CALIFORNIA CORRECTIONAL
HEALTH CARE SERVICES

NASCIO 2021 State IT Recognition Awards Nomination

Title: **Less Clicks, More Care: Automating COVID-19 Test Orders & Results Letters**

Category: Business Process Innovations

State: California

Agency: California Correctional Health Care Services

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Project Initiaion Date: December 3, 2020 – ongoing

EXECUTIVE SUMMARY

Idea

California Correctional Health Care Services (CCHCS) has implemented multiple solutions to automate business processes for managing electronic medical record data for the inmate population in California's 35 adult correctional institutions. Two significant solutions automate ordering for COVID-19 tests and the delivery of patient notification letters with lab results. These automation solutions increase efficiency and provide our health care providers with more time for direct patient care. These solutions have been a critical tool for implementing quarantine surveillance to detect and help prevent the spread of COVID-19 among the 96,000 patients within the California Department of Corrections and Rehabilitation's (CDCR) adult institutions statewide.

Implementation

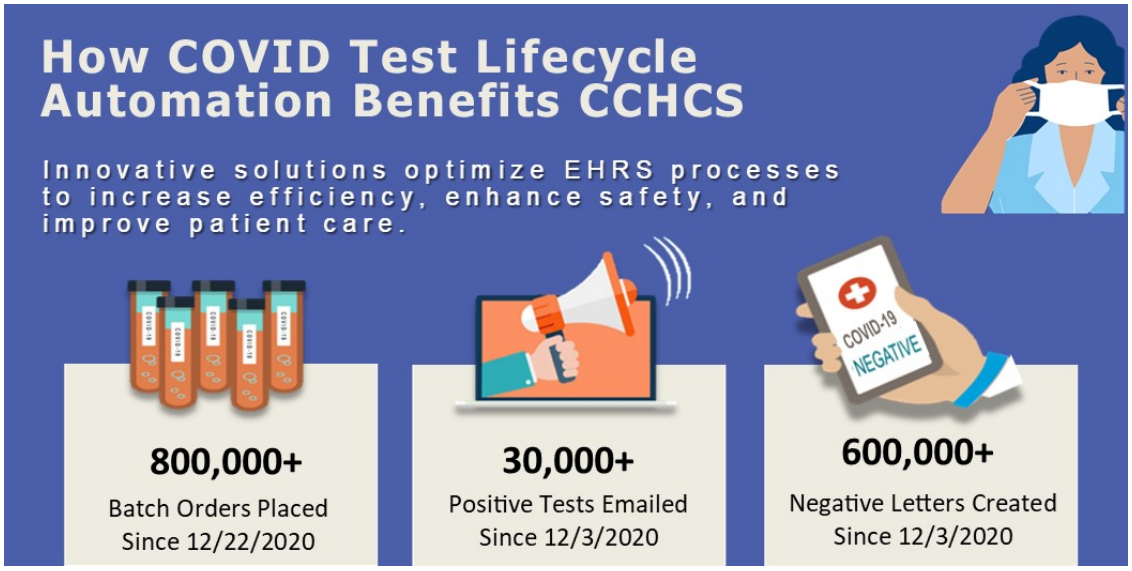
CCHCS continues to implement more accurate and expedient COVID-19 testing for our patient population. With the increase in testing efforts comes a larger burden placed on medical providers to review, endorse, and notify the patients of their test results via patient letter. With the implementation of mass COVID-19 testing, lab orders can now be placed for entire patient populations in the event of an outbreak. This quantity, along with the already high number of daily COVID-19 tests being placed by health care providers, results in potentially hundreds of lab result messages arriving daily in the provider's inbox that they must individually review, endorse, and create patient letters for.

CCHCS IT Services developed an automated COVID-19 patient letter solution that was implemented statewide at all 35 facilities on December 3, 2020. This solution reduced the amount of time a provider has to dedicate to creating COVID-19 patient letters for negative results. This solution also supplies easy-to-use templates for the provider to manually create a patient letter for a positive or indeterminate result and introduced a new way to view the COVID-19 results for an entire facility, all within the CCHCS Electronic Health Record System (EHRS). Since the implementation of this solution, over 600,000 letters have been automatically created.

On December 22, 2020, CCHCS implemented the automated ordering process for COVID-19 tests to help accommodate the surging demand for COVID-19 testing for inmates. Order automation yields significant timesavings. Previously, staff had to manually enter thousands of lab orders each week to support COVID testing and this task required the work of four-to-eight full-time employees per institution. Now, Medical and Nursing staff can create lab orders in bulk, thus eliminating the manual process. Since the implementation of this solution, over 800,000 orders have been placed, saving more than 26,000 hours of staff time.

Impact

Automating COVID-19 test orders and results letters has increased efficiency, decreased the risk of data entry errors, increased staff satisfaction and reduced burnout, enhanced safety by facilitating a quicker response to the ongoing pandemic, and enabled our health care providers to dedicate more time to direct patient care. Implementing these solutions has helped prevent the spread of COVID-19 by alerting care teams of a positive test result the second it enters a patient's chart. This instant notification speeds response times in getting patients into isolation to prevent the further spread of COVID-19 and ensures patients get the care they need.



IDEA

With 96,000 patients across the state, CCHCS faced a unique challenge when it came to providing timely and accurate COVID-19 testing and result notification for its patient population. With symptomatic patients increasing the number of patients needing to be seen by Nursing and Medical staff, there was little time available to place, in some cases, thousands of COVID-19 testing orders in a single day during mass outbreaks and then notify patients of their lab results. A solution was needed for both of these dilemmas.

For the automated ordering solution, Medical and Nursing staff needed a way to select a segment, or their entire patient population, and place COVID-19 testing orders without losing valuable staff hours to data entry for placing the orders one-by-one. They needed a solution that would be scalable for future outbreaks and testing regimens, would have a reporting mechanism for institution staff, and would support multiple order types with different validation rules. With these goals in mind, CCHCS IT Services worked to build an automated solution to meet the needs of the organization's health care providers.

Each COVID-19 lab result that is generated, either through the automated process or manually, creates an EHRS message that is routed to the provider's message center inbox. The provider then has to review, endorse, and create a patient letter for each lab result that is in their message center. Due to the pandemic, the large numbers of COVID lab messages in addition to the lab messages a provider regularly receives for all other lab results created a significant workload for the provider. The additional time required, along with the increased number of mouse clicks dedicated to this process, also put the provider at risk for repetitive task fatigue and increased the risk that a positive test result may not be reviewed timely. Because of these increased risks, an automated patient letter solution was developed and implemented.

IMPLEMENTATION

The automated COVID-19 test order solution uses two Structured Query Language (SQL) Server Integration Services (SSIS) packages. The first package is invoked every minute to pull Comma-Separated Values (CSV) files from a Medical Service Share Folder and inserts the file details into an SQL Server Table. The second SSIS package, which is invoked every two minutes, reads the file contents that were inserted into the SQL server database using the first SSIS package and executes a series of validation steps to determine if an Extensible Markup Language (XML) message should be created or not. If an XML message is created, the message is then routed from the SQL server database to the CCHCS Oracle health care adapter using Golden Gate replication. The CCHCS Oracle health care adapter then converts the XML message into an Order Result Message (ORM) Health Care Level Seven (HL7) message and the message is routed to the EHRS using TCP/IP Protocol. As part of this process, SQL Server Reporting Service (SSRS) is also used to display the file and file content details.

Home › HQ › **Batch Order**

OrderType COV2 (CoV-2 RNA QUAL RT-PCR (COVID19)-39448) OrderDate NULL Institution NULL

1 of 2? 100% Find | Next

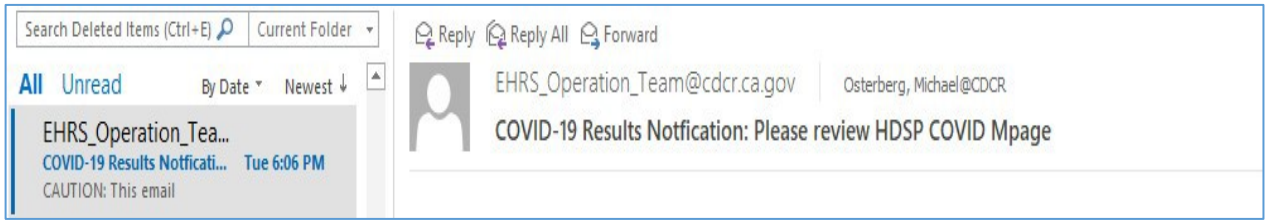
Batch Orders

Click on the file name to view the file contents and processing status of each row

Order Type	Order Date	Institution	File Name	Load Start Date Time	Load End Date Time	Process Start Date Time	Process End Date Time	Error Description	Processed Count	Skipped Count	Error Count	Total Rows	% Processed
COV2	20210414	FSP	20210414_FSP_COV2.csv	4/12/2021 6:10:03 AM	4/12/2021 6:10:03 AM	4/12/2021 6:44:43 AM	4/12/2021 6:46:16 AM		172	0	7	179	100.00 %
COV2	20210414	CTF	20210414_CTF_COV2.csv	4/12/2021 6:10:03 AM	4/12/2021 6:10:03 AM	4/12/2021 6:42:22 AM	4/12/2021 6:44:43 AM		269	0	14	283	100.00 %
COV2	20210414	CMC	20210414_CMC_COV2.csv	4/12/2021 6:10:03 AM	4/12/2021 6:10:03 AM	4/12/2021 6:38:03 AM	4/12/2021 6:42:22 AM		508	0	94	602	100.00 %
COV2	20210414	CCWF	20210414_CCWF_COV2.csv	4/12/2021 6:10:03 AM	4/12/2021 6:10:03 AM	4/12/2021 6:35:09 AM	4/12/2021 6:38:03 AM		355	0	12	367	100.00 %
COV2	20210413	SCC	20210413_SCC_COV2.csv	4/12/2021 6:10:03 AM	4/12/2021 6:10:03 AM	4/12/2021 6:34:46 AM	4/12/2021 6:35:09 AM		40	0	12	52	100.00 %
COV2	20210413	HDSP	20210413_HDSP_COV2.csv	4/12/2021 6:10:02 AM	4/12/2021 6:10:03 AM	4/12/2021 6:27:08 AM	4/12/2021 6:34:46 AM		895	0	20	915	100.00 %
COV2	20210413	FSP	20210413_FSP_COV2.csv	4/12/2021 6:10:02 AM	4/12/2021 6:10:02 AM	4/12/2021 6:25:37 AM	4/12/2021 6:27:08 AM		183	0	21	204	100.00 %

The patient letter solution contains two Discern Rules. The first rule runs on an hourly operations job that is created and maintained in the EHRS. The operations job runs a Cerner Command Language (CCL) script that looks for all COVID-19 labs that have been manually endorsed by a provider through their message center. The rule then takes all of the COVID labs that have been endorsed and reviews their result values. Based on whether the test is positive, negative, or test not performed (TNP), the rule assigns a patient letter template that mirrors the patient letter templates that currently exist in

the provider's message center. The rule then evaluates the patient's current housing unit and prints said patient letter at a predetermined printer within the facility. This printing occurs on an hourly basis by the way of an operations job that is maintained in the EHRS. The provider support or designated staff then collects the patient letter and delivers it to the patient in accordance with policy. Parallel to the creation and printing of the patient letter, the rule also stores a textual copy of the patient letter in the patient's chart within the current folder where all other patient letters are currently stored. This rule and process does not remove or modify the responsibility of the provider to place any relevant follow-up, isolation, or quarantine orders, as the provider will still need to acknowledge the result when they manually endorse it through the message center.

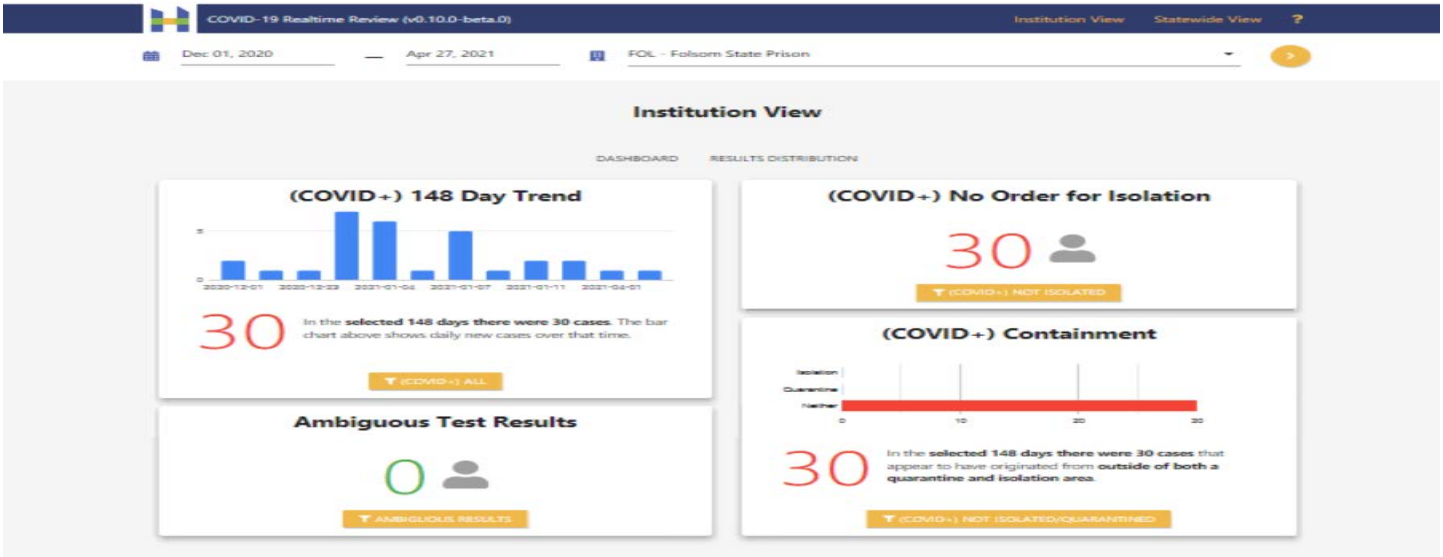


The second Discern Rule does not involve an operations job and instead triggers a clinical event to be added for a COVID-19 lab result in the database. When a COVID lab result creates a clinical event, the rule evaluates the test result value. If the result is positive, the rule then looks at the location of the patient and sends a generic Microsoft Outlook email to the Chief Medical Executive (CME) of the patient's institution. This email does not contain any patient identifiers or health information. It informs the CME that a new test result has come in and that they can review that result by logging into EHRS and checking the COVID-19 Results MPage. This is an additional layer of notification afforded to the CME so that they can be kept aware of any COVID-related results at their respective institution. The result message is still sent to the patient's provider, who is expected to follow current process and address that result within three business days.

The third part of this solution is the creation of an EHRS report that is available for use in the EHRS Reporting Portal. In the event there is ever an issue with a printer at an institution or the need to reprint a patient letter arises, this EHRS report creates a way to go back and reprint any patient letters that may have been missed. The report has search parameters including date range, facility, and individual CDCR number if desired. The user can input their desired parameters and any results will display as the original patient letter(s) that would have printed out on the designated institutional printer. Access to this EHRS report is determined by each program and attached in a document accompanying the Request for Change (RFC).

The last part of this solution is the creation of a COVID-19 Results MPage. This is an organizer-level MPage that allows a user to review all COVID lab results at their respective institution or statewide if desired. This is the MPage that the CME is directed to upon receiving an email in their Outlook inbox. This MPage is quick to load, as well as easy and intuitive to use. The user is able to select a date range and an individual institution if desired. Upon loading of the results based on chosen date and facility,

the user can easily sort their results with one or more criteria simultaneously. These data points include CDCR number, patient name, institution, yard, bed, DOB, result contributor source, event, test result, order start date, test perform date, and order status.



IMPACT

The automated COVID-19 test batch order process has had an immediate and large-scale impact across the entire organization. The batch process allows a facility to identify a subset of their population that needs testing or quarantine orders, submit an easy-to-create file, and have lab test orders placed for their patient population within four minutes of the file being processed. This solution has not only freed up staff to dedicate their time to providing much needed patient care instead of placing orders, it has also ensured that more accurate patient care orders are being placed. CCHCS works with a number of different testing vendors in order to fulfill our testing requirements. This means a number of different types of COVID-19 tests within the EHRS. With order requests sometimes numbering in the thousands for very large facilities, order fatigue was a real concern for our staff. Having staff placing hundreds of orders at a time through a manual process increased the odds for an errant order to be placed. With the batch order process, the order and order details are submitted by the facility and applied to each order, decreasing the risk of data entry errors.

While the impact of COVID-19 may lessen over time, CCHCS will certainly continue to use the automated batch order process going forward. This process will be helpful during yearly vaccinations and testing regimens that CCHCS offers our patients. It will also be on standby for immediate use should there be any outbreaks in the future. We are currently applying this technology for our population involved in the Integrated Substance Use Disorder Treatment (ISUDT) program and looking at other ways we can utilize it to save our staff time and provide accurate and timely care for our patient population.

With the volume of lab orders and patient letters being created by these automated processes, the impact for both the staff and patients is significant. Before these solutions were implemented, Medical and Nursing staff were spending multiple hours a day entering testing and quarantine orders into the EHRS. This manual process increased the possibility of an errant order being placed, contributed to staff burnout, and took time away from patient care. With the automated batch order process, staff now have more time to dedicate to the treatment of their patients. It also allows for the correct orders and labs to be placed in patient charts in a timely manner. Even with multiple staff placing orders, an individual institution could takes hours to place the proper orders. The automated process is able to process lab orders for an entire institution in under five minutes.

The automated patient letter process has also had a significant impact ensuring patients receive timely and accurate information regarding their test results. Providers were receiving hundreds of additional lab results a day in addition to their normal lab messages. The ability to quickly auto-generate patient letters for negative results is a significant timesaver for providers who are now able to dedicate more time to patient care. The ability also to automatically alert care teams of a positive test result the second it enters the patient chart increases response times in getting patients into isolation to prevent further spread of COVID-19 and gets the patient the care they need.