

IT Provisioning for the Ancillary Healthcare marketplace

By

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I. Background

Each time that a piece of paper arrives in a healthcare facility, someone has to deal with it. In one study, the average physician saw 97 patients and handled 335 pages of documents (including 91 pages of received correspondence, 70 pages of laboratory results, 57 prescriptions, 20 pages of outgoing correspondence, and 97 progress notes per week. (Shelagh McRae 2006) The advent of electronic health records has changed the method by which these papers are managed, but there paper remains an active form factor. Providers need to review the data and return the form to the vendor in a usable format. This multiplicity of non-standardized forms used exacerbates this problem. There are many examples of these forms – durable medical suppliers, oxygen/respiratory vendors, Hospice, school/camp physical forms (Figure. 1). The provider has two methods of dealing with this. They can generate an electronic version of the form or deal with the paper.

**THIS FORM REQUIRES PHYSICIAN'S SIGNATURE
AND PARENT/GUARDIAN'S SIGNATURE
FOR PRESCRIBED MEDICATIONS**

Camper's Name: Last _____ First _____ Middle _____

AUTHORIZATION FOR THE ADMINISTRATION OF MEDICATION BY YOUTH CAMP PERSONNEL
If a Youth Camp chooses to administer medications, the Connecticut State Law and Regulations require a physician's or dentist's written order and parent or guardian's authorization for a nurse, first aide, the director, alternate director or youth camp counselor to administer medications. Medications must be in pharmacy prepared containers and labeled with the name of the child, name of the drug, strength, dosage, frequency, directions or other instructions and date of the original container.

MEDICATIONS CURRENTLY BEING TAKEN (Medicines brought to camp must be in their original labeled pharmacy container.)

Med #1 _____ Dosage _____ Specific times taken each day _____
Reason for taking _____

Med #2 _____ Dosage _____ Specific times taken each day _____
Reason for taking _____

Med #3 _____ Dosage _____ Specific times taken each day _____
Reason for taking _____

Med #4 _____ Dosage _____ Specific times taken each day _____
Reason for taking _____

ATTACH ADDITIONAL PAGES FOR MORE MEDICATIONS.
Identify any medications taken during the school year that participant does/may not take during the summer:

AUTHORIZATION FOR LICENSED MEDICAL PERSONNEL (PHYSICIAN OR DENTIST)
The person named herein may be administered the medications indicated above. In the event the camp nurse is unavailable, camp staff member (check one) _____ may not self-administer this medication under the supervision of camp first aide personnel.

Signature _____ Title _____
 Printed _____ Physician or Dentist Signature _____ License # _____
 Address _____ City/State/Zip _____
 Telephone # _____ Date _____

AUTHORIZATION FOR PARENT/GUARDIAN
 I hereby authorize the camp nurse to administer the medications indicated above as ordered by my physician and the camp physician. In the event the camp nurse is unavailable, camp staff member (check one) _____ may not self-administer this medication under the supervision of camp first aid personnel.

Signature _____ Relationship to Child _____
 Printed Name _____ Parent/Guardian Signature _____ Date _____

Figure 1

The full benefit of an EMR comes from its ability to provide reports based on the completion of discrete data fields. Paper documents, as in figure 1, can only be entered as an image. It can be indexed using a few simple characteristics (such as date, type of document, provider) but generally the data contained in it are not searchable. This does not allow the provider to leverage the EMR to its greatest benefit. The provider can decrease the time to achieve full ROI, and increase the benefit of the system only with increase utilization of its

The Stakeholders for this problem include the provider, the vendor, 3rd party payors, the patient and the healthcare system. The effect on the patient is generally small, since commonly in the business of medicine today services are provided first and the paperwork is expected to be delayed.

The business case for changing this process is based on the replacement of paper forms with electronic forms, leveraging the EMR investment to its full advantage. The current situation allows for all types of records to enter the office by several means. Once in the office the form needs to be entered, reviewed and approved (signed), and the completed form sent back. When approving the completed form, the provider either presumes the data to be correct or looks up the information again. Once complete, the paper is signed, copied or scanned, and then prepared for export. The method used for return of the document to the patient or vendor usually mirrors the method of receipt – and is also generally inefficient.

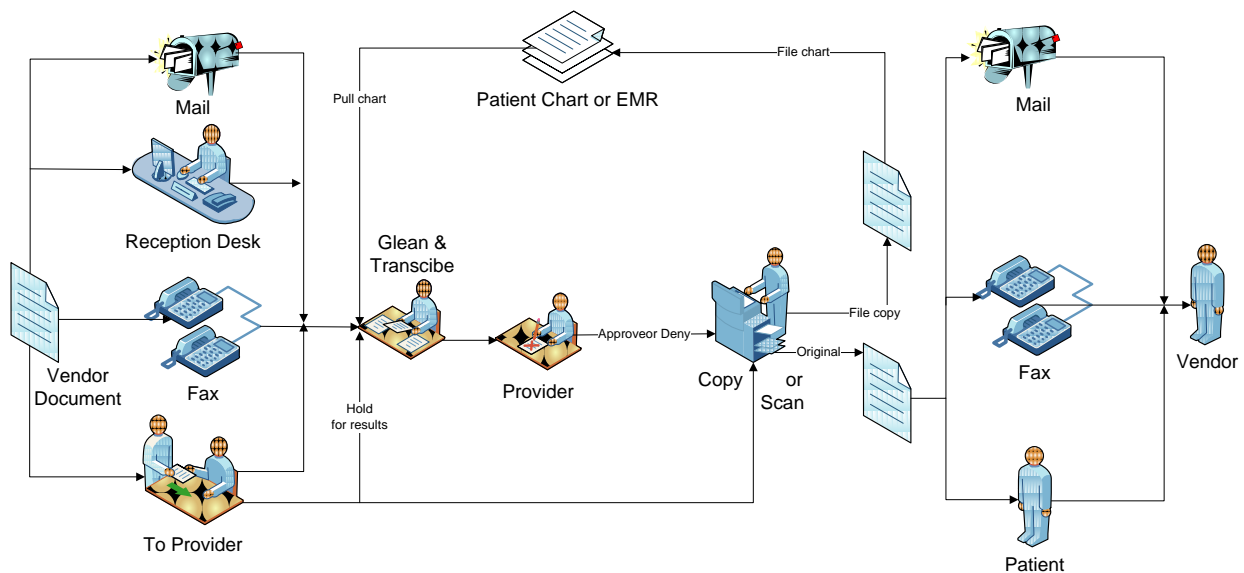


Figure 1 - Current State

The future will be based on an ideal process that would leverage the EMR to the advantage of the provider while maintaining data security and clean databases. In this ideal state the request for information would be presented to the office electronically, software would populate the fields with data available on the office server, prompt the provider for information as needed, and transmit it back to the vendor after approval.

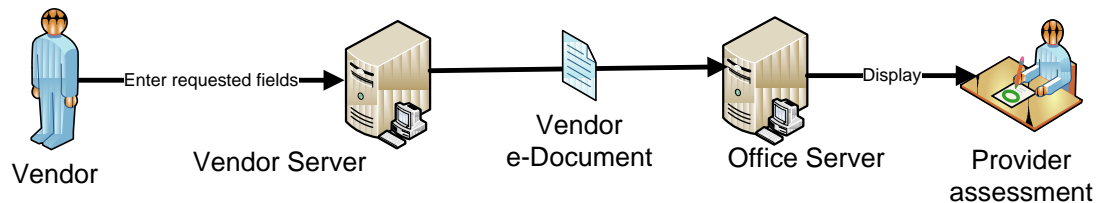


Figure 2 - Future State

In order to maintain data security and a clean database, the data would be extracted from the providers' database onsite, and presented to the provider for review prior to being sent out.

Using a browser embedded in the EMR would allow this web based process to appear seamless to the user. If there is no module within the EMR to view and manipulate web based forms a separate browser can be used with development of database search engines to populate the fields. The system would require the user to move between windows, but ideally the data transfer would be seamless. The EMR database would need to allow interfacing of the search tools, and to implement the entry of data would need to allow uploading of data from an outside source.

The request could come from the vendor directly, or go through a clearinghouse. Any additional data entered by the provider would be kept in the providers' database and associated with the form. This would allow it to be searchable by the provider. Using metadata related to fulfilling the request the records could be flagged so that providers looking at the data would be able to see the form easily as they browse the chart. It would appear in the sequence of events for the patient, and be stored in an appropriate folder for retrieval.

II. Problem statement

More concisely stated, the varied methods of intake for paper forms, and the need to manage them *as paper*, creates a significant source of inefficiency in healthcare. Currently there are not cost effective approaches for management of this. The current process molds the electronic record to fit the needs of a paper system.

a) Impact of the problem on business

The impact on business is with service base is rooted in staffing and capital expense. Currently this impact is substantial - including the purchase of an EMR, the

time to input the paper into the system, routing the paper, pulling information from chart, recording information about the request in the chart, approving the content, and exporting the document back to the vendor. There are no studies of the time required to perform these tasks, but they are similar to the tasks required for a paper system. The average cost to pull a paper chart has been estimated to be about \$5.00 within the past decade. (Samuel J. Wang, Christiana G. Bardon et al. 2003) The effect on providers is most significant since there is no reimbursement to the providers for the work done by them or their staff in order to complete this work. There is an effect on the patient due increased cost in the provision of care, resulting in increased administrative and insurance fees charged to patients.

There is currently a business barrier present in the provision of ancillary services due to the prolonged process of getting the correct information across the system. Although the total volume of ancillary services is high, this barrier reduces the total throughput of product in the market. Due to the overall cost of healthcare, there is concern about excessive expenditure on these products. One method to monitor this is to aggregate data about usage, subsequently assessing the value of different products and services. Currently this is difficult due to the varied approaches to business and limited data collection methods available. Aggregating data would help not only with determining effective monitoring, but also provide for accountability in cases of excessive use.

The vendor will benefit by having a shorter turnaround time, reducing the time in account receivable. This time frame would be further reduced by the improvements in time to billing and a reduction in billing errors. Billing errors would be reduced due to the consistency of data coming through the clearinghouse.

b) Impact of the problem on process

The workflow scenario (Figure 1) involves 3 key events:

- individual review of charts
- transcription of data
- manual arrangements for intake, mailing, faxing or pickup.

Data required by vendors includes that needed for billing and/or management of liability. There are no standards for the process of reading information off of a screen and transcribing it to a form. Forms are commonly standardized across an institution (e.g. the Federal government or Liberty Medical), but not usually across an industry. The data pulled from the screen will be standardized using ICD-9/10 for diagnosis, SNOMED for HPI, HCPCS/CPT coding for procedures and other common standards from the EMR. Specific information systems are not required for this although there are some common image formats (.jpg, .bmp, .pdf) that are used to store files once imaged. The information architecture is well established around manual transcription of data, which take the data elements from the chart and report them on paper documents, and the storage process involves photocopying/scanning machines with capability to import to the EMR. The EMR needs to have a viewer and an indexing system to allow the provider to be aware of the documents presence in the chart.

All of this clearly describes that electronic records usage has generally been molded to work with the paper paradigm. Variations on this process include changes based on record content and triggers used to obtain data, but its' still paper.

The quality and character of the data being put on these forms varies depending on the provider. A 5 digit ICD-9 code with it's correctly assigned name, offers greater value than a 3 digit code and/or a generic version of the name. A greater number of people involved makes the process more inconsistent and difficult to improve. Quality, consistency and completeness are critical to useful data aggregation.(Farnell)

Feedback about incomplete forms currently takes hours to days. This doubles the work for the provider with no value, and the timing is too late to correct behaviors. The provider must directly review the data, and sign it to indicate accountability. Additions or corrections to the report recorded on the paper create a narrative which will be isolated data with no link, reference, or index. The data is lost in an unsearchable field. Loss of data to analyze means decreased efficiency and effectiveness of the organization as it tries to meet its patient's needs and corporate goals.

c) Impact of the problem on technology

The technology involved in using paper is well established and commonly utilized. The interface with vendors is human. The result of using a paper based interface is that the EMR technology is not being leveraged fully toward the goal of non-redundant data entry. There are some further technologies that can help with development of an electronic process. These would include new standards and improved parsing of data from narrative data. There are commonly modules in EMR software to view and manipulate web based forms, but some EMR's may require development of a new tool for this. In the paper based system described, there is limited ability in the system for change due to the lack of incentive (old technology paradigm), limited infrastructure to be changed (systems are well developed), and delay in feedback (keeping pressure for change too far away from the problem).

III. Potential solutions to the problem

Each of the potential solutions will affect the businesses of the vendor and the provider, process used to solve the problem and technology associated with the process. Specifically the solutions should address the following areas:

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Impact on Business - as a result of the desired change. This includes cost effectiveness, leveraging the EMR to full potential by eliminating redundant data entry and maintaining a high content of discrete data elements. There needs to be a reduction in time for the provider and staff to process and feedback time for correction.

Impact on Process - to create the desired change. This includes semantic interoperability between the data source and the vendor, security of the data source and user acceptance (ease of use).

Impact on Technology - needed to implement. This includes the requirements for change, the capability to develop products to meet those requirements, and the user interface.

Cost effectiveness is the global expected outcome of system development and therefore a metric for success rather than a tool for development. Detailed metrics for success would include ease of use, cost of implementation and maintenance, utilization of standards vs. customization, percentage of redundant data entry required, percentage of newly entered data placed in unsearchable fields, and correction feedback loop times. Effective interoperability is a cornerstone of attaining Meaningful Use as well.

Semantic interoperability can be fully addressed by utilizing industry standards for vocabulary and data context. (Lenz 2005) Basic interoperability can be addressed by several different methods including direct access, interface engine, or cloud networking. The presence of a RHIO or other HIE in the community might allow for economy of scale if the system was set up to work from the data repository. More likely the system will grow out of existing vendors such as those providing billing clearinghouse services.

Security issues regarding data sources and the need to provide services for development of forms and interfaces make cloud computing a less likely candidate for developing this interoperability. A centralized server will provide the core of access for both providers and vendors. (Mercury 2009) From a business model standpoint, most transactions would occur in the local community, a moderate number in the region, and relatively few come from outside the region (e.g. The Scooter Store, Liberty Medical).

User acceptance is a key factor in the effective implementation of the system. The technology needs to create an intuitive interface, ideally using tools readily available on the market. Increased customization and larger numbers of interfaces will create higher barriers for acceptance by IT departments and users. New technology that needs to be developed may delay implementation or create early failures.

The idealized system would include methods for process improvement, adaptability to IT changes, and methods for improving communication between the vendors and providers.

a) Solution I –

Establishing a standard for all vendors to submit forms to providers (Vendor compliance solution)

Basic method – Standard vocabulary, context and security is set up for vendors to apply to providers for information. Each vendor applies to each provider they need information from and direct secure links are developed for access.

The workflow for this approach is straight forward. The vendor applies to the provider for the right to send requests electronically. The provider vets the vendor and access is granted. The vendor chooses fields from a standardized set of items and creates a form. The form is sent using an established secure link and the provider's computer matches the patient's identifying information and creates a master identifying

code for this patient with this vendor. New patients would be manually verified. If questions regarding the match develop, the provider can contact the vendor for clarification. Once matched, a Matching Patient Identifier (MPI) code is assigned for future reference by the vendor.

The document is reviewed by the provider and when approved is sent back with the addition of the identifier code. The vendor will keep an MPI list for future requests to this provider for this patient.

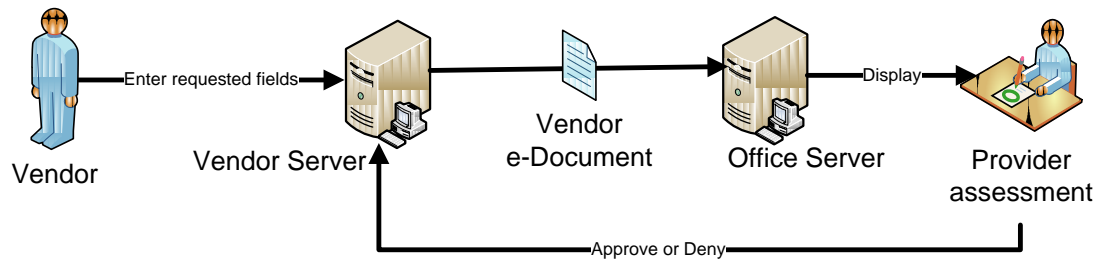


Figure 3 – Vendor Compliance Workflow

i. Impact on business - (Vendor compliance solution)

Several common elements will be evident for all 3 solutions.

- The patient will receive more rapid and consistent responses to requests
- The will have less cost to process forms once implemented.
- The Healthcare system would have the potential for increased throughput of product.
- There would be greater consistency in data due to this standardization, lending it to improved efficiency and quality.
- Data regarding vendors and their products can be used to improve patient and business outcomes
- Better business data can allow the system to help manage excessive usage and lower total health care expenditures.
- If developed, new standards might be slowly implemented or not fully compatible with business needs, complicating the problem.
- A deciding factor would likely be the ability to leverage the EMR tools already in place to their advantage, therefore limiting any new costs.
- There would be eventual advantage due to reduced turnaround time and time to billing, resulting in reduced time in A/R. Rebilling would be reduced due to the improved percentage of consistently correct data.

Implementation of this solution will be slower initially due to the number of vendors requiring initial setup. The vendor will also find it difficult due to the need to apply to each medical provider for access.

ii. Impact on process - (Vendor compliance solution)

There would be clear benefits to the process resulting from fewer people involved, fewer steps involved, increased consistency of data inclusion, and the ability of newly inputted data to be kept in the EMR database discretely. There would be continued approval and e-signing by provider, maintaining control of data security in the human hands of the medical provider.

The ability to aggregate data will allow for improved business intelligence, and potentially improved medical care for the providers' patient population at least. This would occur through utilization review and comparison with outcomes.

iii. Impact on technology - (Vendor compliance solution)

Several common elements will be present in each solution. The concept is that data will be exchanged in a customized CCD, created based on the predefined needs of the vendor using information from the provider:

- Standards – based on the CCD (HITSP 2010)
 - o Vocabulary
 - SNOMED for present illness history
 - ICD-9/10 for diagnosis
 - HCPCS/CPT for procedures
 - NDC for prescriptions
 - LOINC for labs
 - DICOM for radiology results
 - o Context - XML and HL7
 - o Communication and security – see specific solution
- Each system will be run through IHE protocols (IHE 2010) to assure functional dataflow -
 - All of the IHE protocols will apply to some extent since vendors may come from any field. Some examples are listed below:
 - Cardiology – holter monitors, ambulatory BP readings
 - Eye Care – glasses, contacts
 - IT infrastructure – communication standards
 - Laboratory – laboratory results
 - Anatomic Pathology – pathology results and problem descriptions
 - Patient Care Coordination - Hospice
 - Patient Care Device – ambulatory BP readings
 - Pharmacy - medications
 - Quality, Research and Public Health
 - Radiation Oncology – referral for therapy
 - Radiology – referral for procedure, results

The technology needed to implement this is readily available and relatively well standardized. The EMR web browser will allow the forms to appear seamlessly to the user. Once developed, the predefined set of vendor requirements could be mapped to most EMR databases relatively quickly. Delays in development of the standard, the need to map vendors individually, and the need to create trusted connections between

servers are all barriers to success. The technology in the providers' office would be leveraged more fully toward the goal of non-redundant data entry.

If there is no web browser module in the EMR, a 3rd party browser (e.g. Firefox™, Internet Explorer™) can be used with an integrated data migration tool to populate the fields (e.g. PHP™) (2010). This would require the user to move between windows, but the data transfer should be seamless. This could be a high barrier to implementation.

Implementation of this solution would provide immediate feedback to the provider regarding missing required fields, and provide a clear audit trail for accountability. Metadata from the system can be utilized to determine dataflow delays and problems. Analysis of data input – direct unchanged fill from the record, data chosen from a short list by the provider, data searched for by the provider, data corrected by the provider, data added with a narrative by the provider – could be used to improve the efficiency of the system.

iv. Advantages - (Vendor compliance solution)

Improved utilization of the EMR tool including less data redundancy and less unsearchable data

Decreased time and cost to complete the vendor request task

Simple, direct connection to the vendor

v. Disadvantages - (Vendor compliance solution)

Need to develop vendor request terminology standards

Potential need to develop an EMR/Web access interface on the Providers' computer

Security issues about access to the Providers' computer

Cost of multiple interfaces to both develop and manage

b) Solution II -

**Establish a standard for all electronic forms which can be used by all providers and vendors to submit information
(Standardized form solution)**

Basic method – A standardized form, similar to a CCD, will allow certain data to be made available to all parties based on the patient's informed consent. With that consent, the vendor sends a standard form with the required fields marked to the provider. The form can be sent on a thumb drive or memory card, as an encrypted email, via a portal to the provider, or via other trusted methods (pre-established with the provider). The form would be visible in a web application.

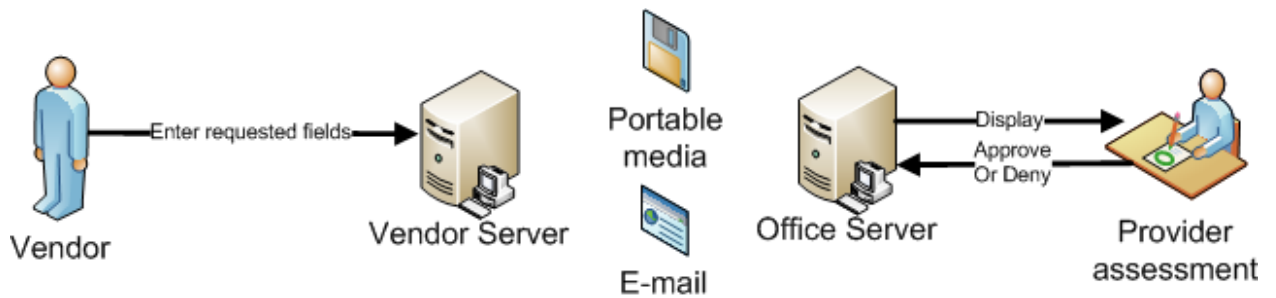


Figure 4 - Standardized Form Solution

i. Impact on business - (Standardized form solution)

The basic elements identified for the first solution will also be evident with this solution.

Again initial setup with a large number of vendors might slow down the system initially. Vendors would still need to be vetted to decrease the risk of viruses and other devices being imported. The vendor may also have difficulty with initial set up due to the need to work with each medical provider to assure clean access and the need to deal with an additional standard that may not fit their needs well.

ii. Impact on process - (Standardized form solution)

There would be clear benefits to the process resulting from fewer people involved, fewer steps involved, increased consistency of data inclusion, and the ability of newly inputted data to be kept in the EMR database discretely. There would be continued approval and e-signing by provider, maintaining control of data security in the human hands of the medical provider.

The key elements that differentiate this method are the multiple methods of data transport and therefore the options for either full network connectivity or none. This makes the system more of an electronic version of paper with all the benefits of the EMR being taken advantage of. The use of other networking options can continue to allow the patient to be in control of their data, but reduce the risk of inadvertent infections and invasions from portable media. The risks of trusted network interfaces are less than those of public portable media. (Gibson 2004)

The ability to aggregate data will allow for improved business intelligence, and potentially improved medical care for the providers' patient population at least. This would occur through utilization review and comparison with outcomes.

iii. Impact on technology - (Standardized form solution)

The basic elements identified in the first solution and the newly developed form standard will apply for this solution. Communication using email would require setting up encrypted email. This is a well established technology but not intuitive to set up. Use of portable media would require prior arrangements for establishing security protocols and methods of verification. The same web interface (intrinsic or added, as

with Solution I) is used in all solutions and would appear seamless to the user. Once developed, standardized form could be mapped to most EMR databases relatively quickly. Delays in development of the standard, the need to map the form, and the need to create trusted connections between servers are all barriers to success. The technology in the providers' office would be leveraged more fully toward the goal of non-redundant data entry, and the highly variable methods of form intake allow for lowered adoption costs. Implementation of this tool would also provide immediate feedback to the provider regarding missing required fields, and provide a clear audit trail for accountability. There would be less capability to 'ping' the vendor with a message/question since the method of transporting the form might not be an active link. As with the first solution, metadata from the system can be utilized to determine dataflow delays and problems. Analysis of data input – direct unchanged fill from the record, data chosen from a short list by the provider, data searched for by the provider, data corrected by the provider, data added with a narrative by the provider – could be used to improve the efficiency of the system.

iv. Advantages - (Standardized form solution)

Improved utilization of the EMR tool including less data redundancy and less unsearchable data

Decreased time and cost to complete the vendor request task

New hardware and networking is not required – multiple methods of data movement. Control of the data flow can literally be in the patient's hands.

Import/Export features used for the CCD or CDA can be utilized for this function- no need to develop a local data migration tool

v. Disadvantages - (Standardized form solution)

Need to develop a new form standard

Potential need to develop an EMR/Web access interface on the Providers' computer

Security issues about access to the Providers' computer with emails and portable media

c) Solution III –

**Create an interface engine and clearinghouse to merge that data of multiple providers output with multiple needs of vendors
(Clearinghouse solution)**

The workflow of the Clearinghouse solution has more electronic exchanges, but no increase in the number of human steps. The vendor would get access a secure web site for the clearinghouse, select the data fields available and create a form for the data. This form would be used as a template for retrieval of information. When the vendor makes a request for data from a provider it would include sufficient standard identifiers (name, DOB, address, provider name) to send the request to the participating medical

provider. The Clearinghouse would then reformat the request and send a clean, secure version to the provider over a trusted connection.

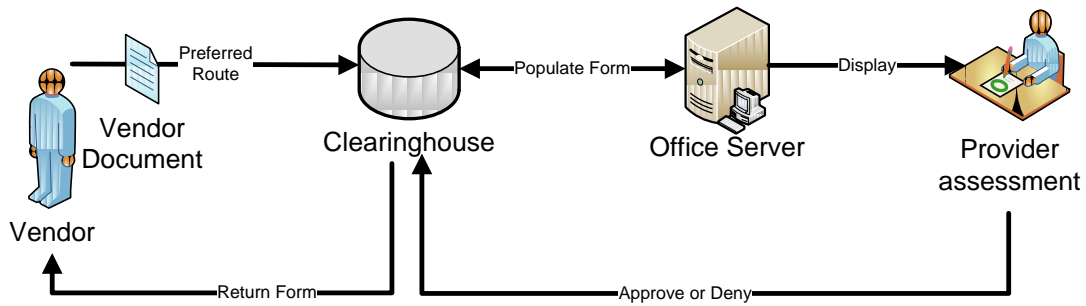


Figure 5 - Clearinghouse Workflow

After matching the providers' server would be then access the EMR database, retrieve the requested data and fill in the form. If there are multiple data elements available, the most recent would be chosen. If there is missing data a flag would be placed, and if there is data that is older than the acceptable limits provided by the vendor then the field would be flagged.

A flag regarding the completed form is sent to the provider. When the form is completed and approved, it is sent to the vendor. Incomplete fields and data rules would prompt the provider to obtain the data or offer a reason for the missing data. There are several similar issues that will be encountered in the process of managing these forms. Sufficient rules will be set up to maximize the potential of the computer to 'set up' the form and appropriate trigger responses within the EMR to simplify follow up and completion. Some of this potential will depend on the capabilities of the medical providers software and their desire to implement those devices.

After the form is sent to the Clearinghouse it is reformatted as needed for the vendor and passed on. The MPI code is sent with the form and the added to the vendors patient list on the clearinghouse database. The vendor can use this list to expedite future requests to that provider.

i. Impact on business - (Clearinghouse solution)

The basic changes identified for the first solution will also be evident with this solution.

The vendor will not need to apply to each medical provider for access, increasing the appeal for them to join in the network. All parties are vetted once by the Clearinghouse.

ii. Impact on process - (Clearinghouse solution)

In this approach the number of people involved remains low, there are fewer steps involved compared to the current state, as well as increased consistency of data inclusion, and the ability of newly inputted data to be kept in the EMR database discretely. There would still be continued approval and e-signing by provider, maintaining control of data security in the human hands of the medical provider.

The key difference to this approach is the indirect link between the vendor and the provider. This increases the security for the provider by requiring only one link to a highly trusted source. Because the data coming from the Clearinghouse is in a format and language compatible with the providers' EMR, no local programs are required for translation or interpretation of data. When available, the EMR's own capability to search, extract and import data can be utilized. Otherwise a small simple data migration tool can be developed.

The ability to aggregate data will allow for improved business intelligence, and potentially improved medical care for the providers' patient population at least. This would occur through utilization review and comparison with outcomes.

iii. Impact on technology - (Clearinghouse solution)

The basic elements defined in the first solution would also be present here. VPN would be used for connection between the provider and the Clearinghouse, and the vendors would link to the Clearinghouse with an SSL based website. The technology in the providers' office would be leveraged more fully toward the goal of non-redundant data entry. If there is no module within the EMR to view and manipulate web based forms a separate browser can be used with development of database search engines to populate the fields. The system would require the user to move between windows, but ideally the data transfer would be seamless. The EMR database would need to allow interfacing of the search tools, and to implement the entry of data would need to allow uploading of data from an outside source. This could be a high barrier to implementation.

Implementation of this tool would also provide immediate feedback to the provider regarding missing required fields, and provide a clear audit trail for accountability. Metadata from the system can be utilized to determine dataflow delays and problems. Analysis of data input – direct unchanged fill from the record, data chosen from a short list by the provider, data searched for by the provider, data corrected by the provider, data added with a narrative by the provider – could be used to improve the efficiency of the system.

iv. Advantages - (Clearinghouse solution)

Improved utilization of the EMR tool including less data redundancy and less unsearchable data

Decreased time and cost to complete the vendor request task

Single trusted connection for interoperability

No vetting of vendors needed by practices, this is done by the Clearinghouse

v. Disadvantages - (Clearinghouse solution)

Potential need to develop an EMR/Web access interface on the Providers' computer

IV. Recommended solution - Clearinghouse solution

I recommend setting up a clearinghouse to connect vendors and providers through an interface engine. This will allow for maximum development within the marketplace.

a) Rationale why you recommend this approach

Each of the solutions offers a reduction in expense for the provider, and integrates the process into their EMR in seamless fashion, so the difference will be based on security and maintenance.

The major advantage of having a data clearinghouse is that over time the governing agency/business can offer better deals to vendors and providers that move their data requirements toward the more commonly used standards. Along with the increasing costs of customization, this will create a business imperative to modify their methods of doing business. It will be very reassuring to providers that access to their data is limited to a single trusted partner. This partner can be a service provider that they already know – providing similar services for prescription and billing clearinghouse services. SaaS models could be developed that would decrease the need for health care facilities to keep any provider server data migration tools up to date and functional.

Similarly on the vendor side, access to a single source for software that will translate their needs into a trusted request to the provider, allowing them to get complete, clear and timely data to fulfill the patient's needs and bill for it in a timely fashion will be a strong selling point.

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