Redesigning Care Delivery through Health IT Implementation

Exploring Trinity Health’s IT Model

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ABSTRACT

Trinity Health is a large multihospital healthcare system that developed a system-wide information technology strategy and implementation model. This study looks at how that system-wide strategy and implementation model, called Project Genesis, was used at Mercy Medical Center-North Iowa, a Trinity Health rural referral hospital, and how the care delivery system was redesigned using an electronic health record. This study was funded in part by a grant (UC1 HS15196; Rural Iowa Redesign of Care Delivery with EHR Functions) from the Agency for Healthcare Research and Quality to implement an integrated EHR system in the hospital and two clinics and assess its impact on patient safety, quality of care and organizational culture. The study looks at redesigning care delivery using the Trinity Implementation Model that consists of local and system-wide planning components; physician and nurse ownership; order set development; clinical workflow redesign; and training and support. It then examines the initial experiences of the IT implementation at Mercy Medical Center-North Iowa, the impact on health information management, lessons learned and future steps to achieve a paperless medical record.

KEYWORDS

Trinity Health, electronic health record, redesigning care delivery, IT implementation methodology, physician and nurse ownership of IT, order sets, clinical workflow redesign, training and support of IT, health information management.

TRINITY HEALTH is a large multihospital healthcare system that developed a system-wide information technology strategy and implementation model. This study looks at how that system-wide strategy and implementation model was used at Mercy Medical Center-North Iowa (MMC-NI), a Trinity Health rural referral hospital, and how the care delivery system was redesigned using an electronic health record. Members of the research team participating in the implementation and evaluation present this case study of a successful “big bang” implementation of many applications associated with the EHR.

Trinity Health is the fourth-largest Catholic health system in the United States based on operating revenues of $6 billion in 2006. It has 45,101 full-time equivalent employees and 7,346 active staff physicians. The vast majority of physicians are self-employed, community-based, private-practice physicians who have alternative hospital choices in most of the local markets. Trinity Health comprises 23 ministry organizations health systems encompassing 44 hospitals (29 owned and 15 managed); 379 outpatient clinics or facilities; numerous long-term care facilities; home health and hospice programs; and senior housing communities in seven states.

Mercy Medical Center-North Iowa is a not-for-profit community health care system that offers comprehensive healthcare services for people throughout northern Iowa and southern Minnesota. As the major rural referral center, MMC-NI is a secondary level healthcare provider with a staff of more than 2,750 employees, 165 active medical staff members and 134 ancillary provid-
ers. It has 193 staffed beds. MMC-NI has 12,961 acute discharges, 1,122 newborn discharges, 34,341 emergency department visits, about 585,000 outpatient visits per year and has 18 wholly owned primary care clinics. MMC-NI is part of a regional network and is affiliated with nine critical access hospitals and 23 primary care clinics.

MMC-NI received a grant (UC1 HS15196, or Rural Iowa Rede
design of Care Delivery with EHR Functions) from the Agency for Healthcare Research and Quality to implement an integrated EHR system in the hospital and two clinics and assess its impact on patient safety, quality of care and organizational culture.

The project's four major goals were to improve the quality and safety of patient care; to enhance organizational culture and safety among the project partners; to improve patient care workflow processes; and to generate significant organizational learning about the effectiveness of the EHR system and the implementation process.

At the time of publication, MMC-NI is in the third year of the AHRQ grant.

REDESIGNING CARE DELIVERY

Trinity Health was formed through the merger of two health systems. As a result of the merger, Trinity Health inherited a mix of hardware platforms, legacy systems and vendors. From this starting point, the organization adopted a system-wide strategy for information technology. This new strategy consisted of standardization across IT vendors, applications and management.

Trinity Health's strategy, formally called Project Genesis, was guided by a steering committee. The steering committee consisted of executives from Trinity Health's corporate office, local ministry organization leaders, clinical representatives, project management and information technology personnel. Strategic decisions were made by the steering committee while a project management office had responsibility for the day-to-day management of Project Genesis.

Trinity Health's IT offices and support center are centrally located and managed from the corporate headquarters in Novi, Mich. Hospital-based IT personnel within local Trinity Health facilities are employed by and report to corporate IT leadership. Standardization on core vendors and centralization of software purchasing enabled Trinity to leverage its size to maximize its influence on current software functionality and future development, as well as minimize costs.

In addition to standardization across the organization's IT infrastructure, Trinity Health selected one implementation process that involved a phased methodology. The first phase involving the clinical systems started in May 2001 and finished in January 2004. Phase one implementation at MMC-NI started in June 2001. It included installation of the central clinical data repository; interfaces for dictated reports, drug administration records and laboratory results; a results viewer (PowerChart); and an adverse drug event rules package.

The second phase of Project Genesis included implementing a new patient management system and the suite of clinical applications, which were nurse documentation, computerized practitioner order entry, a new pharmacy system, a new medical records system, an emergency department system and a new radiology system. Trinity Health implemented an enterprise master person index system before the second phase of Project Genesis to establish unique patient identifiers for the enterprise-wide information systems.

Those developing the Project Genesis plan determined that a “big bang” rather than an incremental approach would be used to implement the new systems. This approach consisted of bringing down all existing information systems, implementing the new systems, inputting patient data into the new system and converting users to the new system for all clinical areas at the same time, over the course of a single weekend.

The Trinity Health implementation methodology developed the components necessary for the big bang approach. These components included clinical workflow redesign, change management, organizational restructuring, multiple training cycles, pre- and post-measurement, readiness assessment and common technology tools. Hospitals applied the model in a systematic way using standardized applications and designs.

The Project Genesis methodology included collaborative learning that fostered a team approach among Trinity Health's hospitals to support each other during cutover and implementation. At each activation, the implementing hospital was joined by staff from Trinity’s home office, other hospitals that had previously activated and hospitals that would be implementing in the future. This “see one, do one, teach one” approach emphasizes hands-on and highly interactive learning. This approach also created a team environment in which clinicians reported feeling supported during a time of extreme change, and they approached issues with the attitude that, “Everyone is dealing with this change together.”

PLANNING: A CRUCIAL COMPONENT

Organizational leadership directed Project Genesis to be centered on change management, which is why the Trinity Health formula for transformation is one part technology and two parts culture and work processes. Trinity Health crafted an 18-month “readi
ness process” to guide the change transformation for its ministry organizations.

The process involved more than selecting specific hardware devices for deployment within an inpatient setting and configuring the system to handle local order sets. Based on Trinity Health's vision for Project Genesis, specific planning elements were designed to transform clinical and information processes, and align organizational structures to support new methods of delivering care.

Physician and nurse ownership. The first element of alignment involved securing physician and nurse ownership in the clinical transformation process. Clinician acceptance of health IT is a critical facilitator of adoption. There is significant evidence to support this, and scholars have suggested several strategies to gain clinician acceptance. Trinity Health secured clinician acceptance by engaging and supporting clinicians throughout the Project Genesis lifecycle.

The Trinity Health implementation model includes care area improvement teams, to review workflow; clinical transformation teams, to look at clinical outcomes; and clinical oversight teams, to
work on management and systems. Many of the teams are focused on transformation within specific patient care services, while others are interdisciplinary and concentrate on organization-wide policies and tasks. All teams are interdisciplinary, comprising administrators, physicians, nurses, pharmacists and HIT staff. Structuring teams in this way ensures that all voices are heard, and that physicians and nurses play active roles in transforming the way in which care is delivered with the new EHR.

Trinity Health also identifies a group of physician champions at each ministry organization. This group represents a cross section of the medical staff, and its members have different levels of computer knowledge and commitment to the project. Many ministry organizations pay a physician a half to a full-time equivalent stipend to lead the local physician engagement effort.

Physician champions helped Trinity Health communicate to clinicians “on the ground.” Beyond communication of key information from the organizational leadership teams, these champions also helped manage the expectations of clinicians, helping them see that HIT is a journey and not a destination. The messages brought to the floors by the champions explained that the transition would be initially bumpy, but that work patterns would be established soon after go-live and smoother waters lay ahead. Physician leaders reported that they sought a “mature system” but that “none exists,” so the system to be implemented was a work in progress. This helped many clinicians at the local ministry organizations see themselves as pioneers, paving the way for others. The leadership at Trinity Health has supported this attitude by forming a partnership with its vendor to share clinicians’ ideas for system improvement. Establishing realistic expectations helped Trinity Health clinicians manage change, and view that change as an opportunity rather than a threat.

Clinician involvement and attitude management continues post-implementation, the final stage of the life cycle. In this stage, Mercy Medical Center formally transitioned its readiness clinical integration team to a post-activation change integration team, through which clinicians work together to review issues and make recommendations to local and Trinity Health leadership on how issues might be resolved. Issues that affect the whole system are documented and forwarded to Trinity Health for action. Staff at Mercy Medical Center monitor the requests and provide feedback to the requesting individuals and teams.

The change integration team helps keep alive the spirit of togetherness that the Trinity Health implementation model created. One Mercy Medical Center manager indicated that she continues to correspond with the managers from other Trinity Health member organizations and the Trinity Health home office she met during Project Genesis. A physician leader reported that some physicians, who before the EHR rarely spoke to one another, now regularly communicate with each other and work together to help resolve issues they encounter with the system.

Order sets. A second critical planning element is the development of standardized order sets. Order sets are widely used in healthcare as a way to combine medications and tests into a cohesive set rather than as individual items. Order sets have been demonstrated to provide time-saving benefits and contribute to greater acceptance of CPOE systems. Evidence-based order sets — those based on scientifically valid clinical best practices — give healthcare organizations an opportunity to reduce variation in care and enhance compliance with treatment guidelines to improve quality of care and reduce the incidence of medical errors.

Trinity Health, like many other healthcare organizations, sought to move toward the delivery of evidence-based medicine, which involves the use of evidence-based order sets. Because of this goal, Trinity Health incorporated the development of templates from Zynx Health for evidence-based order sets.

When it implemented Project Genesis, MMC-NI incorporated the review of Zynx Health into the existing process for developing and refining order sets. Trinity Health recommends that ministry organizations use standardized order sets either developed by other ministry organizations or evidence-based order sets from Zynx Health, which provides information on evidence-based guidelines plus recommended order sets. At MMC-NI, physicians from all service lines were asked to review order sets from other Trinity organizations and Zynx Health to decide which would work best. After the various physician and interdisciplinary teams completed their work, only a handful of order sets based on unique MMC-NI physician preferences remained.

Order sets are helpful in ordering for admission, discharge, transfer, specific diagnosis, pre- and post-procedural orders, and routine medical situations. For complex medical patients with changing clinical conditions, a standard order set may not match the current situation. For this reason, numerous nested order sets — order sets within an order set — were developed. Nested order sets include things like anti-coagulation protocols, sliding insulin scales, inhalation treatments and renal function assessments. The purpose of nested order sets is to add greater flexibility to standard order sets. Physicians are able to make minor adjustments in standard order sets by using nested order sets to respond to changes in a patient’s condition. This approach is more supportive of the clinical workflow in complex and changing medical conditions.

Clinical workflow. A third element in preparation for Project Genesis implementation was analysis of existing clinical workflow, a process often referred to as current state analysis. Clinical staff and implementation team members worked side-by-side to painstakingly document and map the steps typically needed to complete work before the EHR was activated. Future state work maps were created to document the care delivery steps and the flow of information within patient care areas targeted for transformation through the use of the EHR. Attention to detail is
important to determine how best to integrate healthcare IT into the clinical workflow and how to improve existing processes. A gap analysis of current state and future state identifies areas that need significant decisions, re-training or a potential work-around to complete the needed workflow.

Training and support. Training is an essential fourth component in preparing for the implementation of any new technology, especially in healthcare, where mistakes can result in serious harm. Preparing clinicians and staff for use of EHR and CPOE technologies remains a barrier to greater implementation of these technologies in inpatient and ambulatory settings.\(^{10}\) Trinity Health was acutely aware of this, especially because its big bang implementation approach created an instant change-over from paper-based to electronic processes in the course of a single weekend.

To prepare its clinicians and staff, Trinity Health established a training environment in which users learned how to use clinical applications and provided support to users before and after the go-live date. The training environments consisted of classrooms, training stations on nursing units and “Doc-ing” stations at which physicians received convenient, real-time training away from the patient care areas of the hospital.

The acquisition of sufficient training facilities was a primary aim of the local implementation team at MMC-NI. Because it had a large number of staff, substantial space was needed to accommodate group-training sessions. To obtain buy-in for the financial commitment for needed space and equipment, the implementation team devised a forward-thinking facility plan that highlighted how the space and equipment would be used after the Project Genesis implementation for post-implementation training, system upgrades, and for training on other applications, such as billing software and budget preparation training. The result was the creation of a large, multipurpose training laboratory in which education staff could successfully train staff on a variety of topics, not solely limited to the Project Genesis implementation. Of key importance in any healthcare IT implementation is acknowledging that implementation is just one step in a lifecycle of future upgrades and introduction of new applications.

Preparing staff for the go-live date was a primary focus for the implementation team. Senior leadership and team members knew that an unprepared staff would lead to incomplete adoption and possible failure.\(^{11,12}\) In addition to physical space in which education staff could train clinicians in how to use a computer and the clinical applications involved in Project Genesis, the implementation team knew that each clinical unit needed “super users” on the floor to assist colleagues during and immediately after implementation. MMC-NI used a “train the trainer” model to prepare hospital staff members to use the system and support others in using the system. Super users spent as much as 32 hours prior to the go-live date, and two to three weeks after that date, to support staff on their units in making the transition to the new workflows and use of clinical systems. A large part of their duties was monitoring the learning that was taking place in the clinical environment.

The need for significant training did not end after implementation. While super users did not play a significant role long after implementation, the need for ongoing training of staff remained high. As new employees are hired, they require training and orientation to the clinical systems and workflows. Existing employees require periodic training as order sets change, workflows are enhanced through continuous quality improvement, best practices change and software upgrades are deployed.

As part of its organizational transformation, Trinity Health prepares each local ministry organization for ongoing user support after the go-live date. Education coordinators and other education personnel learn to incorporate user support into existing organizational processes, such as new employee orientation and continuing education seminars. Human resource personnel guide updates to annual performance reviews and job descriptions to support the new skills required to deliver care.

LOCAL PLANNING AT MMC-NI

Preparations for the implementation of Project Genesis Phase Two EHR at MMC-NI began in February 2003. The preparation took place over the course of 24 months. Readiness required significant participation from staff, clinicians and senior leadership at Trinity Health and MMC-NI, including the hospital’s CEO, CFO, the chief nursing officer and vice president of medical affairs. Preparations included communication and engagement plans for organizational change, decisions for order sets to be used, development of clinical decision support rules, comprehensive process redesign, information system build and design, user acceptance testing, staff and clinician training, and further enhancement of the hospital’s infrastructure, such as networking and device selection.

MMC-NI went live with the second phase of Project Genesis on July 8, 2005, using the big bang approach. All systems – clinical documentation, EHR, CPOE with more than 250 order sets, 54 clinical decision support rules, emergency department triage and tracking, pharmacy alerts, medication list management, medical records system and patient management systems – were implemented at the same time. The hospital then spent the next 18 months in transition management, which involved evaluating the hospital implementation, and upgrading software, hardware and human processes as needed.

Before activating the EHR, MMC-NI halted the use of the McKesson bar-code medication scanning application they had used for more than a year because it could not be integrated into the Cerner Electronic Medication Administration Record, or eMAR. The medication bar-coding system was reactivated a year later using integrated technology from a Cerner bar-code scanning medication administration system.

INITIAL EXPERIENCES AT MMC-NI

At the end of the three-year planning and implementation cycle, MMC-NI had an online functioning inpatient enterprise HIT system. The enterprise system, standardized across Trinity Health, consists primarily of Cerner applications, which provide core EHR functions, including CPOE, clinical decision support, an emergency department module, a radiology module, a pharmacy module, an electronic medical records module and an interface to the laboratory information system, and clinical documentation transcription systems.

The system also has linkages to evidence-based medicine
databases like Zynx Health and Multum, which enable access to extended knowledge resources and clinical decision support functionality. The system also provides an electronic medication administration record and point-of-care barcode scanning, which support accurate delivery of medications and automatic logging of administered medications directly into the patient's medical record.

MMC-NI had previously brought one of its 40 ambulatory clinics online with an outpatient EHR. Additionally, MMC-NI recently implemented an ambulatory EHR at its Mercy Family

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Medicine Residency Clinic, resulting in a complete longitudinal health record for patients who receive healthcare at these clinics. MMC-NI intends to implement the ambulatory EHR at affiliated ambulatory clinics across northern Iowa in the future.

The goal of Trinity Health was integration of information technology into as many care processes as current technology and human systems would allow. Like many other healthcare organizations that have implemented enterprise systems, MMC-NI had to face the reality that some care processes had to remain on paper. (Table 1.)

The hospital estimates that about 80 percent of patient information is now available electronically. Progress notes from physicians comprise the largest amount of data that remains on paper, except in the emergency department, which has implemented an online template-based physician progress note. The implementation of structured clinical documentation for progress notes, history and physical, discharge summaries and procedural notes is in the pilot phase of implementation within Trinity Health using Cerner PowerNote2G functionality.

Despite the immense challenges and risk of failure, Trinity Health blazed a trail toward transforming the way care is delivered to patients. The successful implementation of healthcare IT systems at a rural hospital was a major win for 'Trinity Health, enabling the system to move forward with successive implementations at its other rural facilities.

MMC-NI currently is working with its network of critical access hospitals and primary care clinics, Mercy Health Network-North Iowa, to create a similar implementation model for activation of the EHR in seven of its nine affiliated critical access hospitals in northern Iowa.13

MMC-NI also is experiencing success. The new care delivery processes, although continuously reviewed and improved, have taken hold, and clinicians have accepted the EHR, CPOE and eMAR technologies. The hospital has also experienced some cost savings and gains in productivity, especially in its health information management department. Finally, the quality and safety of the care delivered at the hospital has increased. These initial successes signal that an organizational transformation has occurred, one that Trinity Health can continue to replicate and from which others can learn.

HEALTH INFORMATION MANAGEMENT

The health information management department observed an increase in access to information after Project Genesis. After the implementation, clinicians and staff at MMC-NI now have access to a majority of patient information via computer as opposed to paper, and much of the documentation that clinicians do is completed online. The health information management director views this as an overall increase in access to information for both clinicians and staff within the department.

Online documentation has reduced the turnaround time between clinical encounters and the completion of clinical documentation related to encounters. Not only do clinicians complete reports faster, but health information management coders can access reports quickly from their workstations after clinician completion, significantly reducing the need for physical retrieval of documentation from file folders and other department personnel. The health information management director expects that coders one day may be able to do their work remotely, possibly from home; but for now, coders will continue to work from the hospital.

Chart assembly — the process of aggregating a variety of information from a patient’s chart into a packet for delivery to a requesting party, such as another provider or the patient — is also more efficient because the health information management department has the ability to print the record with just a few clicks of the mouse.

In addition to better access, conversion to electronic records brought a significant reduction in the size of the paper record. The HIM department is responsible for the management of medical record charts and the paper record contained within those charts. While this did not change with the implementation of Project Genesis, the volume of paper handled by the department did decrease. Before the EHR implementation, a patient may have had as much as a file box full of documents and reports, but now patients generally have only a thin file folder of paper records, the facility’s HIM director said.

Physicians have benefited from the implementation through the use of an “electronic signature” function within the Cerner PowerChart application. Many traditional HIM tasks are now done online, which saves both physicians and HIM staff considerable time. One physician who used to be the most delinquent in completing clinical documentation now is one of the quickest to finish because of the system, the HIM director said. Before Project Genesis, HIM staff often had a difficult time getting physicians to go to the medical records department to complete charts; now, physicians are able to electronically sign documents and orders. The system enables HIM to do tasks quickly, such as sending reminders to physicians to sign the few remaining documents that are on paper.

The director is looking ahead to future innovations that will continue to enhance HIM at Mercy Medical Center. Currently, Trinity Health is developing an integrated imaging solution that the director would like to see implemented at MMC-NI within the next two years. As of August 2006, two Trinity Health ministry organizations were participating in pilot studies of imaging software that can digitize a patient’s paper records, thus enabling critical clinical data to be scanned at the nursing station and integrated into the EHR immediately. HIM staff could scan less important information later, perhaps after discharge. By scanning the few remaining paper documents of the medical record, HIM will be able to produce a completely paperless medical record. Even so, scanned documents have limitations; for example, the lack of discreet data elements in scanned documents severely limit subsequent data mining efforts.

Trinity Health is also experimenting with additional innovations to reduce HIM expenses, such as a backend voice recognition system that, when integrated with the hospital’s dictation system, can translate dictated reports into an electronic form. Front-end voice recognition will be used in specific clinical settings in the future.
SUMMARY OF LESSONS LEARNED

MCC-NI was one of the first Trinity Health organizations to implement Project Genesis. As a result, several issues were identified that are being addressed as Trinity Health refines its implementation process. One area where there is room for improvement is interdepartmental workflow after implementation. Roles and responsibilities change after implementation, and step-by-step directions are needed in the readiness process to address these changes.

The order set design process also has been refined. Early implementations focused on utilization rather than standardization. This experience resulted in the formation of new teams and structures at Trinity Health to redirect the work effort. These include care area improvement teams for acute care settings; those focused on specific venues of care; care transformation teams; those focused on care delivery processes, such as the care of the patient with outcomes; congestive heart failure and teams that provide support and consistency, such as data standards. Through the work of the care area improvement teams and clinical transformation teams, Trinity Health is re-evaluating order sets and documentation templates to move toward a more standard approach throughout the system.

Improvement can be observed in the training of users. In the early phases of Project Genesis, the application used in the training environment had limited functionality and failed to give trainees a true indication of the full functionality of the application. In more recent implementations, Trinity has improved the training environment to better reflect the production environment. It also has allowed access to the production system prior to the go-live date to enable clinicians to pre-build their favorites folder and set up user preferences, which facilitates the transition to the live environment. Additionally, a planned continuing education curriculum approximately 90 days after the go-live date enables clinicians to dive deeper into application functionality and refresh previous learning.

Trinity continues to work with its vendor to address specific issues in functionality identified by clinicians using the system. Issues are particularly prevalent in special treatment areas such as the intensive care unit. The continuing difficulty of the dual environment, in which clinicians must manage both paper and electronic records, is a daily challenge.

The implementation of an EHR is a clinical process transformation, not a software implementation project. It is a journey that needs to be led by a team of committed clinical and administrative leaders to be successful. The journey will span years and spread across the continuum of care. Things will not be perfect at the start, but will require continued clinical input into the development and modification of the system to meet the current and future needs of caregivers. Clinicians will have no safe harbor available to hide from the EHR; their input and support is needed at every step. For the healthcare system, there is significant potential for cost savings, increased quality and reductions in adverse events with the widespread use of the EHR. This is not a journey for the faint of heart, but a journey the healthcare system must take.

LOOKING TO THE FUTURE

Trinity Health is moving closer to its vision of an integrated EHR that can be used across the continuum of care, accessible from anywhere, with real-time decision support at the time clinical decisions are made. It is in the pilot phase of implementing a system-wide medical record scanning solution, structured clinical documentation and back-end voice recognition. Additionally, it is in various stages of planning or building additional clinical applications for the operating rooms, intensive care unit, obstetrics and oncology services.

To measure care and financial performance outcomes, Trinity Health has developed a strategy to integrate clinical, operational and financial information into a decision support data warehouse. Financial and administrative data have resided in a decision support warehouse for several years, and the system now is extracting clinical data into the warehouse. Access to the clinical data will enable Trinity Health to track clinical outcomes, care delivery improvement opportunities and make needed modifications to order sets and documentation templates to improve clinical processes and outcomes.

Trinity Health is making significant strides to meet the goals for healthcare IT as outlined by President Bush in 2004. Clinicians will have a patient’s complete medical history, computerized ordering systems and electronic reminders; quality initiatives will measure performance and drive quality-based competition.

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Randy Haskins is regional IS director for Trinity Health and Mercy Medical Center North Iowa. He provided assistance and review for technical system implications and installation for MMC-NI.

Doug Wakefield, PhD, is a professor and director of the Center for Health Care Quality.

Marcia Ward, PhD, is professor and associate head, Department of Health Management and Policy, Director, Center for Health Policy and Research, College of Public Health, University of Iowa.

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REFERENCES


11. This project also is sponsored by AHRQ. For more information, visit the AHRQ National Resource Center for Health IT Web site: http://healthit.ahrq.gov.

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