Leveraging AI to Enhance Clinical Delivery Models for Field-Based Clinicians

Healthcare delivery is transforming from hospital-centered care to distributed outpatient and field-based settings, driven by advancements in medical technology, evolving reimbursement structures, and patient demand for more convenient, personalized care.

Field-based clinical services bring healthcare directly to patients in their homes, workplaces, schools, and community settings, addressing various needs. These include:

- *Acute care follow-up* such as wound management, IV therapy, post-surgical care,
- *Chronic disease management* such as monitoring and managing heart failure, diabetes, and respiratory illnesses, and ensuring medication adherence,
- *Behavioral health support* such as mental health counseling, crisis intervention, substance use disorder treatment),
- *Rehabilitation services* such as PT, OT, ST, pain management, and
- *Preventive and wellness* care such as mobile health testing, fall prevention programs, and maternal-child health services to promote long-term health and mitigate future risks.

This shift reflects a growing emphasis on proactive, patient-centered care, delivered where it is needed most.

> **Knowledge at Point-of-Care:** *The system provides contextually relevant content to inform actions for individual clinical situations, helping clinicians make timely and accurate decisions during patient visits.*

Issues and Complications

Field clinicians often operate remotely and independently, relying on manual processes and limited resources to provide patient care. This presents challenges that impact the quality of services delivered:

- **Variation in Care Delivery**: There are often considerable differences in how care is provided across locations and patients, as it is not consistently guided by curated, referenceable standards, policies, procedures, and requirements.
- **Delayed Adaptation to Evolving Best Practice**: Field teams struggle to keep pace with the evolving clinical requirements of diverse patient types or sponsoring institutions/plans, resulting in challenges to deliver high-quality, standardized care for existing and new services.
- **Communication Inefficiencies**: The current model relies on frequent, lengthy, and often interrupted communication between field clinicians, agency staff, and medical directors/supervisors. This creates inefficiencies as the field force works to ensure best practice compliance and to mitigate risks.

Addressing these issues requires a more integrated and efficient approach to field operations, supported by technology, streamlined workflows, and robust training programs.

The Need for a Novel Model

We present a plausible format based on an AI-driven model that offers a transformative solution by creating a high-throughput, self-sustaining, scalable framework that builds on three distinct pillars (see Figure 1):

1. High Throughput Data Collection and Clinical Content Categorization
2. Dynamic Knowledge Base and Learning Management System

3. Intelligent Clinical Agent Technology and On-Demand Support

These pillars build on each other in a self-perpetuating manner to reduce variability, enhance reliability, and improve service effectiveness.

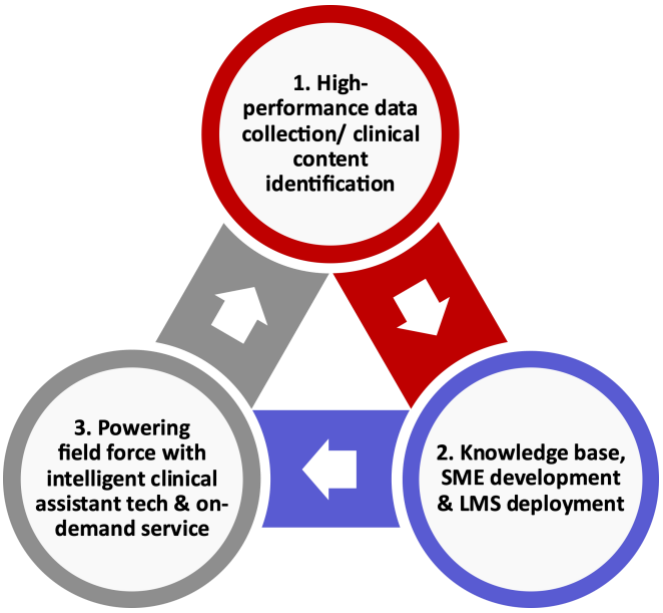

Figure 1: High-Performance Clinical Development and Delivery Model

1. High Throughput Data Collection and Clinical Content Categorization

The technology can capture multimodal clinical data—voice, text, and video. For example, Zoom-based conversations are converted into text-based transcripts. Machine learning models, such as Latent Dirichlet Allocation (LDA), can analyze this textual data to identify and categorize interactions between clinicians and supervisors. These conversations are distilled into meaningful clinical themes, such as:

- Disease-specific knowledge gaps.
- Compliance-related process issues.
- Strategies for managing high-risk cases or non-adherent patients.

The model can, in minutes, effectively organize, categorize, and prioritize inputs into distinct areas, for example:

- **Knowledge-Based Topics**: medication protocols, clinical guidelines, or patient educational resources
- **Process-Based Inquiries**: Issues related to workflow or operational inefficiencies.
- **High-Risk Cases**: Scenarios requiring a more customized approach to high-risk cases or non-adherent patients.
- **Complex Cases**: Scenarios where there is no historic protocol established.

> **AI-Powered Analysis:** *Machine learning models can analyze multi-modal data to identify and categorize interactions between clinicians and supervisors, distilling conversations into meaningful clinical themes within minutes.*

2. Dynamic Knowledge Base and Learning Management System (LMS)

The insights generated from the first pillar feed into a Learning Management System (LMS) for clinical skill development and a referenceable knowledge base accessible at the point-of-care. This knowledge base co-exists with current policies, SOPs, and regional or national best practices and serves as a "single source of truth" for:

- **Clinical Decision Support**: The knowledge base provides contextually relevant content to inform actions for individual clinical situations, helping clinicians make timely and accurate decisions during patient visits.
- **Personalized Care Plans**: Integrated policies, procedures, and checklists guide the delivery of care tailored to each patient's needs, ensuring consistency and adherence to best practices.
- **Training and Education for Clinicians**: The system supports the development of training modules tailored to help clinicians confidently serve patients.
- **Risk Management and Compliance**: The knowledge base centralizes client- and sponsor-specific clinical and compliance requirements. This enables clinicians to meet regulatory standards and address high-risk scenarios effectively.

This dynamic, centralized system, which includes search capabilities and is updated in real time, is the basis for contextually relevant insights.

3. Intelligent Clinical Agent (ICA) Technology and On-Demand Support

The third pillar would introduce an AI-driven Intelligent Clinical Agent (ICA), an advanced chatbot aimed at enhancing clinical decision-making. It integrates insights from the centralized knowledge base with specific patient data, ensuring personalized, dependable, and consistent care tailored to individual patient needs (see Table 1).

> ***Intelligent Support****: The AI-driven Clinical Agent provides tailored checklists and protocols based on entity-based best practice and individual patient care plans, supporting clinicians with personalized guidance at the point-of-care*

Key features include:

- **Personalized Care Guidance**: The ICA provides tailored checklists and reminders based on individual care plans.
- **Contextual Conversations**: Clinicians can easily interact with the ICA to ensure care aligns with established policies, procedures, and patient-specific details.

A home health nurse managing a recently discharged *heart failure patient* leverages the **Intelligent Clinical Assistant (ICA)** to deliver personalized, compliant care. The ICA supports the nurse by: ▪ **Providing Tailored Checklists**: Aligns tasks like weight monitoring, sodium intake, and symptom tracking with standardized protocols and compliance requirements. ▪ **Offering Contextual Insights**: Delivers real-time access to the patient's history, medication regimen, and relevant clinical details while ensuring adherence to policies and procedures. ▪ **Guiding Evidence-Based Care**: Ensures alignment with institutional standards and regulatory guidelines for monitoring and lifestyle adjustments. ▪ **Facilitating Intelligent Escalation**: Flags high-risk issues and streamlines escalation to supervisors.

Table 1: Use Case: Enhancing Post-Discharge Care for a Heart Failure Patient

- **Task Assistance**: Supports clinicians with tasks like managing care plans or behavioral interventions to enhance patient outcomes.

- **Escalation for Complex Cases**: Identifies and flags complex or urgent situations, ensuring human supervisors step in when necessary.

By guiding workflows and adapting to new requirements, the ICA offers a simple, scalable system for delivering high-quality, patient-centered care that evolves with organizational needs.

Towards a Scalable and Self-Sustaining Model

The integration of AI into field-based clinical delivery offers a path toward transformative change. By leveraging high-throughput data collection, dynamic knowledge bases, and intelligent clinical assistants, organizations can achieve a scalable, self-sustaining model that adapts to evolving needs.

This AI-driven approach empowers clinicians with the tools to deliver consistent, personalized, and high-quality care confidently while ensuring alignment with policies, standards, and compliance requirements.

As healthcare continues to decentralize, these technologies are not just an enhancement—they are essential for meeting the demands of modern, patient-centered care.

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