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Electronic Messaging for Gonorrhea and Chlamydia Test Result Notification, Improving Treatment and Patient Satisfaction

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Abstract

Background: Approximately 20% of chlamydia (CT) and gonorrhea (GC) cases in Louisiana are diagnosed at Parish Health Units (PHU). Patient notification of CT and GC test results involves nurses' phone calls and letters to positive patients, which is time consuming and inefficient.

Methods: In December 2018, electronic results notification was implemented in Caddo PHU using Chexout software to notify enrolled patients via text or email when test results are ready to view in a patient portal. We compared the timeliness of GC/CT results notification and treatment pre- (December 2017-November 2018) and post- (December 2018–November 2019) Chexout implementation. A random sample of patients were interviewed to assess acceptability.

Results: During December 2018 - November 2019, 5,432 patients were tested for CT/GC, 3,924 (72%) enrolled in Chexout, and notifications were sent to 3,884 (99%). Among CT positives, 472/568 (83%) viewed results in the portal compared to 2,451/3,356 (73%) CT negatives. Among GC positives, 300/353 (85%) viewed results compared to 2,657/3,571 (74%) GC negatives. Treatment success for CT improved from 493/670 (74%) to 506/568 (89%) and for GC from 332/409 (81%) to 325/353 (92%). Mean time to treatment decreased for CT (13.4 to 10.7 days) and GC (11.3 to 9.2 days). Enrolled patients found Chexout notification satisfactory 168/169 (99%) and easy to use 130/141 (92%). Reasons for declining electronic notification included lack of personal cell phone 55/86 (64%) and confidentiality concerns 42/86 (49%).

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Conclusions: Electronic messaging decreased time to notification and increased treatment success. Nurses spent less time notifying patients leaving more time for patient care.

Summary

Electronic notification of chlamydia and gonorrhea test results in Louisiana decreased time to notification and increased treatment success. Patients were highly satisfied with the service.

Keywords

Chlamydia; Gonorrhea; Text message; Results notification

Introduction

Louisiana experiences some of the highest rates of sexually transmitted diseases (STD) in the nation and has ranked at or near the top for chlamydia (CT) and gonorrhea (GC) rates since 2009.[1,2] Approximately 20% of CT and GC cases reported in Louisiana every year are diagnosed at Louisiana Parish Health Units (PHUs). Current results notification at PHUs for CT and GC tests includes up to two phone calls by nurses followed by a certified letter to notify the patient with positive test results. Patients with negative test results do not receive any notification. Prevention and control of CT and GC requires timely identification of infection, timely notification of results, timely and effective patient treatment along with partner notification and treatment. Louisiana Department of Health (LDH) like many other health departments in states with high CT and GC morbidity do not make any attempt to identify the partners of these cases [3] because intensive partner notification simply is not affordable.[4,5] Due to limited funding and a high volume of patients at PHUs, nursing staff are often not available to notify patients of their results in a timely manner, causing delays in treatment. Results notification by phone calls and letters requires a significant amount of staff time. Alternatively, text messaging and e-mails are widely used by people of all age groups [6] and have been routinely used in various health interventions including STD testing.[7,8]

Chexout is a software designed to automatically notify patients of available test results using electronic messaging when results are ready to view in a patient portal. This service was implemented at the Caddo Parish (county) Health Unit in Shreveport, Louisiana in 2018 to facilitate GC and CT test results notification for both positive and negative tests and improve treatment outcomes. The Caddo PHU also incorporated partner notification into the electronic messaging provided by Chexout. The aims of this demonstration project were to: 1) increase the proportion of patients notified of test results, 2) decrease time to treatment, 3) increase partner testing and treatment by using electronic messaging and 4) assess patient perceptions about electronic results notification and partner services.

Methods

In December 2018, the Louisiana Department of Health STD/HIV/Hepatitis Program (SHHP) implemented the Chexout Results Notification system at the Caddo PHU by integrating the results notification package into health unit procedures for patients tested

for CT or GC. SHHP staff worked with Chexout programmers to modify messaging and services to include specific result notification messages and partner notification information.

During registration, all patients were given the choice between 'Chexout electronic notification' and the 'standard notification'. In Chexout notification, patients received a notification by text message or email that their CT and GC test results (positive or negative) were available in the patient portal. In standard notification, the nurses at the health unit would notify them of positive results via phone call or certified letter as per the standard operating procedures at the Caddo PHU. Those with negative test results in the standard notification group were not notified of their test results. They had to either call or visit the health unit to receive their negative test results. Prior to implementation of the electronic notification service, all nurses and patient registration staff at the Caddo PHU were provided training on the electronic notification process. The LDH Consent for Services and Billing consent form was modified to capture the Chexout notification option along with a mandatory field for a valid cell phone number or email address specifically for the patients who chose the Chexout notification. The patients were also given small cards and flyers during registration which described how to enroll in the Chexout notification system, view their test results, and access additional STD prevention information.

Every evening, patient visits, test orders, and treatment data from Louisiana Electronic Health Record (EHR) and test result data from Louisiana State Laboratory Lab Reporting System (STARLIMS) were downloaded and electronically sent to the Chexout server. In the server all these data were matched by an automated matching system using patient name, date of birth, and social security number.

The morning after the patient's visit to the health unit, the patient received the following text requesting that they set up an account in the Chexout portal: "Hello 'Patient's Name', Activate secure lab results account @ https://secureaccount.Chexout.com/patient/ login or with your email @ www.Chexout.com." The patients were required to set up their portal account and reset their password using the link in the text. When lab results were available in the Chexout server, the patient would receive an electronic result notification text based on the results of the test to log in to their portal to view their results. For patients with negative test results the text stated "Your lab results are available. *Chexout Account Link*." For patients with positive results who had not been treated presumptively the text states "Please return to the clinic for treatment. Your partners should also be treated. Your lab results are available. *Chexout Account Link*". For patients with positive test results who were treated presumptively on the day of their test, the text states "Please make sure your partners get treated. Your lab results are available. *Chexout Account Link."*

Patients with negative test results received one results notification text. Patients with positive test results also received a second results notification text two days after the first results notification text. Once the patients received their results notification text, they could log into their secure Chexout portal to view the detailed result (Supplemental Figure 1). In the portal, patients with positive results also received an alphanumeric code (like 'apple2') to give to their partner(s) who could go to the Caddo PHU to receive fast-track testing and treatment services. The code could also be recorded in the clinic record to link

the patients with their partners. Additional STD related information is available in the Chexout portal results page for the patients to learn more about STD prevention and control and partner notification. The patients had the option of either notifying their partners or requesting the Louisiana Department of Health – STD/HIV/Hepatitis Program (SHHP) Disease Intervention Specialist (DIS) to notify their partners. If they chose the SHHP DIS to do the partner notification, they could use a secure link in the results page of the Chexout portal to provide partner information that was sent to a DIS for follow up.

We reviewed data before (December 2017- November 2018) and after Chexout was implemented for results notification (December 2018 - November 2019). We calculated time to treatment from specimen collection, treatment success, and number of partners seeking testing and treatment. We did an intention-to-treat analysis that included in the post-Chexout group both persons who accepted and refused text notification in order to avoid bias based on who chose to receive text notification.

During June - October 2019 we interviewed a sample of patients from both the Chexout notification group and the standard notification group who were tested for CT and GC at the health unit to assess the patients' perceptions about electronic messaging for results notification and STD care. During this time frame every 3rd patient from the Chexout notification group and every 3rd patient from the standard notification group were selected for interview. Two interviewers conducted the interviews over the telephone using a survey questionnaire that included mostly questions with multiple response options and a few open-ended questions. The interview responses helped the Caddo PHU address reported barriers associated with implementation of electronic messaging service. We attempted to contact the patients up to 3 times to conduct a 5-minute survey by telephone. Interview data were entered into a password protected Access database. Electronic results notification data were extracted from the EHR system and Chexout server and stored in a separate password protected Access database. Data were analyzed using SPSS version 24.0. Chi-square tests were done for statistical comparison. This evaluation of a public health program was reviewed by the Louisiana Department of Health Institutional Review Board and received a non-research determination because it was an evaluation of routine programmatic activities and was considered exempt.

Results

Between December 2017 and November 2018 (Pre-Chexout), a total of 6,515 patients were tested for CT and GC at Caddo PHU. Among those tested, 65% were female and 35% male. (Table 1) There were 670 chlamydia cases and 409 gonorrhea cases diagnosed during this period. Paper documentation, lack of documentation, or documentation as free text within the electronic health record system left us unable to determine how many of the above-mentioned patients with CT or GC were either sought for notification or successfully notified of their test results. Among the 670 patients with CT, 493 were adequately treated (74%) while 332 out of 409 (81%) patients with GC were adequately treated. Among those who were treated, the mean time to treatment from specimen collection was 13.4 days (median 13.0 days) for CT patients compared to 11.3 days (median 10.0 days) for GC patients.

Between December 2018 and November 2019 (Post-Chexout), a total of 5,432 patients were tested for CT and GC at Caddo PHU among whom, 62% were females and 38% males. Seventy-two percent of the patients enrolled into Chexout electronic notification during their visit. Enrollment into Chexout electronic results notification was similar by gender, 73% of females and 71% of males. Results notification texts were sent to 99% of the enrolled patients (3,884/3,924). The remaining 1% did not receive notification because they provided a home telephone number instead of a cell phone or the cell phone number was no longer in service. Among the Chexout notification patients, 83% (472/568) of CT positive patients viewed their results in the patient portal after receiving the results notification text compared to 73% (2,451/3,356) of CT negative patients. Additionally, 85% (300/353) of GC positive patients viewed their results in the patient portal after receiving the results notification text compared to 74% (2,657/3,571) of GC negative patients.

During this project period, 89% (506/568) of CT patients and 92% (325/353) of GC patients were adequately treated, including 19 with CT and 21 with GC who were presumptively treated at the time the specimen was obtained. Treatment success among CT patients improved from 74% during pre-Chexout to 89% during post-Chexout ($p < 0.001$) while for GC patients, treatment improved from 81% during pre-Chexout to 92% during post-Chexout ($p < 0.001$). Among those who were treated, the mean time to treatment from specimen collection was 10.7 days (median 11.0 days) for CT patients and 9.2 days (median 9.0 days) for GC patients. The average number of days between specimen collection and treatment decreased by 2.7 days ($p < 0.0001$) for patients with CT. Similarly, for patients treated for GC, the average number of days between specimen collection and treatment decreased by 2.1 days ($p < 0.0001$). Although not the outcome of interest due to potential selection bias, we note that treatment for CT was given to 384/406 (95%)) in the Chexout notification group and 122/162 (75%) in the standard notification group and treatment for GC was given to 254/264 (96%) in the Chexout notification group and 71/89 (80%) in the standard notification group. Among patients who were treated, the mean time to treatment for patients with CT was 9.2 days in the Chexout notification group and 15.5 days in standard notification group while for patients with GC it was 8.9 days and 10.2 days respectively.

Between December 2017 and November 2018 (Pre-Chexout), a total of 31 patients came to the health unit and mentioned that their partner(s) recommended that they should be tested. Of these partners, 9/31 (29%) tested positive for chlamydia and 5/31 (16%) tested positive for gonorrhea. Between December 2018 and November 2019 (Post-Chexout), a total of 42 patients came to the health unit and mentioned that their partners requested them to be screened and 15/42 (36%) tested positive for chlamydia while 7/42 (17%) tested positive for gonorrhea. However, only 6 of these partners were able to provide the alphanumeric code given to them by the original patients to be linked to their partners. Additionally, 4 patients used the secure link in their results portal requesting the health department DIS to notify their partners. These 4 patients provided contact information on 4 partners. DIS successfully contacted 2 partners, one partner refused examination and the other returned to the health unit and tested negative for both GC and CT.

We sampled 200 patients from the Chexout notification group and an additional 200 patients from the standard notification group to call for the follow-up interview. Among the Chexout

notification group, 86% (n=172) were successfully interviewed compared to 43% (n=86) from the standard notification group (Supplemental Table 1). Twenty-eight patients (14%) in the Chexout notification group could not be interviewed because they could not be reached (n=19) or they refused an interview (n=9). Additionally, 53% (n=114) of the patients from the standard notification group could not be interviewed because they could not be reached (n=91) or they refused an interview (n=23). Sixty-two percent of interviewed patients in Chexout notification group were female compared to 42% of the standard notification group. Chexout notification patients reported the electronic results notification service was satisfactory (99.4%) and easy to use (92.2%). Eleven patients disliked the idea of not having other STD test results (syphilis and HIV) through electronic notification while 4 patients were concerned about confidentiality though none reported that a breach of confidentiality had occurred.

Standard notification patients reported their major reasons for declining electronic test results notification were not having a personal cell phone (64%), confidentiality concerns (48.8%), and not being tech savvy (27.9%).

Discussion

Our analysis demonstrated that electronic notification of STD results can improve overall notification and treatment rates. It was the method of notification chosen by most patients. We found that the majority of the patients at Caddo PHU voluntarily enrolled to receive electronic test results notification and almost all of the enrolled patients successfully received the results notification message as soon as the results were released by the Louisiana State Office of Public Health Laboratory. The patients did not have to wait for a phone call from the health unit notifying them of their positive results and the patients with negative test results had the ability to easily verify their test results in the Chexout portal. With improvements in the proportion of patients notified of their results, overall treatment success increased for both CT (74% vs 89%) and GC (81% vs 92%) patients. Additionally, we found a decrease in the time to treatment for positive patients. For patients with CT the average number of days between specimen collection and treatment decreased by 2.7 days. Similarly, for patients diagnosed with GC, the average decreased by 2.1 days. Our findings suggested that electronic messaging was an acceptable and preferred method for CT and GC results notification compared to the traditional PHU protocol of phone calls and letters. Most patients found the secure online Chexout portal simple, easy to use, and could be accessed anywhere via phone or computer. The majority of the Chexout notification patients in the study found electronic notification satisfactory and preferred it to notification via phone calls or letters. It should be noted that although three fourths of the patients at Caddo PHU enrolled in the Chexout electronic notification, the enrollment might have gone up if this notification was made the routine, with the option to choose the standard notification.

As technology advances and people become even more technologically savvy, timely notification of test results by electronic notification will improve the STD control and prevention activities. Earlier studies have found that results notification by text messages has been successfully used to notify patients of their STD results in other settings; thus, reducing the staff time spent calling patients with results and recommendations to return

for treatment. [9,10,11,12] Electronic notification is generally acceptable to patients [12,13] and has been shown to reduce time to notification of positive results. [9, 10,11,14,15] In our study, the patients received the results notification text to view their results in the patient portal within a day of release of the test results by the state laboratory. Patients in both the United Kingdom and Florida were notified of their STD results in a similar timeframe via text message or e-mail [9, 10, 11,] A multicenter study among wellness center patients in California and Florida used 'Healthvana' results notification system and successfully sent results notification immediately after availability of test results. [15] Similar to other studies,[9,15,16] we also found a reduction in time to treatment for positive patients. Among CT patients' timeliness of treatment improved by 2.7 days while timeliness of GC treatment improved by 2.1 days after Chexout was implemented. In the UK, results notification improved the timeliness of CT treatment among men by 3.8 days[9] and in California and Florida, electronic notification of results improved the timeliness of treatment among CT/GC patients by 1.5 days. [15] A review of the uses of mobile phone text messaging in sexual health clinics also found out that text message notification significantly improved the number of patients returning to clinics for treatment. [16]

The interviewed patients from the Chexout notification group mentioned that they received important STD-related information in the portal, along with how to better prevent and control CT and GC and links to additional STD fact sheets. Availability of this information in the patient portal with information on how and where to access STD related care was helpful for the patients and their partners. This aligns with other studies that have found that electronic notification is a useful way to provide STD related information to patients. [17,18]

Partner notification of CT and GC is not routinely done by health department staff in most states in the US because of very high reported volumes of these cases. Such partner notification is time consuming and requires significant resources which are usually unavailable. We built an online partner notification tool for the patients in their results portal page where information on partner notification including how to notify partners, where the partners could get tested and receive treatment, business hours of the STD care providers and cost of testing and treatment were provided. There was also an automated code generated for patients to give to their partners. The purpose of the code was to help expedite the partners' visits with fast-track walk-in appointments at the health unit for testing and treatment and also to link the patients with their partners within the electronic health records. However, this resource was not used by many patients. There was also an additional tool where the patients could request the health department to notify their partners by providing information on their partners. This tool was also not used much with only 4 patients making the request. A recent study in North Carolina on electronic notification of test results, had a built-in partner notification tool similar to our study with very low utilization by patients. [12] Further work is needed to develop better and innovative partner notification tools to incorporate with electronic notification.

This study has several limitations including – First, there were no test result notification data prior to implementation of Chexout. Second, this was not a randomized trial. It was a Pre-Post evaluation which could have been influenced by temporal trends in other factors that influence treatment rates. Third, about a quarter of the patients chose not to receive

text notification but were still included on the post-Chexout comparison group to minimize selection bias. This might have resulted in an underestimate of the benefits of text results notification.

The health unit nurses were highly satisfied with the electronic results notification service which they mentioned during routine communication. They no longer had to devote much time to reaching patients to notify them of their results by phone or letters. This allowed them to devote more time to clinical activities. However, if the patients in the Chexout notification group did not return to the health unit for treatment within 14 days of receiving the text notifying they should return for treatment, the nurses attempted to call them to return for treatment. We did not perform any workload analysis to assess changes to workload of the health unit staff. With limited budget and reduced staff, jurisdictions are always looking for innovative and cost-effective ways to reach patients in a timely manner for results notification. Electronic notification can also play a critical role by providing disease-related information to patients in a familiar and easily consumable format. Communication between the providers and patients can significantly improve by using this technology which in turn can improve the health and well-being of the patients.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1:

Characteristics of patients tested for chlamydia and gonorrhea at Caddo Parish Health Unit, December 2017-November 2018 (Pre Chexout) and December 2018 - November 2019 (Post Chexout)

Patients	Pre Chexout	Post Chexout		
	Total	Total	Chexout Notification	Standard Notification
Total	**6,515**	**5,432**	**3,924**	**1,508**
Gender				
Female	4,213 (64.7%)	3,367(62.0%)	2,457 (62.6%)	910 (60.3%)
Male	2,302 (35.3%)	2,065 (38.0%)	1,467 (37.4%)	598 (39.7%)
Race/Ethnicity				
Black/African American	5,591 (85.8%)	4,460 (82.1%)	3,197 (81.5%)	1,263 (83.8%)
White	752 (11.5%)	722 (13.3%)	551 (14.0%)	171 (11.3%)
Hispanic/Latino	106 (1.6%)	162 (3.0%)	115 (2.9%)	47 (3.1%)
Other/Multirace/Unknown	66 (1.0%)	88 (1.6%)	61 (1.6%)	27 (1.8%)
Age Group				
<14	51 (0.8%)	30 (0.6%)	19 (0.5%)	11 (0.7%)
15-29	4,101 (62.9%)	3,193 (58.8%)	2,333 (59.5%)	860 (57.0%)
30-39	1,606 (24.7%)	1,412 (26.0%)	1,015 (25.9%)	397 (26.3%)
40+	757 (11.6%)	797 (14.7%)	557 (14.2%)	240 (15.9%)

P > 0.05 for all comparison groups – Pre Chexout Total compared to Post Chexout Total and Post Chexout - Chexout notification compared to Post Chexout - standard notification

Table 2:

Testing and treatment of patients before (December 2017- November 2018) and after (December 2018 - November 2019) Chexout implementation

Patients	Chlamydia			Gonorrhea		
	Pre- Chexout	Post-Chexout	P-value	Pre- Chexout	Post-Chexout	P-value
Patients Tested	**6,515**	**5,432**		**6,515**	**5,432**	
Patients Positive	670 (10.3%)	568 (10.5%)	0.3	409 (6.2%)	353 (6.4%)	0.3
Patients Treated	493 (73.6%)	506 (89.1%)	<0.001	332 (81.2%)	325 (92.1%)	<0.001
Time to Treatment (Mean)	13.4 days	10.7 days	<0.001	11.3 days	9.2 days	<0.001
Time to Treatment (Median)	13.0 days	11.0 days	0.002	10.0 days	9.0 days	0.002

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