence, administrative workflows gain focus once supporting clinical data systems are identified; the clinical-data sector provides granularity for workflows as the availability of suppliers for promoting a modality is readied. Several studies present cases that illustrate the consequences of failing to bridge the administrative and clinical domains. The administrative side of a clinical enterprise includes various workflows, frequently centered on clinical data.

Administrators schedule facilities and allocate required operators. When suitable systems govern the data, the result is that administrative processes remain stable through time, even as data systems change. Conversely, if data systems govern the flows, then workflows continuously change. Laboratory and radiological services are exceptional, wherein frameworks are mature enough that workflow standards guide the implementations of data systems.

Specialized workflows constitute the cornerstone of an enterprise and quickly lead to bottlenecks. Specification and formalization of business flows at a global level enable seamless bridging of the administrative and clinical domains (Gooch & Roudsari, 2011). The classical clinical research enterprise emphasizes that clinical practice and research remain separate endeavors. Owing to their differing goals, there is an inherent difference in workflow and data-management requirements. Collaboration between the clinical and research teams often exhibits efficiency issues, overlooked dissonance in the process (Cofiel et al., 2013).

4.1. Identifying the Gap

Both administrative workflows and clinical data systems are crucial parts of healthcare delivery. Administrative workflows direct the daily activities of healthcare providers, each of which should be supported by operational data systems. Clinical data systems manage digital health data collected at scale, and they have limited ability to connect with administrative workflows (Cofiel et al., 2013).

Technical systems for managing or supporting administrative workflows are scarce or lack maturity. Consequently, administrative workflows are often carried out using an ad-hoc mixture of digital and physical methods, e.g., online forms combined with paper forms, or time scheduling relying on a combination of legacy systems and email. The absence of operational digital systems for providing real-time information on administrative workload places a significant strain on hospital supervisors and leads to suboptimal utilization of resources. On the other side, clinical data systems represent an entire class of digital solutions based on a wide spectrum of technologies, ranging from traditional relational or distributed databases to big data processors. Clinical data systems for all types of data (e.g., medical

Power System Technology
ISSN:1000-3673
Received: 16-03-2025 Revised: 05-04-2025 Accepted: 02-05-2025

images, bio-signal data, medical laboratory tests, diagnostic reports, administered medications, and questionnaires) are widely adopted by the wider scientific and clinical communities, supporting the effective collection and management of heterogeneous clinical data. However, clinical data systems typically operate independently and do not integrate with administrative workflows. A well-known example is patient-time management following scheduling activities: hospital staff responsible for scheduling patients for a specific diagnostic exam are unaware of developed events and cannot retrieve information on whether patients attended appointments or if the tests were actually performed.

Most of the currently adopted solutions that manage clinical workflows and support the administration of clinical pathways focus on clinical decisions. Examples include tools for operatory rooms and related activities, appointment scheduling, patient admission-discharge-transfer, computerized physician order entry, and guides for drugs prescription. Depending on the application, clinical workflows and clinical data are often considered separately or integrated at a very coarse level.

4.2. Impact on Patient Care

Administrative workflows substantially impact the quality of care (Zhang et al., 2019) , yet mechanisms to bridge these processes with clinical data systems remain either underdeveloped or underutilized. They are often neglected or managed as separate entities. Consequently, high-quality data captured by clinical data systems seldom benefit administrative processes. This disconnect can lead to errors, incomplete information, information delays, and redundancies. As accuracy and completeness of administrative information enhance the effectiveness of clinical data systems, bridging the two can improve patient care by enabling just-in-time data access and accurate data capture at various touchpoints.

4.3. Case Studies of Integration

Case studies from governance organisations in Ontario, Canada, and the north of England demonstrate that bridging the gap between administrative workflows and clinical data systems yields improvements (J Cruz-Correia et al., 2007). The manner in which data systems are implemented has a direct impact on patient care. The projects, which involved the integration of geographically separated healthcare systems with disparate data representations, extensively used electronic messaging for communication, adopting HL7 and various web-service architectures as standards. They integrated a broad spectrum of clinical data, including radiological images, consultation notes, medication lists, referrals and discharge letters, and laboratory and pathology reports (Gooch & Roudsari, 2011). Implementers encountered both workflows that matched the recommended operational model and those that deviated from it. Bridging gaps between workflows and data systems, rather

Power System Technology
ISSN:1000-3673
Received: 16-03-2025 Revised: 05-04-2025 Accepted: 02-05-2025

than harmonising one to the other, constituted a significant part of the work and formed a major part of the benefits realised. The case studies offer valuable insights into the factors that need to be addressed when attempting to link hospital information systems with healthcare organisational and departmental processes.

5. Strategies for Bridging the Gap

Integration of administrative workflows and clinical data systems occurs across various levels of healthcare delivery, from electronic health record animation and clinical task timeliness to resource scheduling, population health, and clinical competencies (Cofiel et al., 2013). Data systems can either encode or produce such workflows, or enable their enactment; yet, a structural gap persists between the working knowledge embedded in administrative workflows and the varying scopes, objects, and representations of clinical data systems.

Overcoming this disjunction involves revisiting diverse integration approaches and considering the framing of specific solutions based on pragmatic level of endeavor, the balance of current clinical and administrative work, and the perspective through which the problem is viewed. Addressing the gap is best approached as an opportunity to align and blend the “business” and “clinical” monitoring capabilities of clinical organizations. The necessary solutions may be social, technological, or procedural. Accordingly, the following section reviews strategies and tactics for bridging the divide and establishing a more effective relationship between administrative workflows and clinical data systems.

5.1. Process Optimization Techniques

Workflow optimization is typically approached by modeling organizational patterns and formalizing medical knowledge (Gooch & Roudsari, 2011). Modeling tools, guideline ontologies, medical ontologies and organizational ontologies can be combined. Process logic, knowledge concepts and data mapping enable model verification and clinical workflow simulation. Workflow modeling therefore provides visualization, execution and dynamic adaptation. Clinical process models support revision, maintenance and reporting. A real-world process can be represented by a formal model in which discrete events occur and are performed by users with specified roles. However, decomposing care tasks into linear steps is not always conceptualized as a most particular operation, since parts of care tasks may be completed or abandoned temporarily with others being performed partially or in parallel. Semantic web approaches propose an open-world view that does not require all facts to be explicitly stated and that allows new facts to be introduced without a pre-defined schema. This contrasts with the closed-world assumption of most previous approaches that had to be based on a complete, closed set of statements.

Power System Technology
ISSN:1000-3673
Received: 16-03-2025 Revised: 05-04-2025 Accepted: 02-05-2025

5.2. Leveraging Technology Solutions

Seven priority focus areas emerged to guide the complex transformation required to build a 21st-century integrated system of care: Issues affecting interoperability among data and information technology systems; patient identification; the capture and sharing of clinical information; case management processes; discharge criteria; regulatory barriers and incentives; and principles to guide implementation of strategies that address the six preceding issues. Priorities identified and implemented involve the design of patient-centered administrative and clinical workflows, recommendations to align activities at the federal, state, regional, and local levels to achieve key objectives, and the development of a transformation path to move from the current environment to the envisioned future. Both clinical and nonclinical data are essential to understand use of, access to, performance of, and outcomes from healthcare services. The research defines key attributes of information flow, transitions of care, entities, events, and the data required to support effective care delivery during the transitions from inpatient to outpatient and to other types of care (Zayas-Cabán et al., 2021).

5.3. Training and Change Management

Education generally follows the launch of an electronic health record (EHR) rather than preparing nurses in advance. Training consists mainly of demonstrations of program features or the “how-to” use of the EHR system. To better equip nurses, administrators ensure the continuous provision of updates regarding workflow changes, as in the case of the Perry County Memorial Hospital’s (PCMH) staffing of an “electronic classroom” to assist nurses with EHR use and provide timely workflow information (Lynn Atienza San Jose, 2017).

6. Best Practices for Integration

Integration of clinical knowledge management and business process support provides a framework for creating and linking a clinical knowledge repository with an enterprise business process management platform (Gooch & Roudsari, 2011). Computer-interpretable guideline representation enables evidence-based medicine to be incorporated into healthcare workflows, guiding practice and helping to deliver care in line with clinical guidelines and policy. Guidelines often assume the existence of an underlying, reliable, well-structured information infrastructure to deliver or collect data and events, yet many organizations face challenges in developing a coherent strategy across governance, medical knowledge, data, and systems platforms.

The security associated with embedded ActiveX controls is relatively low, although digital certificates can provide some protection. Embedding ActiveX controls in practice management systems is feasible if the system supports ActiveX (Madanamohanan, 2005). Systems integration can be expanded by adding functionalities through incremental builds

Power System Technology
ISSN:1000-3673
Received: 16-03-2025 Revised: 05-04-2025 Accepted: 02-05-2025

once connection and data exchange are established. Users' intended uses must be studied in detail, as some may only want to retrieve records while others may require editing or advanced functions. The choice of integration method depends on factors such as interface availability, cost, internet connection, required functionalities, access locations, and document security. Web-enabled system integration solutions are increasingly accepted, allowing access to information from multiple locations via the internet and offering high security, scalability, and general applicability. Standards in healthcare systems facilitate better sharing of information between different vendors and systems, enabling electronic exchange of medical data across diverse platforms.

A prospective workflow assessment can enhance the acceptability and performance of eHealth interventions in clinical practice (Staras et al., 2021). A four-step strategy increases the compatibility between eHealth interventions and clinical workflow, as compatibility is a key predictor of clinician use. By following a step-by-step guide, eHealth researchers can study clinical workflows to design implementation strategies that complement rather than compete with clinical care. Engagement of clinical staff in implementation planning increases buy-in to the intervention; while adaptations remain possible, they should be implemented only after considering effects on the core intervention.

6.1. Collaboration Between Departments

Healthcare organizations organize their work around three concepts: administrative workflows, care pathways, and information pipelines. Although several electronic tools have been developed to model and manage them separately, intensive patient-centered care requires these three concepts to be seamlessly connected (F. J. Vos et al., 2020).

Approximately 75% of a nurse's time is administratively oriented, involving continuous care coordination, material management, and the processing of requests made by clinicians. The administrative workforce responsible for service provisioning has grown significantly in Western healthcare systems, making the management of the corresponding workflows crucial (L. Priest et al., 2014).

A wide range of clinical data systems are currently available, including electronic medical records, computerized provider order entry platforms, picture archiving and communication systems, and clinical data repositories. These software solutions have been designed to cover the increasing need for clinical data management, storage, and processing. They support the clinical workforce directly in its core activity. However, an administrative staff member elaborating a patient request currently has to switch between a specific information system that organizes the work (usually an Enterprise Resource Planning platform) and various clinical applications providing, in a rather fragmented way, request-related information. This

Power System Technology
ISSN:1000-3673
Received: 16-03-2025 Revised: 05-04-2025 Accepted: 02-05-2025

repeated context switching is undoubtedly a source of inefficiency and a well-documented risk factor for errors, yet a gap still exists.

6.2. Continuous Improvement Models

Continuous improvement models facilitate the seamless integration of administrative workflows and clinical information systems by creating ongoing optimization programs. They provide a framework for analyzing and enhancing processes, thus limiting the unwanted side effects of Healthcare Information Technology (HIT) deployment. Unlike isolated, one-time interventions, continuous improvement fosters a perpetual cycle of refinement, supporting the development of resilient, high-performing systems capable of adapting to evolving challenges. By embracing continuous improvement, healthcare organizations can maintain alignment between human factors and technological solutions, ensuring safe, sustainable, and high-quality care delivery (Mohd Yusof et al., 2012).

6.3. Monitoring and Evaluation Metrics

Monitoring and evaluation metrics constitute a multifaceted approach that quantifies the performance of integrated administrative workflows and clinical data systems. The effective implementation of such metrics supports the development of reliable and valid electronic health record (EHR) use metrics that are cost-efficient and rapidly deployable (R. Levy et al., 2023). Metric specification assigns clear definitions to each indicator, ensuring consistent comprehension. Metric capture involves gathering raw data from varied information sources, and metric collate aggregates data from multiple locations for subsequent processing. Metric analysis interprets and assesses aggregated data to assess performance levels. Reporting conveys analysis outcomes to relevant stakeholders, while feedback facilitates continuous workflow optimization. Sharing promotes transparency by disseminating findings to a broader community. Review guides the continuous evaluation and refinement of existing metrics, supporting the sustained enhancement of integrated workflows (Chen et al., 2023).

7. Future Trends in Healthcare Integration

The rapid advances in digital technologies have served as valuable resources for the improvement of information exchange, collaboration, and knowledge sharing among medical providers, healthcare specialists, researchers, and patients. Naturally, the healthcare industry has been regarded as one of the most rapidly developing data-intensive areas where efficient access, sharing, and integration of distributed medical data continue to pose a significant challenge. As such, healthcare systems of the future need to be flexible enough to operate in a dynamic context, with a real-time integration of distributed data at multiple levels of scale, ownership, representation, and complexity (Madanamohanan, 2005). Compounding this issue are the barriers that restrict access to historical and distributed records and the lack of robust data management mechanisms capable of automatically integrating fragmented clinical data

Power System Technology
ISSN:1000-3673
Received: 16-03-2025 Revised: 05-04-2025 Accepted: 02-05-2025

(J Cruz-Correia et al., 2007). In addition, a better alignment and integration of administrative workflows and clinical data systems are required to ensure effective execution of healthcare operations (Zayas-Cabán et al., 2021). Against this backdrop, the next phase of healthcare development will necessitate systems that guarantee seamless connectivity and situated collaboration between the administrative and clinical domains.

7.1. Emerging Technologies

Emerging technology solutions have altered how administrative workflows interface with clinical data systems. Practical examples verify the role of technology in reducing frictions. When structural alignment is impossible, technologies with considerable adaptation overhead can represent an unwanted alternative. Natural language processing and machine learning offer promise yet often face dissolution once introduced.

Integration capacity defines which technologies generate expected impact. Data integration by itself is insufficient. Bridge technologies that facilitate workflow and support the collaborative co-evolution of workflows and data partially address integration challenges but generally lack scalability and completeness (Zayas-Cabán et al., 2021). With large-scale adoption, significant opportunities for improved administrative efficiency follow. Adjoining the administrative domain represents a second avenue; for example, quality inspection of structured documents may help extract additional value. Such opportunities arise from extrapolating introduction points that maintain functional granularity while enclosing independent components (C. James et al., 2017).

7.2. Policy and Regulation Changes

The future of healthcare integration is shaped by emerging trends that have the potential to redefine the collaborative landscape. Advancements in interoperability standards, such as the Fast Healthcare Interoperability Resources (FHIR) specification, aim to simplify the exchange of information (Gooch & Roudsari, 2011). Cloud-based services provide scalable infrastructure and integrated platforms that support diverse data-sharing needs and sustainability objectives. Patient-centred models of care emphasize the importance of coordinating communication across the continuum, enabling timely, accurate, and secure transmissions that empower individuals and optimize resource deployment. In parallel, policy and regulatory changes can drive or constrain the adoption of new approaches. Recognizing the complexities of administrative workflows and their interaction with clinical data is essential for informing strategies that harmonize these domains effectively. In this context, the continued development of supportive frameworks will ensure the alignment of administration functions with the wider healthcare ecosystem.

Power System Technology
ISSN:1000-3673
Received: 16-03-2025 Revised: 05-04-2025 Accepted: 02-05-2025

7.3. Patient-Centered Approaches

Healthcare organizations seek to bridge the gap in knowledge and communication between the administrative and clinical domains. Efforts can focus on implementing initiatives and tools often regarded as part of administrative workflows and addressing fragmentation, mismatches, or incompatibilities within these workflows. Providing frontline staff with patient-centered approaches enhances their capability to meet patient expectations and deliver high-quality care with each electronic or physical encounter (Gooch & Roudsari, 2011).

Organizations associate patient-centered approaches with decisions, workflows, initiatives, and tools that frontline staff use to understand, anticipate, and respond to patient needs or experiences. Patient-centeredness is embedded in such decisions and schemes as patient access, patient experience, patient telemedicine, patient messaging, patient surveys, patient collaboration, patient-reported outcomes, patient education and outreach, patient ambulatory orders, patient self-management, patient satisfaction, and patient request tracking. The selected references confirm patient-centered configurations that reinforce opposition to the prevailing gap.

8. Conclusion

Bridging administrative workflows with clinical data systems supports care delivery, quality assessment and evaluation, and clinical research. Administrative workflows govern the operational aspects of healthcare organizations, encompassing patient admission, appointment scheduling, resource management, billing, insurance processing, compliance reporting, and staff coordination. Large healthcare organizations commonly rely on specialized software systems routinely supported by dedicated IT staff and supplemental personnel. In contrast, small provider offices exist without such support, where reliance rests on ancillary user effort, such as filling spreadsheets or completing checklist forms. Clinical data systems focus upon capturing, storing, and syndicating patient records, representing the core capability of electronic health records (EHRs). Clinical information models and messaging standards have achieved a high interoperability standard, supporting the exchange of detailed clinical data across organizational boundaries. However, clinical data systems maintain a limited role in direct support of administrative workflow activities. Consequently, the administrative work procedures hold a more dominant influence over the practitioner's daily experience than clinical data functions.

The administrative workflow overlooks the value of clinical data records, and the EHR information systems neglect the tasks required to complete preparatory work necessary for interactions with the patient. The administrative and clinical workflow situations pose a divergence, where the preparation and follow-up work required for clinical assessment, diagnostic evaluations, patient-specific therapy design, and the identification of

Power System Technology
ISSN:1000-3673
Received: 16-03-2025 Revised: 05-04-2025 Accepted: 02-05-2025

contraindicated options lack integration and remain wholly separated from the patient record and management systems. The distinct domains, governance structures, and technical platforms create a costly separation, evident in many aspects of administering clinical studies, common therapy administration workflows, and the performance of clinical skills examinations with simulated patients.

Broader implications highlight that progress in large settings does not easily extend to small organizations with limited administrative support. Such smaller clinics, hospitals, and support operations encounter many benefits tied to clinical data archive access: requests for patient history during lacunae at cancer treatment centers; instruction for practice cases with ophthalmology care; clarifying vignette constructions for a teaching facility; preparation and follow-up of clinical procedures for formative and summative experiences. The limited infrastructure and presumption of tractability create a significant technological impediment to progress in the administrative domain, where the bulk of professional effort resides (Gooch & Roudsari, 2011) (Cofiel et al., 2013) (Zayas-Cabán et al., 2021).

References:

1. Cofiel, L., U. Bassi, D., Kumar Ray, R., Pietrobon, R., & Brentani, H., 2013. Detecting Dissonance in Clinical and Research Workflow for Translational Psychiatric Registries. ncbi.nlm.nih.gov
2. Gooch, P. & Roudsari, A., 2011. Computerization of workflows, guidelines and care pathways: a review of implementation challenges for process-oriented health information systems. [PDF]
3. Rohner, P., 2018. Identity Management for Health Professionals: A Method for the Integration ofResponsibility, Organization, and IT. [PDF]
4. H. AlHazme, R., M. Rana, A., & De Lucca, M., 2014. Development and Implementation of a Clinical and Business Intelligence System for the Florida Health Data Warehouse. ncbi.nlm.nih.gov
5. Marés, J., Shamardin, L., Weiler, G., Anguita Sanchez, A., Sfakianakis, S., Neri, E., Zasada, S. J., Graf, N., & Coveney, P. V., 2014. p-medicine: a medical informatics platform for integrated large scale heterogeneous patient data. [PDF]
6. Green, S., Hillersdal, L., Holt, J., Hoeyer, K., & Wadmann, S., 2022. The practical ethics of repurposing health data: how to acknowledge invisible data work and the need for prioritization. ncbi.nlm.nih.gov
7. D. Knight, K., 2004. The Application of XML as a Means of Exchanging Discharge Summaries between Hospital Informations Systems.. [PDF]
8. Zhang, R., R Burgess, E., C Reddy, M., E Rothrock, N., Bhatt, S., V Rasmussen, L., Butt, Z., & B Starren, J., 2019. Provider perspectives on the integration of patient-reported outcomes in an electronic health record. ncbi.nlm.nih.gov

Power System Technology
ISSN:1000-3673
Received: 16-03-2025 Revised: 05-04-2025 Accepted: 02-05-2025

9. J Cruz-Correia, R., M Vieira-Marques, P., M Ferreira, A., C Almeida, F., C Wyatt, J., & M Costa-Pereira, A., 2007. Reviewing the integration of patient data: how systems are evolving in practice to meet patient needs. ncbi.nlm.nih.gov
10. Zayas-Cabán, T., Naim Haque, S., & Kemper, N., 2021. Identifying Opportunities for Workflow Automation in Health Care: Lessons Learned from Other Industries. ncbi.nlm.nih.gov
11. Lynn Atienza San Jose, R., 2017. Educating Nurses on Workflow Changes from Electronic Health Record Adoption. [PDF]
12. Madanamohanan, M., 2005. Systems integration in healthcare industry: A case study of one healthcare records management company. [PDF]
13. Staras, S., S Tauscher, J., Rich, N., Samarah, E., A Thompson, L., M Vinson, M., J Muszynski, M., & A Shenkman, E., 2021. Using a Clinical Workflow Analysis to Enhance eHealth Implementation Planning: Tutorial and Case Study. ncbi.nlm.nih.gov
14. F. J. Vos, J., Boonstra, A., Kooistra, A., Seelen, M., & van Offenbeek, M., 2020. The influence of electronic health record use on collaboration among medical specialties. ncbi.nlm.nih.gov
15. L. Priest, E., Klekar, C., Cantu, G., Berryman, C., Garinger, G., Hall, L., Kouznetsova, M., Kudyakov, R., & Masica, A., 2014. Developing Electronic Data Methods Infrastructure to Participate in Collaborative Research Networks. ncbi.nlm.nih.gov
16. Mohd Yusof, M., Khodambashi, S., & Marzuki Mokhtar, A., 2012. Evaluation of the clinical process in a critical care information system using the Lean method: a case study. ncbi.nlm.nih.gov
17. R. Levy, D., J. Moy, A., Apathy, N., Adler-Milstein, J., Rotenstein, L., Nath, B., Trent Rosenbloom, S., Kannampallil, T., G. Mishuris, R., Alexanian, A., Sieja, A., R. Hribar, M., S. Patel, J., A. Sinsky, C., & R. Melnick, E., 2023. Identifying and Addressing Barriers to Implementing Core Electronic Health Record Use Metrics for Ambulatory Care: Virtual Consensus Conference Proceedings. ncbi.nlm.nih.gov
18. Chen, J., L Cutrona, S., Dharod, A., C Bunch, S., L Foley, K., Ostasiewski, B., R Hale, E., Bridges, A., Moses, A., C Donny, E., L Sutfin, E., & K Houston, T., 2023. Monitoring the Implementation of Tobacco Cessation Support Tools: Using Novel Electronic Health Record Activity Metrics. ncbi.nlm.nih.gov
19. C. James, B., P. Edwards, D., F. James, A., L. Bradshaw, R., S. White, K., Wood, C., & Huff, S., 2017. An Efficient, Clinically-Natural Electronic Medical Record System that Produces Computable Data. ncbi.nlm.nih.gov