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The effect of electronic patient records (EPR) on the time taken to treat patients with
genital Chlamydia infection

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Abstract

Objectives: To measure the time taken to recall and treat patients with untreated Chlamydia attending a sexual health clinic before and after the introduction of EPR.

Methods: 52 consecutive qualifying patients were identified for Jan-Mar 2007 (paper case records) and 2009 (EPR). For each the patient time intervals were measured between each of following dates: first attendance, first positive result received, first attempted patient contact and attendance for treatment.

Results: Between 2007 and 2009, the median time taken to treat a patient after receipt of a positive Chlamydia result fell by 11.5 days (median 15 days in 2007, 3.5 days in 2009). The time between first attendance and treatment was reduced by 9.5 days (median 21 days in 2007, 11.5 days in 2009) despite results taking 2 days longer to arrive in 2009. The proportion of patients treated within 2 weeks of a positive result rose from 38% in 2007 to 94% in 2009. Compared with paper notes, EPR decreased the time to recall, by eliminating three time-delaying patient recall processes. By ensuring more accurate patient recall information, EPR also lead to a higher proportion of patients successfully recalled by telephone (26/44 ,59% versus 46/52, 88% in 2007 and 2009 respectively), leading to earlier treatment.

Conclusions: The 'time to treat' interval was dramatically reduced following the introduction of EPR. Clinics using paper notes should consider switching to EPR as a means of improving STI recall efficiency.

Introduction

The longer an STI goes untreated, the more risk there is of onward transmission and of clinical complications. [1] Any system that makes patient recall more efficient and effective therefore serves to reduce the spread and complications of STIs. [1] Theoretically, EPR are more efficient to use than paper-based records for recall due to instant access and the use of failsafe mechanisms which ensure better patient contact information. [2] This clinic changed from paper-based records to EPR in August 2007 [2] and thus was in a position to compare any subsequent efficiencies. We also switched from routine genital swabs to urine-based Chlamydia and gonorrhoea testing for asymptomatic patients between the two time periods, The number of men with Chlamydia who had been treated as asymptomatic NSU on the day of attendance was therefore reduced in 2009 compared with 2007. This study looks at time taken to recall and treat the two groups of asymptomatic patients with Chlamydia in each of these two years.

Key messages

- Rapid recall and treatment of patients with a diagnosed STI such as Chlamydia reduces the risk of onward transmission and complications.
- EPR improves patient recall through instant access to case notes and increased accuracy of recall information, leading to early treatment of patients with Chlamydia.
- Sexual health clinics without EPR should move towards such a system as a means of improving their efficiency and effectiveness.

Methods

Two periods were chosen: January – March 2007 (paper note system) and January – March 2009 (EPR, Lillie Sexual Health Management System, Blithe Computer Systems Ltd.). For each period, 52 consecutive patients were identified who had a diagnosis of genital Chlamydia infection and had not been treated on the day the test was taken. For each, the following dates were noted: first attendance, first positive result, first attempted patient contact, day of patient treatment. The time intervals between each date were measured. We also recorded the methods of contact and gender of patients and assessed the affect of each on recall time.

The result handling and patient recall mechanisms for each time period were described and each step compared to ascertain their effects on recall efficiency.

Statistics

Sample size calculation: A minimum of 49 patients was required for each year to detect a difference of the mean times taken to treat patients after result receipt of 1 day (assuming a mean of 4 and 3 days and standard deviation of 2 days for 2007 and 2009 respectively) using a 5% alpha and 80% statistical power level. [3] Differences between the groups of time intervals were measured using the Mann-Whitney test. [4] Differences in proportions of factors between the two years were measured using the Chi-Square test. [5]

Results

The processes for recall of patients with a positive Chlamydia test are shown in figures 1 and 2. There are seven steps leading to patient recall using paper notes in 2007, each with inherent possible delays. In 2009 the EPR system had eliminated three of these steps (steps 2-4). In addition, the EPR system allowed for electronic

prompts to ensure that all staff ensure that the patients address and telephone details are correct.

The major recall times and other results comparing 2007 and 2009 are given in Table 1. The majority of patients (>80%) were in the age range 16-30 years. 96 and 45 patients with Chlamydia were excluded from the analysis in 2007 and 2009 respectively, having been treated at the initial day of attendance. There are more men (35%) in the 2009 sample than in 2007 (8%), as less men in 2009 had been treated on the initial day of attendance (as asymptomatic NSU) following the introduction of urine-based Chlamydia/gonorrhoea testing in late 2007.

Table 1: Overall differences between 2007 and 2009

Median (range) time intervals measured in days:	2007 (N=52)	2009 (N=52)	Difference in median days	P value
Result to treatment	15 (1-112)	3.5 (0-30)	-11.5	<0.0001
Result to 1st attempted contact	7 (1-20)	0 (0-7)	-7	<0.0001
1st attendance to treatment	21 (6-117)	11.5 (3-39)	-9.5	<0.0001
1st attendance to 1st attempted contact	13 (6-45)	8 (3-12)	-5	<0.0001
1st Attendance to Result	5 (1-32)	7 (3-12)	+2	<0.0001
Other Results				
Proportion treated within 14 days of the result	16/46* (37%)	49/52 (94%)		0.0067
Proportion treated within 30 days of the test	39/46* (85%)	50/52 (96%)		0.66
Proportion treated within 30 days of the result	40/46* (87%)	51/52 (98%)		0.68
Females in each group	48/52 (92%)	34/52 (65%)		0.25
Successful telephone recall	26/44 (59%)*	46/52 (88%)		0.20
Successful letter recall	18/44 (41%)*	6/52 (12%)		0.019

*- Some data points missing

Sub-group analyses were performed to look in more detail at the factors influencing recall times and times to treatment (table 2). Analysis of the data comparing recall times for men and women showed no statistical differences in 2009. More people had to be contacted by letter in 2007 as the recorded telephone numbers in the notes were more likely to be inaccurate in 2007 compared with 2009. In 2007, patients recalled by letter took longer than those successfully recalled by telephone for the intervals: result to treatment and attendance to treatment

Table 2 . Sub-group analyses

Time intervals	Median (range) in days	Median (range) in days	Difference in median days	P value
Result to treatment, Women Vs men 2009	<i>Women</i> 3 (0-30)	<i>Men</i> 5.5 (0-11)	2	0.97
Result to 1st attempted contact Women Vs men 2009	<i>Women</i> 0 (0-7)	<i>Men</i> 0 (0-5)	0	0.79
1st attendance to treatment, Women Vs men 2009	<i>Women</i> 10.5 (3-39)	<i>Men</i> 13 (8-19)	2.5	0.25
1st attendance to 1st attempted contact, Women Vs men 2009	<i>Women</i> 7 (3-14)	<i>Men</i> 8.5 (6-12)	1.5	0.08
Result to treatment, Letter recall Vs phone 2007	<i>Letter</i> 17 (6-112)	<i>Phone</i> 11 (1-83)	-6	0.022
Result to 1st attempted contact Letter recall Vs phone 2007	<i>Letter</i> 7 (2-13)	<i>Phone</i> 7 (1-20)	0	0.87
1st attendance to treatment, Letter recall Vs phone 2007	<i>Letter</i> 21 (12-117)	<i>Phone</i> 17 (6-91)	-4	0.024
1st attendance to Results, Letter recall Vs phone 2007	<i>Letter</i> 4 (1-9)	<i>Phone</i> 5 (1-11)	1	0.109
Result to treatment Telephone recall, 2007 Vs 2009	2007 11 (1-83)	2009 3.5 (0-30)	-7.5	<0.0001
Result to 1st attempted contact Telephone recall, 2007 Vs 2009	2007 7 (1-20)	2009 0 (0-7)	-7	<0.0001
1st attendance to treatment, Telephone recall, 2007 Vs 2009	2007 17 (6-91)	2009 11.5 (3-39)	-5.5	0.0002
1st attendance to Results, Telephone recall, 2007 Vs 2009	2007 5 (1-11)	2009 7 (3-12)	2	0.0028

Comparing 2007 to 2009, patients successfully recalled by telephone were seen/contacted less quickly for the intervals results to treatment, results to first attempted contact and attendance to treatment . This was due to the longer time delays between results arrival and the first attempted contact in 2007 as a result of the time taken for paper notes to be sought by administration staff.

Discussion

This study demonstrates that since the introduction of EPR, the time taken to treat patients after receipt of a positive Chlamydia result has dramatically reduced. In comparison with 2007, patients in 2009 were contacted a median of 7 days sooner and treated a median of 11.5 days earlier following the positive result. The overall time from first attendance to treatment was also reduced by a median of 9.5 days in 2009, even though results took a median 2 days longer to return from the laboratory. This decrease in time to treat has led to a large increase in the proportion of patients treated within 2 weeks of the result, rising from 37% in 2007 to 94% in 2009. The reasons for this are clear. Analysis of the clinic systems for patient recall used in 2007 and 2009 shows that the major inefficiencies of the paper records system were the long times taken to find notes and the inaccurate contact information they contained, leading to delays in contacting the patients. EPR allowed for much more efficient working in these areas.

The need to treat patients quickly is self-evident. Epidemiological modelling has shown that the rapid treatment of patients with diagnosed infection reduces the incidence of acute STIs, [1] as well as preventing clinical complications. The use of paper case records in clinics mitigates against this as they lead to inherent

inefficiencies, such as delays in finding the notes and difficulties in keeping the patient contact information reliably updated. [2] EPR overcomes these problems by, amongst other things, ensuring instant access to the case record and prompting staff members to ensure accurate patient contact information. Automated letters and text messages can also be generated from EPR systems and it has been previously demonstrated that patient-recall efficiency is also seen with automated texting services. [6] In this study, most patients in the EPR arm were contacted on the day of the receipt of the result and treated within 3.5 days. By comparison, it took an average of 7 days to contact the patient and a further 8 days to treat them in the paper notes arm. How does this compare with any available outcome targets? In 2004, national outcome standards suggested that 70% of patients (50% in London) should be treated for Chlamydia within 4 weeks of diagnosis. [7] National Chlamydia guidelines in the UK and US have not set time-to-treat standards [8,9] although the English National Chlamydia Screening Programme suggests that 50% and 80% of patients should be treated within 14 and 30 days respectively. [10] We far exceeded these standards in 2009, as we treated 94% and 98% of initially untreated patients within 14 and 30 days of a positive result.

The strength of this study is that it compares patients from the same cohort, at two time periods, in a normal clinical situation and is therefore a reflection of standard clinical practice. It is also the first paper to demonstrate how EPR can improve the efficiency of patient recall within the setting of a sexual health clinic. Potential weaknesses are that other changes unrelated to EPR might have occurred between the two time periods that led to these improvements. We have tried to eliminate confounding factors by looking for bias related to gender and mode of

communication. There were more men eligible for the study in 2009, as in 2007 the majority of men with Chlamydia were treated as NSU at first attendance, when urethral swabs were used routinely. In 2009 most asymptomatic men had a urine-based test leading to more of them requiring later recall. Although more patients had a successful telephone recall in 2009, this was inherently due to the EPR as it has multiple prompts to ensure that telephone numbers were correct. In the paper notes telephone numbers were more frequently incorrect and so more recall was by letter. The different proportion of patients recalled by letter/telephone in the two periods are therefore a direct result of the change to EPR and could not be seen as a bias in the study.

We suggest that with the increasing use of non-invasive Chlamydia screening methods such as urine sampling, and more effective patient recall, new national standards should be set for the time taken to recall and treat infected patients.

This study shows that an EPR system is superior to paper-based case records in enabling the efficient and effective treatment of patients with STIs such as Chlamydia. EPR also has several other inherent advantages over paper record. [2]. Clinics still running paper-based case records should strongly consider switching to EPR.

What research should be performed in the future? EPR and other technology, such as automated patient recall following the electronic receipt of results, might in future further reduce the time to treat interval. In theory all patients would be recalled on the day the result is received without the intervention of a person. Future research should look at how additional automated recall technology can be added to current EPR

systems and what effect they would have on patient recall for treatment. Appropriate use of technology greatly improves our ability to treat patients rapidly and we should strive to use all available methods, for the good of our patients and the betterment of public health.

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Competing Interests: GB has performed training and lecturing on the use of EPR for Blithe Computer Systems Ltd. in return for educational donations to the clinic.

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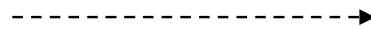
Fig 1. STI Recall Using Paper Notes

Notes

1. Positive STI result arrives from Lab.



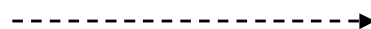
2. Request to reception to find the patients' notes



Reception or Health Adviser may be busy



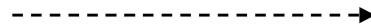
3. Notes sought by reception



Some notes cannot be found readily



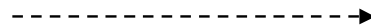
4. Notes returned to Health Advisers



Health Adviser has to make time to deal with the notes as they return



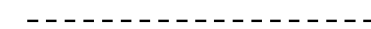
5. Health Adviser attempts to contact patient by phone



Telephone number may not have been updated in the notes



6. Patients who cannot be contacted by phone have a letter written



Time taken to print the letters.
Address may not have been updated



7. Patient returns for treatment

Fig 2. STI Recall Using EPR

