EAST LONDON PATIENT RECORD: BENEFITS STUDY EVALUATION

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Integrated care has become a key focus of health service reform in recent years and this is to be applauded given the fragmentation within the NHS and social care system. Yet efforts to integrate care services have rarely extended into a concern for the broader health of local populations and the impact of the wider determinants of health.

In order to do this, we need to use a population-level based approach in order to plan programmes and interventions across a range of different services and sectors. This needs population-level data and population-based budgets aligned to financial incentives with improving population health rather than just payment by results. Hence we need the involvement of a range of partners and services to deliver improvements.

This project has highlighted benefits to augment integrated care by providing the “IT-glue” that brings together the various stakeholders to ensure seamless care for patients from different providers and it is anticipated to cause less duplication which adds unnecessary costs as well as a burden for patients and professionals alike.

The analysis of the questionnaires showed that the majority of clinicians wanted to be able to view data from beyond their own organisation saving time in retrieving vital information. This would equate to 9,400 hours of clinical time saved per year. Efficiency savings included reduction in paperwork, less missing paperwork and reduction in investigations ordered by preventing duplication.

The costs of running the eLPR each year equated to 57p per patient per year but the savings equated to at least 121p per patient per year.

The reduction in referrals equated to an annual saving of £133k whilst ceasing using other systems could save approximately £500k per year. The significant referral avoidance from GPs was because they were able to view existing results and history that would otherwise not have been available to them. An important finding was that clinicians felt that not only the relationship with patients was better but also better patient engagement. It was felt that patients were more confident in the level of care received, more engaged and happy that their information was available.
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2. ABSTRACT

OBJECTIVES
To evaluate the effectiveness of the east London Patient Record (eLPR), which uses two independent but linked Cerner Health Information Exchanges (HIEs) to provide a view to clinicians of patient information held by other local health and social care providers. Also, to look forward to the benefits of a population health advanced analytics system that is currently being developed, called Discovery.

METHODS
During May 2017, we surveyed and interviewed clinical users of the eLPR in both primary and secondary care settings. In total 97 questionnaires were completed with a small number of subsequent interviews taking place to obtain quotes and to delve further into some of the answers provided. The completed questionnaires provided both quantitative information and qualitative information that is presented within this paper. For the Discovery project, we held a workshop with the clinicians involved with the project to explore the expected benefits.

RESULTS
The results of using the eLPR were almost entirely favourable, with the majority of clinicians finding positive benefits to being able to view data from beyond their own organisation; as well as the direct benefit of seeing otherwise unavailable information, there was significant time saved through not having to contact colleagues in other organisations to retrieve vital information.

The costs of running the eLPR each year, outlined below, equate to 57p per patient per year. Just taking the easily quantifiable savings of clinician efficiency (£940k), first referral avoided (£133k) and system avoidance (£500k), the savings equate to 121p per patient per year.

KEY FINDINGS WERE:
• Costs to setup eLPR
  While difficult to quantify with precision at a distance of five years, it is thought that implementation costs were approximately £1.7m. Recurrent annual costs (support, licenses, etc.) are approximately £745k. This would give a total five year cost of approximately £5m.
• Time saving
  As well as the improved efficiency mentioned above, 53% reported daily time savings of between 6 minutes and >30 minutes saved per day through the use of eLPR. On average 250 GPs using the system per day, 250 every other day and 88 at least once a week, this would equate to 9,400 hours of clinical time saved per year. Assuming a cost of £100 per hour for a clinician, over £940k per year is saved across the 4 CCGs. Of course, these time savings are a small amount per person per day and simply reduce how late the clinicians finish their day. They are non-cashable savings; the value is shown simply for comparison purposes.
ABSTRACT

• **Reduction in referrals**
  Based on the responses to this survey it is not unreasonable to conclude that **1,233 referrals are avoided across WELC each year**. Taking the cost of first referral, single professional for the lowest cost treatment function (Anaesthetics) and a market forces factor of 1.2 (just under both Homerton and Barts Health’s figure), i.e. £111, this equates to an annual saving of £133k.

• **Ceasing using other systems**
  In 2017 the Newham Hospital Urgent Care Centre was able to consolidate its use of systems through eLPR. This brought a number of notable benefits including: elimination of dual-entry and associated training costs and time wasted entering data into multiple systems leading to savings in licensing and support costs. Newham CCG believe this will save approximately £500k per year.

1,233 referrals are avoided across WELC each year.

In 2016 one CCG was able to cease the use of a similar system that had failed to gain traction with users which had been intended for a similar function.

• **Efficiency**
  In questions of efficiency, 48% of clinicians felt the amount of paperwork had been reduced or significantly reduced, 63% felt there had been a reduction or significant reduction in records/notes going missing and 42% recorded a reduction or significant reduction in the number of investigations ordered.

Similarly, 78% of hospital clinicians state that they could handle in a better or much better way the speed and quality of treatment in their department. About 80% of the clinicians stated that the number of phone calls answered or made have been reduced / greatly reduced because the information is already available in eLPR thereby reducing the need to call a colleague for further information.

• **Better clinician relationship with patients**
  In the nine questions that focused around different aspects of the clinicians’ relationship with the patient, the percentage of clinicians who felt the relationship was better or much better, ranged between 54% and 89%. For example, 62% felt the patient engagement and relationship was better or much better when eLPR is used.

Overall, 81% of clinicians felt eLPR had a positive or very positive effect on their working day.

Other benefits included an improved relationship with patients who, it was felt, were more confident in the level of care received, more engaged and happy that their information was available; partly so they didn’t have to repeat themselves. There was also perceived to be a significant time saving for clinicians and significant referral avoidance from GPs being able to view existing results and history that would otherwise not have been available to them.

63% felt there had been a reduction or significant reduction in records/notes going missing.
DISCUSSION
While the benefits of the eLPR were nearly entirely positive or neutral, there were some issues in terms of the ability to access the data. There were a number of responses indicating slow performance, which appeared to be down to individual PCs or network performance within the user’s organisation rather than a general feeling of the whole system being too slow.

As more organisations join and so data is retrieved from more and more systems, this is an area that the system administrators will need to be cognisant of. A mechanism is in place with the system host to increase resources as necessary to maintain performance levels. While a small number of users reported issues, there was a general perception that the current system is easy to use and very valuable, and will be even further enhanced as other providers, particularly in the mental health and social care spheres, contribute their information.

CONCLUSION
The overwhelming weight of the responses where positive. The cost of providing the functionality of the system in the first place, the cost of adding additional organisations and users, and the cost of ongoing support and maintenance are all felt to be low in comparison with the benefits to patients and clinicians. While there are undoubtedly occasions where information is not always retrieved in a timely manner and some users who feel that more training would be helpful, these issues are far outweighed by the overarching point that 81% of clinicians felt eLPR had a positive or very positive effect on their working day.

Overall, 81% of clinicians felt eLPR had a positive or very positive effect on their working day.
3. WHAT WAS ALREADY KNOWN ABOUT SHARED RECORDS IN EAST LONDON?

The eLPR has been in place for around three years although it has continually been evolving in that period, with more organisations due to join over the next few months. The shared record is actively being used and increasing month on month, with over **81,000 accesses in November 2017**. The following organisations are currently (November 2017) participating:

- Barts Health (acute services in Newham, Tower Hamlets, Waltham Forest. Community services in Tower Hamlets)
- East London Foundation Trust (ELFT) (Mental health services in C&H, Newham, TH. Community services in Newham)
- GPs in City & Hackney (C&H)
- GPs in Newham
- GPs in Tower Hamlets (TH)
- GPs in Waltham Forest (WF)
- GPs in West Essex (WE)
- Homerton University Hospital Trust (Acute and community services in C&H)
- London Borough Newham (LBN)
- London Borough Hackney (LBH)
- North East London Foundation Trust (NELFT) (Mental health and community services in WF, BHR and Essex)
- St. Joseph’s Hospice (SJH)

The general perception is that the system is well received and usage is growing steadily.

81,000 accesses in November 2017.
4. WHY CONDUCT A FORMAL REVIEW?

Health Information Exchanges (HIE) have proved to be beneficial as per the research conducted in other parts of England and at global level. The potential benefits of HIE on healthcare have fostered its implementation and adoption in the globally. However, there is a dearth of publications that demonstrate HIE effectiveness. Although the evidence supports benefits of HIE in improving the quality of care, the full impact of HIE on clinical outcomes are inadequately studied.

The eLPR has reached the stage where, anecdotally, it is providing real benefits to clinicians as they interact with patients. East London is often cited as being a leading health system when it comes to its shared records approach. The programme itself would benefit from a formal, external review, identifying measures that go beyond simply measuring the exchange of health information and the number of views. Although measuring the flow of information is important, it is also critical to examine the usage and usefulness of the information that is exchanged as well as the impact of exchange on health outcomes.

Firm plans are in place to add two more social care systems, an acute Trust and 125 additional GP practices (BHR) into the eLPR before the end of 2018, and talks are underway with other providers. However, it is important to understand the clinicians’ priorities for making an informed decision on next steps.

The eLPR needs to be reviewed to understand the benefits of the approach that has been taken as well as the expected benefits of the additional organisations joining, most notably the social care organisations within North East London (NEL), Barking & Dagenham, Havering and Redbridge University Hospital Trust (BHRUT) and Barking & Dagenham, Havering and Redbridge (BHR) GPs.
5. WHAT THIS WORK ADDS

This analysis aims to address the following areas which have not been evaluated or reported elsewhere:

- **Patient/citizen satisfaction**, e.g. tell their story once, increased confidence in level of care being received and personalised care
- **Efficiency and resulting cost savings**, e.g. reduction in letters, phone calls & faxes, carrying out triage and analyses, reduced referrals, reduced assessments, reduced tests and orders
- **Improved efficiency in the care pathway**, e.g. admissions and re-admissions, discharge planning and care planning
- **Effects on the quality of care that professionals are able to provide**, e.g. are patient wishes better met, has there been an improvement to patient satisfaction scores attributable to eLPR, etc.
- **Safety**, e.g. better access to clinically important information, safe transfers of care, medicines reconciliation
- **Resulting cost savings**
- **An assessment of the effect of eLPR on data quality**, i.e. has there be a demonstrable effect on data quality in host systems because the data has been exposed to a wider audience?
- **An assessment of the effect of eLPR on supporting professionals in their decision making**
- **An understanding of the information sharing priorities for eLPR users**
- **An understanding of any training needs for eLPR users**
- **If some clinicians are not using the eLPR as much as they could, what are the reasons?** E.g. technical issues, poor quality information, etc.

The general perception is that the system is well received and usage is growing steadily.
6. SUGGESTIONS FOR FUTURE RESEARCH

The health and care system in north east London is pursuing a dual approach of record sharing (eLPR) and population health analytics (Discovery). Discovery has been under development for a little over a year and is now receiving data from GPs and acute trusts on a regular basis. The first use cases have been approved by the project board and are now under development.

Although the perceived benefits of the Discovery Project are shown in this document, these need to be reviewed to understand the benefits that are likely to be accrued from this approach and to set up the mechanism for future evaluation of the success of the project.

Keywords: shared record, shared care record, evaluation, GPs, Barts Health, Homerton Hospital, City & Hackney, Tower Hamlets, Newham, Waltham Forest, ELFT, NELFT, eLPR, HIE, Health Information Exchange, Benefits Study, Discovery, population health.
7. BACKGROUND OF THE PROGRAMME

Using Cerner HIE to provide interoperability between Cerner Millennium, EMIS and the Medical Information Gateway (MIG), has successfully delivered the following functionality:

- A GP record summary containing 10 pages of patient data is available to Barts Health and Homerton clinicians (from their respective GPs, including recent advice given, real-time medications, current and past problem list, procedures such as immunisations, allergies and alerts. This is presented by MIG as a page within Cerner Millennium with tabs for each section of the record.

- Barts Health acute share: Previous and Future Appointments (all except Homerton), Outpatient Letters for the Royal London, Paediatric Outpatients at Whipps Cross, Discharge Summaries, Radiology reports, Pathology results, Endoscopy from Royal London only (for now other hospitals to follow), Oncology and clinical Oncology letters – Now delivered electronically and in the eLPR, Gastroenterology

- Homerton acute share: Previous (all) and Future Appointments (all except Barts), Discharge Summaries, Radiology reports, Pathology results (all except Barts), Diagnoses, Chronic Problems, Procedures, Allergies, Vital Signs

- Homerton Community share: Demographics, Alerts, Allergies and Adverse Reactions, Referrals, Past and Future appointments, Recent Assessment information (name and when completed – not the assessment itself), Immunisations, Diagnoses

- Mental Health information is shared by ELFT, such as Demographics, Referrals, Appointments, Physical Health – Investigations, Physical Health – Lifestyle Assessment, Physical Health – Psychotropic Medication Monitoring, Physical Health – Observations and Measurements, Child Health – Blood Spots, Child Health – Assessments, Child Health – Immunisation History, Alerts, Admissions, Mental Health Section, Latest Confirmed Diagnosis [ICD10], CPA details, Care Cluster, Progress Notes, Risk, Care Plans

- The Providers continue to focus on exploiting their EHRs for more data collection and clinical support. Consequently, the richness of the content of the shared record continues to increase.
THIS FUNCTIONALITY IS UNDERPINNED BY:

- Regular meetings of health and care professionals and IT professionals since 2012 to establish the level of trust required to share and use data. See the Farr Institute’s concept of the ‘diameter of trust’ introduced in the paper, ‘Combining Health Data Uses to Ignite Health System Learning’
- A ‘single system’ strategy that aims to minimise the number and types of clinical systems in use, thus EMIS is used in all but 4 GP practices across the four CCGs and Cerner Millennium is used in both acute hospitals. This is not to say that other systems can’t be connected, for example RiO (ELFT and Homerton Community) and SystmOne (West Essex and some Waltham Forest GPs) are connected
- Standards based approach ensuring low cost development in most instances
- An HIE to HIE link between Barts Health and Homerton established to allow clinicians to view results, etc., from the other trust. This is thought to have been the first such connection in England
- System integration and patient matching between primary and secondary care for practices using EMIS and SystmOne
- Approval and sign-up to data sharing for all GPs across Tower Hamlets, Waltham Forest, Newham, City & Hackney and West Essex, both acute Trusts and ELFT.

THE ABILITY TO VIEW THIS INFORMATION NOW LEADS TO IMPROVED:

- patient safety – supporting safer and more informed treatment by providing clinicians with timely access to accurate and up to date information
- efficiency – reducing the time, effort and resources required to obtain relevant information regarding patient care, e.g. avoiding repeat test requests
- effectiveness – supporting the delivery of appropriate care to patients
- patient experience – reducing the need for patients to recall or repeat relevant information which also supports people with communication difficulties
- access to data for clinical audit and quality improvement.

There has already been significant progress across east London and the foundations of a resilient, flexible health IT infrastructure have been established. The standards of the individual systems used by each health and social care provider have advanced and there is now a strong base to further develop this interconnected system.

Where community services and GPs use a common system (primarily in east London via EMIS), sharing also takes place via that mechanism. Sharing in this way has been encouraged by the strategic decision to use as few a number of systems as possible.
While there are some national systems that share information to support patient care, it is limited when compared to what is available to users of the eLPR. National systems providing small subsets of the eLPR functionality include the Summary Care Record, the e-Referral System, the Electronic Prescription Service and the Child Protection Information Sharing project (CP-IS). While local providers make some use of these systems and certainly provide data feeds into them, the breadth and depth of the information accessible via the eLPR is of significantly greater use.

Figure 1 attempts to show the systems that make up the east London Patient System Connectivity and those currently planned to connect:
Figure 1: East London Patient Record System Connectivity
9. METHOD

Primary data gathering was conducted by setting up 5 questionnaires to cover the areas as follows:

1. GPs in Newham, Tower Hamlets, Waltham Forest
2. GPs in City and Hackney
3. Homerton Hospital clinicians
4. East London Foundation Trust clinicians
5. Barts Health clinicians

The questionnaire covered a comprehensive view of the tangible clinical and care benefits of the shared care record covering the benefits already being accrued from eLPR, and expected future benefits of eLPR in terms of patient satisfaction, efficiency, cost savings, improved efficiency in care pathway, patient safety, data quality and other support provided by eLPR.

Questionnaires were distributed to the users of HIE using Survey Monkey. Ninety-seven responses were received.

<table>
<thead>
<tr>
<th>Questionnaire #</th>
<th>Primary / Secondary</th>
<th>Survey</th>
<th>Responses as at 15 May 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Primary</td>
<td>City &amp; Hackney - HIE GPs</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>Primary</td>
<td>TH, WF &amp; Newham GPs - eLPR</td>
<td>29</td>
</tr>
<tr>
<td>3</td>
<td>Secondary</td>
<td>Barts - eLPR</td>
<td>33</td>
</tr>
<tr>
<td>4</td>
<td>Secondary</td>
<td>ELFT</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Secondary</td>
<td>Homerton - HIE</td>
<td>26</td>
</tr>
</tbody>
</table>

Total: 97

Table 2: Top three features used
Thirty-seven percent of these participants consented for a deep dive interview to understand the practical issues and benefits of the HIE from their perspective. From among these participants, 35% were interviewed.

Responses for each questionnaire have been analysed and grouped as primary care, secondary care and consolidated (includes both primary and secondary).

Both qualitative as well as quantitative responses were collected from the participants of the study. The responses have been analysed and results interpreted in this report.

Secondary data analysis was conducted through literary searches which was included in the questionnaire and this report.
This section reviews the current literature to articulate the findings of benefits across UK and globally for Health Information Exchanges.

The literature review was conducted by systematically reviewing peer-reviewed and non-peer-reviewed publications from research databases and websites. We abstracted each of these publications for common themes that portrayed benefits and challenges from both primary and secondary care perspective. We grouped the themes and identified examples to conduct further analysis.

One hundred and thirty-two articles were initially retrieved out of which seventy-three articles were selected for a detailed analysis. The articles were categorised into most beneficial features, patient experience and clinician experience to summarise the HIE benefits. Twenty-five studies met the inclusion criteria for our research and are cited in this study.

**BENEFITS OF HIE**

Health Information Exchange (HIE) systems facilitate access to patient information for a variety of health care organisations, end users, and clinical and organisational goals in the report, Organisational Uses of Health Information Exchange to Change Cost and Utilization Outcomes: A Typology from a Multi-Site Qualitative Analysis, from data collected through interviews with 25 health care organisation leaders, clinicians and employees, as well as representatives from the Bronx RHIO from June 2014 to March 2015.

Health Information Technology (HIT) in general and electronic health records (EHRs) in particular are increasingly viewed as tools for improving the quality, safety and efficiency of health systems in the findings by, Systematic review: impact of health information technology on quality, efficiency, and costs of medical care.

The report, “The association between health information exchange and measures of patient satisfaction” examined, “the outcomes expected to be improved by HIE are patient-provider communication and patient satisfaction” and provided some evidence that hospitals engaging in HIE are associated with higher patient satisfaction using nationally representative datasets in the US. The hypotheses proved to some extent were, “Hospitals engaged in health information exchange will have higher levels of patients reporting, ‘health professionals always communicated well’”, and “Hospitals engaged in health information exchange will have higher levels of patient satisfaction.”
“Systematic Review of Health Information Exchange in Primary Care\textsuperscript{8}”, analysed 39 peer-reviewed publications in-depth and identified themes of cost savings, workflow efficiency, and quality, and concluded that the only benefits to be reliably documented were those regarding efficiency, including improved access to test results and other data from outside the practice and decreased staff time for handling referrals and claims processing.

Six year history of successful HIE in New York was analysed for the study, “Consumer perceptions of electronic health information exchange\textsuperscript{9}”, in 2011. Eight hundred respondents participated (71\% response rate). Large majorities supported HIE among healthcare providers (69\%); thought it would improve quality of care (68\%); and supported “break the glass” access to HIE data without need for consent in emergencies (90\%).

In Latin America a web survey was conducted on “Usefulness of the functionalities of an Electronic Medical Record on a Latin American Medical Web Portal\textsuperscript{10}” between July 15 to August 15, 2008 which attracted a response from 5171 users. The analysis of the responses showed that over 90\% of respondents were in favour of its use, with values that exceed 80\% in the analysis of the utilities by categories.

Analysis of responses from a cross-sectional mail survey of 1043 licensed physicians who saw outpatients in Massachusetts in 2007, in the study entitled, “Physician attitudes toward health information exchange: Results of a state-wide survey\textsuperscript{11}”, revealed that overall, 70\% indicated that HIE would reduce costs, while 86\% said it would improve quality and 76\% believed that it would save time.

In a study, “Physicians’ potential use and preferences related to health information exchange\textsuperscript{12}”, based on participation from 144 physicians, sixty-eight percent (n=88) of physicians expressed interest in using HIE for their clinical work. Most physicians expected HIE to improve provider communication (89\%), coordination and continuity of care (87\%) and efficiency (87\%).

“Health care provider perceptions of a query-based health information exchange: barriers and benefits.”\textsuperscript{13} conducted a comprehensive assessment of health care providers’ perspectives on a query-based HIE based on the responses from 615 questionnaires, out of which 63\% of the users of HIE reported satisfaction with HIE. The most common reasons for adoption among current or previous users of an HIE (N = 198) were improvement in patient care (N = 111, 56\%) as well as receiving (N = 95, 48\%) and sending information (N = 80, 40\%) in the referral network. Accessing a comprehensive patient medication list was identified as the most important feature of the HIE (N = 422, 69\%).
“Impact of Health Information Exchange on Emergency Medicine Clinical Decision Making,”14 analysed 40 interviews from 29 providers and concluded that their findings were concordant with previous studies that indicated exchanged information is useful to provide context for interpreting lab results, making admission decisions, and preventing repeat diagnostic imaging.

Health information exchange (HIE) has the potential to improve the quality of healthcare by enabling providers with better access to patient information from multiple sources at the point of care, according to “How could health information exchange better meet the needs of care practitioners?”15

Based on the background that electronic health information exchange (HIE), in which patients’ clinical data follow them between care delivery settings, is expected to produce large quality gains and cost savings, “Case study: analysis of end-user requests on electronic medical record and computerized physician order entry system of Seoul National University Hospital in Korea”16, classified user requests and concluded that the most common requests (73%), are improving quality of care. The study aimed to provide evidence on whether HIE reduces repeat imaging in the emergency department (ED) setting. The study concluded that HIE participation was associated with decreases in the probability of repeat imaging for all three imaging modalities examined and supported the widely held notion that HIE can reduce redundant medical services and thereby produce cost savings.

Another similar study, “Does Health Information Exchange Reduce Redundant Imaging? Evidence from Emergency Departments,”17 to evaluate whether HIE adoption is associated with decreases in repeat imaging in emergency departments, from the State Emergency Department Databases for California and Florida for 2007-2010, concluded that HIE was associated with reduced repeat imaging in EDs with empirical evidence.

HIE-based alerts could be utilized to reduce potentially avoidable CT scans as per the cohort analysis in the study, “Patient crossover and potentially avoidable repeat computed tomography exams across a health information exchange.”18

“The financial impact of health information exchange on emergency department care,”19 examines the cost reductions in Emergency Departments. Applied only to the study population, over a period of 13 months, HIE access was associated with an annual cost savings of $1.9 million. Net of annual operating costs, HIE access reduced overall costs by $1.07 million. Hospital admission reductions accounted for 97.6% of total cost reductions. The study also suggested that they believe that these savings will be only a fraction of the economic benefit that will be realized as the connected digital healthcare delivery system evolves.

The study, “Health information exchange system usage patterns in three communities: Practice sites, users, patients, and data,”20 illustrates large-scale usage of a query-based HIE system implemented across three communities in New York state using access log files from January 2009 to May 2011 to measure usage patterns of a query-based HIE web portal system with respect to practice sites, users, patients, and data. Patient summary data displayed by default was the most accessed feature of query-based HIE systems.

A study, “Electronic health information exchange in underserved settings: examining initiatives in small physician practices & community health centers,”21 concluded that the major perceived benefit of HIE use was the improved care-coordination clinicians could provide to patients as a direct result of the HIE information based on interviews with 24 providers, administrators and office staff from 16 locations in two states. Utilization and perceived benefits of the exchange systems differed based on several practice- and clinic-level factors.
The study, “A Case Report in Health Information Exchange for Inter-Organizational Patient Transfers”\(^{22}\), reports that participants’ experiences demonstrate how stakeholders may succeed in developing and piloting an electronic transfer form that relies on HIE to aggregate, communicate, and display relevant patient transfer data across health care organisations. Their experiences also provide insights for others seeking to develop HIE applications to improve patient transfers between emergency departments and skilled nursing facilities.

A qualitative study, “Health information exchange technology on the front lines of healthcare: workflow factors and patterns of use”\(^{22}\) to develop an in-depth understanding of how a health information exchange (HIE) fits into clinical workflow at multiple clinical sites, concluded that understanding end users’ perspectives towards HIE technology is crucial to the long-term success of HIE.

HIE systems are likely to have increased utilization and effectiveness if specific patient-level clinical information is delivered at the right time to the right users, in an analysis reported from, “A user needs assessment to inform health information exchange design and implementation”\(^{24}\).

“Health information exchange: national and international approaches,”\(^{25}\) review, reports the finding that multiple nations see the potential benefits of HIE and that has led to national and international efforts of varying scope, scale, and purview. National efforts continue to work to overcome the challenges of interoperability, record linking, insufficient infrastructures, governance, and inter-organisational relationships, but have created architectural strategies, oversight agencies, and incentives to foster exchange. The results from the above studies are similar to the findings presented in this report.
Questionnaires completed by 97 clinicians from both Primary and Secondary care settings were recorded in Survey Monkey. The data from Survey Monkey was exported to Microsoft Excel to enable analysis of the responses to each question. Qualitative responses received through free text questions were coded and grouped into themes and converted into meaningful results. Quantitative responses were analysed using spreadsheet analysis features. Both qualitative and quantitative responses were analysed to provide inputs for this report.

Age group of the clinicians that completed the questionnaire are as follows: 16% of the clinicians were in the age group 25-35 years, 31% in the age group 36-45 years, 38% in the age group 45-55 years, 8% in the age group 56-65 years, and 4% over 65 years. Two percent of the clinicians did not respond to this question.

To understand the length of familiarity with eLPR, the clinicians were asked to state when they first used it. Eliminating the 12% of unanswered responses for this question, 48% of the clinicians first used eLPR over 26 weeks ago, 19% between 13-26 weeks, 15% between 4-12 weeks and 18% within the last 4 weeks.

### QUANTITATIVE ANALYSIS:

1. Frequency of usage
2. Most accessed information data sets (top 3 out of 12)
3. Patient experience (6-point scale) covering 9 areas
4. Increase/Decrease % of: Requests exchanged, number of tests, phone calls (6-point scale)
5. Review patient before consultation and if there is a saving quantifying in minutes per day
6. Referrals increased/decreased (6-point scale) and quantified through selection
7. Effects of using HIE on a 6-point scale across:
   a. confidence in accessing the latest patient information
   b. paperwork
   c. missing records/notes
   d. patient safety
   e. information quick decisions by having all information in one place
   f. number of investigation ordered
8. Re-admission avoidance in a 6-point scale
9. Overall effect (6-point scale)
QUALITATIVE ANALYSIS:
1. Case study examples of HIE improving patient care, their experience or efficiency gains in enabling clinicians to make better use of time
2. Technical problems using the HIE
3. Any other ways where HIE helped in the role
4. What other ways do administrative staff use HIE for patient benefits?
5. How do you envisage the benefit of ability to view patient information from additional NHS providers and borough council social services departments?
6. Data quality improvements
7. Other benefits
8. Other comments

CAVEATS:
1. It was noticed that sometimes busy clinicians select the options without giving much thought. When interviewed to understand why they selected a negative response, they said that was not their intention. They had little time and so quickly selected what they thought was a positive response
2. Some of the clinicians may not fully appreciate the benefits of the eLPR as they may not know the range of what is available, especially if they haven’t looked at it for a number of months. This came out in another interview where the clinician was not sure how to use the system
3. There could be factors such as a slow internet connection or an old system which may be the reason for a rating of poor performance of the system. For example, a clinician mentioned that the PDF files did not open up at all, when their PC was checked it transpired that they did not have Adobe installed. Some clinicians reported significant performance differences between PCs on different part of the same LAN.
12. FUTURE RESULTS

An extended study is planned for the Discovery programme. Discovery is established as a secure data service with linked combined identifiable data from all systems supporting direct health care, initially in East London. Discovery has been shaped with four main aims:

1. To predict, anticipate or inform individual health needs from algorithms running in real time (or as near as possible) and to deliver the insight gained directly into the patient’s record across the whole of their pathway, whether in primary or secondary care or elsewhere, thus creating the opportunity to improve or prevent adverse outcomes.

2. To expand the existing primary care informatics driven population health programme in east London, led by the Clinical Effectiveness Group at Queen Mary, to all health and care sectors.

3. To enable the real-time reporting on programmes by providers and commissioners supporting clinical improvement and new payment mechanisms. This would involve reporting on a pseudonymised or identifiable cut of the clinical data, as appropriate.

4. To use data by third parties (commissioners, public health, and academics) to support research, development and planning, whether on consented identifiable data, or the pseudonymised dataset. East London would thus become a research enabled community.
This study was a clinical audit study and did not require research ethics approval.
14. CONCLUSION

This study is the first formal analysis to explore the benefits of eLPR across the primary and secondary care users listed in section 3 after nearly three years of its implementation.

This study clearly re-iterates the benefits of eLPR both from the qualitative and quantitative perspective and is in alignment with the health information exchange benefits especially related to integrated information, clinicians’ confidence, patients’ engagement and confidence, preparation for the appointments, personalised care, and speed and quality of treatment recorded by other studies which are referenced in the document. Significant savings by avoiding duplication, and efficient administration as well as retrieval of information thereby saving consultation time were also identified and captured in this study.
# 15. ANNEX A: FULL SURVEY RESULTS

## A1. BELOW IS SHOWN THE AGGREGATED RESULTS

<table>
<thead>
<tr>
<th>What three sets of information do you access most in eLPR? (tick up to 3)</th>
<th>GPs</th>
<th>Barts Health, Homerton, ELFT</th>
<th>Consolidated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab results</td>
<td>19%</td>
<td>8%</td>
<td>13%</td>
</tr>
<tr>
<td>Patient history</td>
<td>1%</td>
<td>15%</td>
<td>5%</td>
</tr>
<tr>
<td>Radiology images, X-rays, scans</td>
<td>19%</td>
<td>4%</td>
<td>14%</td>
</tr>
<tr>
<td>Histopathology results</td>
<td>3%</td>
<td>2%</td>
<td>3%</td>
</tr>
<tr>
<td>Outpatient Clinic Letters</td>
<td>13%</td>
<td>13%</td>
<td>15%</td>
</tr>
<tr>
<td>Previous attendances</td>
<td>7%</td>
<td>4%</td>
<td>5%</td>
</tr>
<tr>
<td>Upcoming Appointments</td>
<td>18%</td>
<td>2%</td>
<td>11%</td>
</tr>
<tr>
<td>Discharge summary</td>
<td>10%</td>
<td>12%</td>
<td>12%</td>
</tr>
<tr>
<td>Patient medication information</td>
<td>2%</td>
<td>20%</td>
<td>11%</td>
</tr>
<tr>
<td>Complications / known allergies</td>
<td>1%</td>
<td>7%</td>
<td>2%</td>
</tr>
<tr>
<td>Chronic conditions</td>
<td>2%</td>
<td>11%</td>
<td>6%</td>
</tr>
<tr>
<td>Clinical procedures</td>
<td>5%</td>
<td>2%</td>
<td>3%</td>
</tr>
</tbody>
</table>

Table 2: What three sets of information do you access most in eLPR?  
(greyed out boxes refer to top three features used)
Table 3: Changes in Patient experience
In your own experience what effect has using eLPR had on........ Reduced, Greatly reduced About the same Increased, Greatly increased

| the number of letters received from and sent to patients and colleagues? | 24% | 71% | 5% |
| the number and complexity of tests ordered? | 44% | 53% | 3% |
| the number of phone calls answered or made, i.e. has the information available in eLPR meant you haven’t needed to call a colleague for further information? | 80% | 19% | 1% |

Table 4a: Effect of eLPR on letters, tests, calls

| In your own experience what effect has using eLPR had on your ability to effectively review a patient before consultation | Response Percent |
| Much easier | 28% |
| Easier | 45% |
| About the same | 26% |
| Harder | 1% |
| Much harder | 0% |

Table 4b: Effect of eLPR on letters, tests, calls
ANNEX A: FULL SURVEY RESULTS

Assuming the lowest saving in each category and 250 clinicians using the system per day, 250 every other day and 88 at least once a week, this would equate to 9,400 hours of clinical time saved per year. Assuming a cost of £100 per hour for a clinician, over £940k per year is saved across the 4 CCGs.

Table 5a: Saving consultation times per day

<table>
<thead>
<tr>
<th>If easier or much easier, how much consultation time would you estimate this has saved you on average per day?</th>
<th>Response Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than 30 minutes</td>
<td>7%</td>
</tr>
<tr>
<td>16-30 minutes</td>
<td>13%</td>
</tr>
<tr>
<td>11-15 minutes</td>
<td>13%</td>
</tr>
<tr>
<td>6-10 minutes</td>
<td>20%</td>
</tr>
<tr>
<td>0-5 minutes</td>
<td>47%</td>
</tr>
</tbody>
</table>

Table 5b: Savings in consultation

In your own experience what effect has using eLPR had on the number of referrals made by you?

<table>
<thead>
<tr>
<th>Response Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Significantly reduced</td>
</tr>
<tr>
<td>Reduced</td>
</tr>
<tr>
<td>About the same</td>
</tr>
<tr>
<td>Increased</td>
</tr>
<tr>
<td>Significantly increased</td>
</tr>
</tbody>
</table>
If reduced or significantly reduced how many referrals would you estimate this has saved you on average per week?

<table>
<thead>
<tr>
<th>Response</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 or more</td>
<td>0%</td>
</tr>
<tr>
<td>3-4</td>
<td>2%</td>
</tr>
<tr>
<td>2</td>
<td>14%</td>
</tr>
<tr>
<td>1</td>
<td>18%</td>
</tr>
<tr>
<td>None</td>
<td>66%</td>
</tr>
</tbody>
</table>

Table 6: Number of referrals saved

Assuming the lowest saving in each category and 250 clinicians using the system per day, 250 every other day and 88 at least once a week, this would equate to roughly 1,233 referrals saved per year.

Taking the cost of first referral, single professional for the lowest cost treatment function (Anaesthetics) and a market forces factor of 1.2 (just under both Homerton and Barts Health’s figure), i.e. £111, this equates to an annual saving of £133k

<table>
<thead>
<tr>
<th>In your own experience what effect has using eLPR had on</th>
<th>Significantly increased</th>
<th>Increased</th>
<th>About the same</th>
<th>Reduced</th>
<th>Significantly reduced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confidence in accessing the latest information about the patient</td>
<td>22%</td>
<td>63%</td>
<td>10%</td>
<td>4%</td>
<td>1%</td>
</tr>
<tr>
<td>Patient safety</td>
<td>23%</td>
<td>51%</td>
<td>18%</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>Informed quick decisions by having all information in one place</td>
<td>28%</td>
<td>45%</td>
<td>19%</td>
<td>6%</td>
<td>2%</td>
</tr>
</tbody>
</table>

Table 6a: Effect of eLPR usage on various activities
Access to the system is the best thing since sliced bread! The dark shadow of what was going on at the hospital has been lifted and there are many times when tests are not sent down the link but are on the system which saves a huge amount of time in not having to contact the hospital.
A2. MAIN FINDINGS – QUALITATIVE ANALYSIS

Clinicians were asked to state any other benefits that came from eLPR which were not covered in the previous sections. The following are some of the benefits highlighted by the clinicians:

**BETTER TREATMENT FOR PATIENTS**
- Transparency of patient treatment at other sites
- Reconfirmation of diagnosis when hospital notes are not clear
- Ability for GPs to view clinical letters from hospitals
- Ability to access discharge summaries from other hospitals and Trust emergency departments
- City & Hackney clinicians stated that connection to Homerton and ELFT data has been very useful
- Better Patient Experience
- Increase in patient confidence
- Patient reassurance by checking scan reports very quickly
- Hospital clinicians stated that they could help local patients who come without full medical history as many do not remember their medications
- GPs expressed that they were able to have conversation with patients about attendance at hospital appointments and also liaison with hospital consultants in a timely manner
- GPs stated that they could help their patients when they did not know or forgot their next review date at the hospital
- GPs are able to see when patients were analysed, check on effectiveness of referrals and also follow up on referrals.

**BETTER PATIENT EXPERIENCE**
- Increase in patient confidence
- Patient reassurance by checking scan reports very quickly
- Hospital clinicians stated that they could help local patients who come without full medical history as many do not remember their medications
- GPs expressed that they were able to have conversation with patients about attendance at hospital appointments and also liaison with hospital consultants in a timely manner
- GPs stated that they could help their patients when they did not know or forgot their next review date at the hospital
- GPs are able to see when patients were analysed, check on effectiveness of referrals and also follow up on referrals.

"I was able to reassure a very anxious patient by checking the radiology report on a scan that had been done the day before at RLH that his brain abscess had gone."

-HOMERTON CLINICIAN

"In cases where I need to review a clinical condition that has already been assessed in hospital I can determine whether future blood tests or other investigations are necessary by examining previous results. Time is saved by not having to make a call to pathology department, allowing more time focus on patient care."

-GP
ANNEX A: FULL SURVEY RESULTS

INFORMATION
• Accuracy of information
• Access to up-to-date medicine lists
• Access to GP immunisation records
• Avoid duplication by checking results
• Knowing upcoming hospital appointments
• Clinical notes and recording of information in the system
• Reduction in duplication.

INFORMED DECISION MAKING
• Access to patient medication histories from GP services
• Staff from ICU found the information provided in HIE from other providers immensely helpful, as without HIE there would be very limited information available
• Better prescribing decisions
• Clinicians stated that in the need to review clinical condition that has already been assessed in a hospital informed decisions can be made about whether future blood tests or other investigations are necessary by examining previous results
• View GP thought process regarding ongoing care/frequent presentations.

SAVING TIME
• Saving time by not having to call pathology department or chasing letters, enables rechannelling the time to focus on patient care
• Saving administration time and avoidance of unnecessary administration.

OTHER BENEFITS
• Audit using Big Data
• Clinical notes help in the absence of clinical letters
• Medicine reconciliation in hospital
• Immunology aids in improving protection for vulnerable older patients
• Primary and secondary care can view specific data-sets showing the evolution of a condition in an acute or community setting
• Continuity with report writing
• Save deciphering illegible discharge summaries
• Data quality improvement
• More cohesive approach to patient care between hospital and GP.

Finally, GPs also stated that eLPR reinforced the importance of care plans, risk assessments and highlighted priority of consent.

"All organisations involved in patient care will hopefully be able to spend more time on support or direct patient care rather than chasing information. Primary and secondary care may benefit from viewing specific data-sets showing the evolution of a condition in an acute or community setting."
Several clinicians provided quotes expressing the advantages they found from using ELPR:

**GPS**
- “It has saved so much time chasing hospital info.”
- “It has helped to save admin time and reduced chasing of reports or results done at Barts.”
- “Saves a huge amount of time phoning for results, clinic letters etc.”

**BARTS HEALTH**
- “It is very useful to be able to see patient medication histories from the GP services as patients do not always remember what they are taking.”
- “The connection to Homerton and ELFT data has made the range of data accessible much greater and improved utility.”
- “Being able to access the information from ELFT has had a huge positive impact.”
- “Helps with delays to tracking as sometimes the clinic letters are not typed but the clinic note is there for all to see.”
- “Knowledge of GP procedures - immunisation in particular. Vital for the protection of older patients and the immunologically vulnerable.”
- “Longitudinal nature of the GP record is valuable for important events and procedures.”

**ELFT**
- “To have been able to have a conversation with patients about attendance at hospital appointments, timely liaison with hospital consultants.”

**HOMERTON**
- “I get much better information on patients past medical history, medications and clinic letters.”
- “Being able to see the reports for imaging performed at Barts and Newham hospitals has made reviewing the images easier and in the complex cases helped to avoid unnecessary imaging, biopsies etc.”
- “Feel that safety is much improved as patients are often unable to tell me about their medications and past problems - this information is vital in the emergency setting and therefore has been extremely beneficial to me.”
A3. BENEFITS OF ELPR TO PRACTICE STAFF

ELPR HAS A POSITIVE BENEFIT BY SAVING TIME IN THE FOLLOWING WAYS:

- Ease of access to shared information
- Less chasing of information and results
- Chasing appointments for patients and advising upcoming appointments
- Receipt of reference letter and access to inpatient information
- Less calls from secondary providers looking for information about a specific patient
- Immediate access to documents such as discharge letters.

COST / TIME SAVINGS PROJECTION

- Some projection based on timing information from Stratford Village Surgery (10,000 patient population) on 4 benefit areas:
  1. Viewing of future appointments (saving 20mins per day of GP time)
  2. Viewing of radiology reports (saving average 35mins per day for practice staff)
  3. Viewing of laboratory results (saving average 35mins per day for practice staff)
  4. Enquiries from acute related to patient medication clarifications (2 enquiries per week @ 10 mins per query)
- Data extrapolated across the 56 activated Surgeries across Newham and Tower Hamlets CCG’s based on above timings and scaled according to list size

- List sizes based on 2015 QOF returns plus 2.5% uplift to reflect average increases across UK
- Cost calculations based on PSSRU unit costs for GP activity (£217 per hour of patient activity) and average hourly rate for reception staff/medical secretaries (£10 per hour).

HEADLINE ANNUAL SAVINGS ACROSS 56 SURGERIES:

- Reduction in time viewing of future appointments
  - 5,891 hours per year (In region of (IRO) £1,278,319)
- Reduction in time viewing of radiology reports
  - 10,310 hours per year (IRO £103,097)
- Reduction in time viewing of laboratory results
  - 10,310 hours per year (IRO £103,097)
- Reduction in time dealing with enquiries from acute related to patient medications clarification
  - 859 hours per year (IRO £8592)
- Total annual reduction in hours across CCG
  - **27,369 hours per year**
  - **IRO £1,493,105 per year**

Because of the extrapolation involved, these figures have not been included in the summary report but are included here to show what could be possible.
A4. ENVISAGED BENEFITS OF ELPR FOR ADMINISTRATIVE STAFF

To date, eLPR has been provided primarily to clinicians for use in direct patient consultations. It has quickly become clear, however, that significant benefit can be gained by administrative staff working for the direct benefit of patients and with their consent.

ADMISSION AND DISCHARGES
- Monitoring of patients referred on two week wait cancer pathway
- Navigators can book GP appointments in the Urgent Care Centre
- Management of clinic appointments
- Quick admission and discharges
- Staff can see if the patients have other appointments without the need to ring the provider.

DATA MANAGEMENT
- Accurate drug list
- Accurate GP and Demographic data
- Improved Depth of Coding
- Correct contact number, next of kin and contact details
- Avoid duplication
- Single source of information.

SEVERAL CLINICIANS PROVIDED QUOTES EXPRESSING THE ADVANTAGES THEY EXPECT FROM ADMINISTRATIVE STAFF USING ELPR:

GPS
“Previously patients would often ask practice staff to find out whether they had been booked for a test or appointment if they had not received notification from secondary care. Chasing these appointments would use up valuable admin staff.”

“If we can download blood test results directly from eLPR then it will reduce a lot of time.”

“Useful where same key data is spread between providers e.g. DM management.”

“Being able to see OPA times in primary care means we can remind patients and reduce DNA rate and re-referral work for us. I can also see when my patient has been admitted and is still in hospital, rather than not knowing until they are discharged.”

“Clinical information obtained much quicker and easier.”

BARTS HEALTH
“Improved depth of coding.”

“Have used to check next of kin and contact details.”

HOMERTON
“I get much better information on patients past medical history, medications and clinic letters.”

“Being able to see the reports for imaging performed at Barts and Newham hospitals has made reviewing the images easier and in the complex cases helped to avoid unnecessary imaging, biopsies etc.”

“Feel that safety is much improved as patients are often unable to tell me about their medications and past problems - this information is vital in the emergency setting and therefore has been extremely beneficial to me.”
A5. BENEFITS ENVISAGED OF EXPANDING TO SOCIAL CARE AND OTHER ORGANISATIONS

Clinicians were asked to answer the question, “In the near future you will be able to view patient information from additional NHS providers and the borough council social services departments. How do you envisage this might help you in your treatment of patients?”

Key points that came out were as follows:

- Very useful for new patients as it will enable access to their records immediately
- Ability to check immunisations
- Avoiding lengthy waits on phone calls to social services in some situations
- Better consultation
- Transparency will help reduce misuse of hospital bookings or blocking beds in an acute setting
- Support holistic approach to care
- Reduce gaps and replications in care
- Ability to view care packages in out of hours thereby avoid hospital admissions
- Improved knowledge and decision making
- Links to Mental Health will improve communications
- Communication of changes to patient medication from Mental Health can be quicker
- Reduction in primary care workload
- Better understanding of social care, plans and support, if a patient has a social worker and at what stage the help is available for them.

QUOTES:

GPS
“I will be able to see at a glance whether additional support/ therapies are being accessed.”

“For new patients where there may have been a delay in receiving the records from the previous GPs this will help to avoid duplication of referrals and allow for better decision-making.”

“Yes, however it will demand more of my time.”

“Mental health is terrible at communicating so this should help a little.”

“It will be helpful to be able to see OPA dates, and OPA letters and discharge summaries, and sharing blood test results across organisations will reduce primary care workload as ELFT can see for themselves what has been done so the GP doesn’t have to tell them.”

“Not having to chase appointments or ring through for results is very beneficial.”

“Same as above, plus changes to medication can be particularly slow in filtering through to GPs from mental health teams so it will be most helpful.”
ANNEX A: FULL SURVEY RESULTS

BARTS HEALTH
“Save time in working out whether someone is already linked in or not.”
“It might be useful if there was more information there than I can already access from Whipps Cross EPR.”
“Excellent. I will then be able to see what care packages are in place out of hours and avoid hospital admissions.”
“Massively as we do phone pre-assessments of non-local patients and waste hours throughout the week trying to get results.”
“Huge help as will reduce duplication and waiting for the information to arrive 1-2 days later.”
“Excellent for patients new to the area. Emergency departments frequently repeat tests that we don’t know have recently been done in another department.”
“Awareness of follow-up and outcome at other centres/community services.”

HOMERTON
“Better understanding of social care.”
“Drastically, linking these services is integral. Had a coroner court case recently for a 24-year-old who presented at multiple institutes with headache. Due to reliance on her history and not being able to check other institutions, she was never scanned for frequent presentation of headaches, died of a brain tumour. In this case, access to info from additional NHS providers may have prevented her slipping through the net. However, she never registered with a GP, not sure whether HIE is reliant on GP registration?”
“Absolutely with access to knowing other involvement from LBH and ELFT will be invaluable.”
“Would be great for us if we could see data from Great Ormond street.”

ELFT
“It will give a more complete picture of the patient.”
“Significantly. Could you make this happen now, please?”
A6. MAIN FINDINGS – QUANTITATIVE ANALYSIS

FREQUENCY OF USAGE
All the respondents were asked about the frequency of usage of the HIE. Among the responses received, 37% of the respondents use HIE 2-4 times a week, 35% of the respondents use HIE 5 or more times per week, 13% of the respondents use HIE once per week and 15% use HIE less frequently.

Forty-eight percent of the hospital clinicians tend to use HIE 2-4 times a week, whereas fifty percent of the GPs use HIE 5 or more times a week. Forty-three percent of GPs use HIE 2-4 times a week. 25% of the GPs use HIE at least once a week and 33% of the GPs use it less frequently. Among the hospital clinicians, 27% of them use HIE 5 or more times a week, 33% of the hospital clinicians use HIE at least once a week. However, over 63% of the hospital clinicians use the HIE less frequently. A further analysis of why the clinicians used HIE less frequently revealed that 47% of those that stated that they use HIE infrequently or do not use HIE, did not have access to the system, 47% did not know how to use the system, 13% felt it too complex to operate and 7% preferred paper records.

PATIENT EXPERIENCE
GPs provided mostly positive ratings or neutral ratings on the patient experience questions.

Chart 1: Patient experience
BETTER PREPARATION FOR APPOINTMENTS
Overall 63% percent of the clinicians stated that their patients felt that they were better prepared for appointments. Fifty-six percent of the GP respondents and 68% of the hospital clinicians stated that their patients felt they were better prepared for appointments. About 44% of the GPs, 29% of the hospital clinicians and 35% of the overall clinicians stated that their experience was about the same. Negative responses were recorded by 3% of hospital clinicians and 2% of overall respondents. There were no GPs that provided any negative response.

REPetITION
While it is true that 100% of the patients have to tell their story only once to their clinician and not repeat it again because it gets stored in the system on their record, 59% of the respondents acknowledged it in the survey. Sixty-three percent of the hospital clinicians and 54% of the GPs provided the same positive response. About 46% of the GPs, 35% of the hospital clinicians and 40% of the overall clinicians stated that the experience was about the same. Only 2% of the hospital clinicians, no GPs and about 1% of the overall clinicians provided a negative response.

PATIENT’S CONFIDENCE
Overall 63% of the respondents stated that their patients felt more confident in the level of care they received. 57% of the GPs and 66% of the hospital clinicians provided the same positive response. About 43% of the GPs, 32% of the hospital clinicians and 36% of the overall clinicians stated that the experience was about the same. Only 2% of the hospital clinicians, no GPs and about 1% of the overall clinicians provided a negative response.

BARTS CLINICIAN
“There are two core reasons; Patient confidence in the data Enriching what I know about patients to improve decision making”

PERSONALISED CARE
Sixty-four percent of the GPs, 87% of the hospital clinicians and 79% overall stated that they are able to provide a more tailored care package because they are able to see a more complete view of the patient record, thereby offering enhanced personalise care. About 36% of the GPs, 11% of the hospital clinicians and 20% of the overall clinicians stated that the experience was about the same. Only 2% of the hospital clinicians, no GPs and about 1% of the overall clinicians provided a negative response.

GP
“Not having to chase appointments or ring through for results is very beneficial. It allows us to have up to date information that at times is urgently needed; it allows us to access letters that have never arrived at the surgery for one reason or another; it means we can check patients’ upcoming appointments either to help them remember to attend or just to know we do not need to re-refer.”
PATIENT ENGAGEMENT
Sixty-two percent of the GPs, 52% of the hospital clinicians and 56% overall respondents stated that their engagement and relationship with patients is enhanced due to the usage of HIE. About 38% of the GPs, 46% of the hospital clinicians and 43% of the overall clinicians stated that the experience was about the same. Only 2% of the hospital clinicians, no GPs and about 1% of the overall clinicians provided a negative response.

TREATMENT ELSEWHERE
Seventy-five percent of the GPS, 66% of the hospital clinicians and 69% of the overall respondents stated that they could address patients concerns about treatment elsewhere in a better or much better way. About 25% of the GPs, 28% of the hospital clinicians and 27% of the overall clinicians stated that the experience was about the same. Only 6% of the hospital clinicians, no GPs and about 4% of the overall clinicians provided a negative response.

SPEED AND QUALITY OF TREATMENT
Seventy-eight percent of the hospital clinicians state that they could handle in a better or much better way the speed and quality of treatment in their department. Only 20% expressed a neutral and 2% expressed a negative response for the same.

INTEGRATED INFORMATION
Eighty-nine percent of the GPs, 75% of the hospital clinicians and 80% of the overall clinicians expressed that patients were pleased that the clinicians were able to access hospital/GP information for them such as blood test results, hospital appointments, etc. Eleven percent of the GPs, 23% of the hospital clinicians with about 19% overall clinicians felt that it was still about the same. There were no negative GP responses and only 2% hospital clinicians that provided negative response to this query.

PATIENT HISTORY
Fifty-nine percent of the GPs, 81% of the hospital clinicians and 74% of the overall clinicians stated that their patient experience is better or much better with regards to accessing patient history using HIE. About 41% of the GPs, 17% of the hospital clinicians and 25% of the overall clinicians stated that the experience was about the same. Only 2% of the hospital clinicians, no GPs and about 1% of the overall clinicians provided a negative response.

CORRESPONDENCE
About 24% of the respondents stated that the number of letters received from and sent to patients and colleagues is reduced or greatly reduced, about 71% of the respondents stated that it is about the same and 5% stated that it is increased/greatly increased (see chart 2).

TESTS
Forty-four percent of the clinicians stated that the number and complexity of tests ordered are reduced/greatly reduced due to the use of eLPR. About 53% state that it is about the same and 3% state that it has increased (see chart 3).

PHONE CALLS
About 80% of the clinicians stated that the number of phone calls answered or made have been reduced / greatly reduced because the information is already available in eLPR thereby not needing to call a colleague for further information. About 19% of the clinicians expressed that it is about the same and 1% stated that it has increased / greatly increased (see chart 4).

80% of the overall clinicians expressed that patients were pleased that the clinicians were able to access hospital/GP information.
**CORRESPONDENCE - RECEIVED/SENT**

- Increased, Greatly increased: 24%
- About the same: 71%
- Reduced, Greatly reduced: 5%

Chart 2: Correspondence sent/received

**NUMBER OF COMPLEXITY OF TESTS ORDERED**

- Increased, Greatly increased: 53%
- About the same: 44%
- Reduced, Greatly reduced: 3%

Chart 3: Number of complexity of tests ordered

**PHONE CALLS - MADE OR RECEIVED**

- Increased, Greatly increased: 19%
- About the same: 80%
- Reduced, Greatly reduced: 1%

Chart 4: Phone calls - made or received
ANNEX A: FULL SURVEY RESULTS

REVIEW OF PATIENT BEFORE CONSULTATION
About 28% of the clinicians stated that it was much easier to review their patients before consultation due to eLPR, 45% said it was easier, 26% stated it was about the same and 1% stated it was harder. No one said it was much harder to review using eLPR.

SAVINGS IN CONSULTATION TIME
Forty-seven percent of the clinicians stated that they could save 0-5 minutes, 20% of the clinicians stated that they could save 6-10 minutes, 13% of the clinicians stated that they could save 11-15 minutes, 13% of the clinicians state that they could save 16-30 minutes and 7% of the clinicians stated that they could save over 30 minutes of consultation time on average per day.

REFERRALS
Twenty-five percent of the clinicians stated that due to usage of eLPR the number of referrals made by them were reduced or significantly reduced, 71% stated that it was about the same and 2% state that it has now increased and 2% stated that it is significantly increased. About 18% clinicians stated that they saved at least 1 referral per week, 14% stated that they saved 2 referrals per week, and 2% stated that they saved 3-4 referrals per week and 66% did not see any savings.

A7. CLINICIANS’ CONFIDENCE
While responses in this section were overwhelmingly positive, a very small number stated that their confidence levels were reduced by using eLPR. It has not been possible to establish for certain why this might be the case; it could simply be errors in the way the questionnaire was completed.

LATEST INFORMATION
About 22% of the clinicians stated that due to eLPR, their confidence in accessing the latest information about the patient is significantly increased, 63% stated that it is increased, 10% stated that it is about the same, 4% stated that it is reduced and 1% stated that it is significantly reduced.

PATIENT SAFETY
About 23% of the clinicians stated that due to eLPR, their confidence in patient safety significantly increased, 51% stated that it is increased, 18% stated that it is about the same, 4% stated that it is reduced and 4% stated that it is significantly reduced.

INFORMED QUICK DECISIONS
About 28% of the clinicians stated that due to eLPR, their ability to make informed quick decisions due to being provided all information in one place has significantly increased, 45% stated that it is increased, 19% stated that it is about the same, 6% stated that it is reduced and 2% stated that it is significantly reduced.
**PAPERWORK**
About 9% of the clinicians stated that due to eLPR their paperwork is significantly reduced, 39% stated that it is reduced, 42% stated that it is about the same, 8% stated that it is increased and 3% stated it is significantly increased.

**MISSING RECORDS/NOTES**
About 23% of the clinicians stated that due to eLPR the missing records/notes are significantly reduced, 40% stated that it is reduced, 29% stated that it is about the same, 4% stated that it is increased and 4% stated it is significantly increased.

**NUMBER OF INVESTIGATIONS ORDERED**
About 4% of the clinicians stated that due to eLPR, the number of investigations ordered, due to being provided all information thereby enabling them to take a different course of action has significantly reduced, 38% stated that it is reduced, 42% stated that it is about the same, 9% stated that it is increased and 7% stated that it is significantly reduced.

**READMISSIONS**
About 3% of the clinicians stated that their ability to help avoid re-admissions to secondary care due to eLPR has significantly reduced, 16% stated that it has reduced, 68% stated that it remains the same, 11% stated that it has enhanced, and 2% stated that it has greatly enhanced.

**EFFECT OF ELPVR ON THE CLINICIAN’S WORKING DAY**
About 24% of the clinicians stated that the effect of eLPR on their working day was very positive, 57% stated that it was positive, 16% stated that it is about the same, 2% said it was detrimental and 1% stated that it was very detrimental.
16. ANNEX B: STRENGTHS AND AREAS FOR IMPROVEMENT

B1. STRENGTHS - MOST USED FEATURES OF HIE

The clinicians were asked to state which three sets of information they access most in HIE among 12 datasets. Overall the top 3 scoring features were Outpatient Clinic Letters (9%), followed by lab results (8%) and Radiology images, X-rays, scans (8%). Complete scores are depicted in Table 2 earlier in this report.

GPs stated that the top features they use HIE for, is seeing lab results the most (19%), and Radiology images, X-rays (19%), followed by Upcoming Appointments (18%).

Hospital staff stated that they use HIE mostly for Patient Medical information (20%), Patient history (15%) and Outpatient Clinic Letters (13%). There is no unused feature by the GPs or Hospital clinicians.
Chart 2: Correspondence sent/received

TOP 3 MOSTLY USED FEATURES
B2. IMPROVEMENTS

GENERAL
The key area of improvement is to increase the awareness of the information available in eLPR and its usage, ensuring that the clinicians have access to it and adequate training of the system and its features across all the sites. Other improvements suggested are:

- Shared coding for entries across different organisations will help with data consistency
- Training for secondary care will improve usage of eLPR and enable clinicians and patients to tap the benefits
- Integration of current medical lists and allergies, radiology, endoscopy appointments, A&E, OPA, Pathology will help patient experience and better treatment
- Access to neo-natal discharge summary will benefit the clinicians
- More granular information like GP consultations could be added
- The need for patient consent to be obtained at the start of each session seems to prevent preparation for consultation. A strategy needs to be worked out to reduce this hurdle. For example, patients could be asked in advance if a consultant can view the hospital notes
B3. TECHNICAL ISSUES

It was also noticed during interviews that some of the issues faced by the clinicians while using HIE were not with the HIE system but with their PCs, local network or software, such as usage of an outdated copy of Adobe. HIE performance is optimised when local systems are updated regularly.

BARTS HEALTH
About 33% of the respondents stated that there were technical issues faced by them while using HIE but 67% stated that they do not face any technical issues. Among the issues stated, 64% of the clinicians stated loading issue and 9% requested training.

ELFT
One respondent stated that he had issues with HIE. The issue reported was about understanding the risks regarding any loss of data.

HOMERTON HOSPITAL
About 43% of the respondents stated that there were technical issues faced by them while using HIE but 57% stated that they do not face any technical issues. Eighty-eight percent of the clinicians responding with issues, reported slow systems, loading times and slow connectivity. About 25% stated that they were not provided any training and hence found it hard to navigate. About 60% of the clinicians that had technical issues, stated that they could not find the data within HIE.

CITY & HACKNEY GPS
About 14% of the respondents stated that there were technical issues faced by them while using HIE but 86% stated that they do not face any technical issues. Only one of the respondent expressed concern on ease of viewing and printing or exporting to EMIS.

TOWER HAMLETS, NEWHAM, WALTHAM FOREST GPS
About 38% of the respondents stated that there were technical issues faced by them while using HIE but 62% stated that they do not face any technical issues. Among the respondents that faced issues, 45% attribute it to loading time, 36% stated that it was not easy to manoeuvre around the system, 10% had training needs, 10% had access issues and another 10% were not sure if it was being used by their Practice.
**17. ANNEX C: COSTS**

**C1. BELOW IS SHOWN THE AGGREGATED RESULTS**

The costs of getting to the point that the eLPR is now at are hard to fully quantify and attribute. However, the following one-off costs have been identified:

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Item</th>
<th>Approximate One-off Cost (£000’s)</th>
<th>Approximate Annual Recurring Cost (£000’s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homerton</td>
<td>HIE installation</td>
<td>£20</td>
<td></td>
</tr>
<tr>
<td>Homerton</td>
<td>HIE license</td>
<td>£120</td>
<td></td>
</tr>
<tr>
<td>Homerton</td>
<td>Support staff</td>
<td>£50</td>
<td></td>
</tr>
<tr>
<td>Homerton</td>
<td>HIE connectors: HUH community, ELFT, social care (Hackney) and WEL GPs</td>
<td>£85</td>
<td></td>
</tr>
<tr>
<td>City and Hackney CCG</td>
<td>RiO development for HIE HUH community and ELFT MH</td>
<td>£250</td>
<td></td>
</tr>
<tr>
<td>City and Hackney CCG</td>
<td>RiO HIE link HUH community * The server expansion accommodates other functionality – assume HIE is 50% of overall cost</td>
<td>£25*</td>
<td></td>
</tr>
<tr>
<td>City and Hackney CCG</td>
<td>MIG</td>
<td>£1</td>
<td>£25</td>
</tr>
<tr>
<td>Barts Health</td>
<td>HIE installation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barts Health</td>
<td>HIE license</td>
<td></td>
<td>Approx. £1,300</td>
</tr>
<tr>
<td>Barts Health</td>
<td>Support costs</td>
<td></td>
<td>Approx. £450</td>
</tr>
<tr>
<td>Barts Health</td>
<td>HIE connectors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Newham CCG</td>
<td>MIG</td>
<td>£1</td>
<td>£25</td>
</tr>
<tr>
<td>Tower Hamlets CCG</td>
<td>MIG</td>
<td>£1</td>
<td>£25</td>
</tr>
<tr>
<td>Waltham Forest CCG</td>
<td>MIG</td>
<td>£1</td>
<td>£25</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>£1,656</strong></td>
<td><strong>£745</strong></td>
</tr>
</tbody>
</table>

Table 9: HIE costs

The total cost of eLPR from its inception over five years is therefore approximately £5m.
C2. COST SAVING – IN PRIMARY CARE

Again, assessing costs avoided due to the use of the eLPR is complex. A study was completed in 2016 of the savings accruing to what was felt to be a reasonably typical general practice (around 10,000 registered patients). If the finding from that practice were to be realised across WELC this would equate to around 45,000 administrative hours and 12,000 GP hours. There are approximately 1.3m registered patients in WELC.

Consensus among the GPIT leads is that the biggest single time saving benefit is the number of contacts that are avoided because hospital information is available through eLPR that otherwise wouldn’t be obtainable quickly enough within a consultation. Traditionally this would lead to another contact, with the consequent inconvenience for the patient, potential delay in treatment and cost to the practice. It is thought that, for each GP using the system, an average of 5 such contacts are avoided every week. With around 700 GPs with current access to the system this gives a potential reduction of 182,000 contacts avoided each year across WELC.

Given the time savings reported in terms of consultation time in Table 5a, this would equate to 14,755 hours of GP time per year.

Given the reduction in referrals reported in Table 6, a potential of 1233 referrals could be saved per year if full take-up of the system were achieved.

Saving 45,000 administrative hours and 12,000 GP hours.

C3. COST SAVING – IN SECONDARY CARE

- Pharmacists tend to use the SCR for medicines reconciliation of inpatients but use eLPR in area. It has stopped them having to ring GP. This is a saving of about 20 minutes per patient.
- Midwifery – patients with more complicated antenatal history, diabetes, etc.
- Heart failure nurses at Whipps cross
- Rapid access chest pain clinic at RLH use eLPR – checking on people not bad enough to be admitted but warrant further investigation
- Adult Respiratory Care (AReCare) team – hospital based community team for patients with COPD use eLPR for tracking medicines and care pathway
- Epilepsy clinical specialist nurses – nurse modifies drugs, etc.
- One particular consultant haematologist uses eLPR to view the medication list, problem list (to make sure GP has the same diagnosis, i.e. reconciliation), procedures list – where GPs record immunisation as it is very useful to know if patient has had flu, pneumonia vaccinations, etc.
- Some hypertension doctors use it to check blood pressure results in other settings
- Consultants occasionally use eLPR to get a better understanding of the patient’s history and condition so they can ask more informed questions of the GP
- Another time saving for doctors is around medicines, especially older patients on multiple drugs. Where a detailed meds discussion is required with a patient having a GP list saves time if the patient isn’t confident of the names of the drugs they are on or simply can’t remember them.
- Pre-surgical assessment nurses use eLPR for medicines assessment.
18. ANNEX D: LOGICAL DATA MODEL

RESEARCH EVALUATION: BENEFITS STUDY OF HEALTH INFORMATION EXCHANGE

<table>
<thead>
<tr>
<th>Need/problem</th>
<th>Inputs</th>
<th>Outputs</th>
<th>Primary/short term</th>
<th>Secondary/medium term</th>
<th>Tertiary/long term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluate the benefits of the Health Information Exchange</td>
<td><strong>Staff:</strong> Research Fellow (Radha Muthuswamy), Project Manager (Martin Wallis)</td>
<td><strong>What is evaluated?</strong> Benefits from HIE is evaluated by taking the feedback from the users of the system</td>
<td>Formally assess and understand the benefits from HIE</td>
<td>Perform informed decisions on the priorities for integration (e.g., Is integration of Social care more of a priority than Mental Health? What other data would the clinicians want to be made available?)</td>
<td>Discovery study with a wider participation covering 3m population (Trusts have been identified and will be approached once the first phase of HIE evaluation is complete)</td>
</tr>
</tbody>
</table>

No formal study has been conducted on the benefits of using HIE by East London Hospitals/GPs

**Time:** 50 effort days, 6 months elapsed time

**Who?** GPs, Hospital clinicians provide their feedback to the researchers to evaluate Participation from Hospital Clinicians and GPs from Newham, Waltham Forest, Tower Hamlets, Homerton, East London Foundation Trust, City & Hackney

**Identify any areas of improvement**

**Make decisions on funding other integration interventions**
### RESEARCH EVALUATION: BENEFITS STUDY OF HEALTH INFORMATION EXCHANGE

**Future decisions** have to be made on integration priorities and funding.

**Budget:** £45k

**How? Primary:** Evaluation to be conducted through questionnaire (setup the questionnaires in survey monkey), interview clinical staff

**Secondary:** Literary searches & analysis

**Identify training/skills need(s)**

**Policy changes for betterment**

**Outcomes**

<table>
<thead>
<tr>
<th>Need/problem</th>
<th>Inputs</th>
<th>Outputs</th>
<th>Primary/short term</th>
<th>Secondary/medium term</th>
<th>Tertiary/long term</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Equipment:</strong> Laptops, internet (use what already exists)</td>
<td><strong>Final output:</strong> Report to be published externally</td>
<td><strong>Primary</strong></td>
<td>Share the findings through publication for use by other CCGs</td>
<td><strong>Secondary</strong></td>
<td>Better practice (as more data will be visible and staff will be better trained) and behaviour (with data available for informed decisions)</td>
</tr>
<tr>
<td><strong>Space:</strong> Use the CCG space for meetings and the clients’ office for interviews</td>
<td></td>
<td><strong>Secondary</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Assumptions**

There will be a facilitator in each CCG (Newham, Waltham Forest, Tower Hamlets, East London Foundation Trust, City & Hackney) to co-ordinate distribution of questionnaire to staff and chasing the responses.

Responses from the clinical staff will be good.

**External factors**

Variable funding, scientific and technological advancements, clinical/society attitudes, economic conditions, changing public policies, DoH priorities, Sustainability and Transformation Plans, co-ordination and co-operation with other government entities.

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**Table 9: HIE costs**

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EAST LONDON PATIENT RECORD: BENEFITS STUDY EVALUATION
Why is the Evaluation needed? East London electric Health Information Exchange (HIE) provides real benefits to clinicians and has reached a stage where it would benefit from a formal evaluation to identify measures that go beyond simply measuring the exchange of health information. Although measuring the flow of information is important, it is also critical to examine the usage and usefulness of the information that is exchanged, as well as the impact of exchange on health outcomes, and decide integration priorities/funding.

RESEARCH EVALUATION GOALS
• Evaluate the benefits of the Health Information Exchange
• No formal study has been conducted on the benefits of using HIE by east London Hospitals/GPs
• Future decisions have to be made on integrations priorities and funding

ASSUMPTIONS
• There will be a facilitator in each CCG (Newham, Waltham Forest, Tower Hamlets, East London Foundation Trust, City & Hackney) to co-ordinate distribution of questionnaire to staff and chasing responses
• Responses from the clinical staff will be good

INPUTS
Staff: Principal Research Investigator (DR Anwar Khan), Research Fellow (Radha Muthuswamy)
Time: 50 effort days, 3 months elapsed time
Budget: £10,000
Equipments: Laptops, internet (use what already exists)
Space: Use the CCG space for meetings and the clients office for interviews

OUTPUTS
What is evaluated? Benefits from HIE is evaluated by taking the feedback from the users of the system
Who? GPs, Hospital clinicians provides their feedback to the researchers to evaluate
Participation from Hospital Clinicians and GPs from Newham, Waltham Forest, Tower Hamlets, Homerton, East London Foundation Trust, City & Hackney
How? Primary: Evaluation to be conducted through questionnaire (setup the questionnaires in survey monkey), interview clinical staff. Secondary: Literary searches & analysis
Final Output: Report to be published externally

EVALUATION FRAMEWORK

CONTEXTUAL FACTORS: Variable funding, scientific and technological advancements, clinical/society attitudes, economic conditions, changing public policies, DoH priorities, Sustainability and Transformation Plans, co-ordination and co-operation with other government entities.

East London HIE Benefits Study: Logical Data Model
Why is the Evaluation needed? East London Electric Health Information Exchange (HIE) provides real benefits to clinicians and has reached a stage where it would benefit from a formal evaluation to identify measures that go beyond simply measuring the exchange of health information. Although measuring the flow of information is important, it is also critical to examine the usage and usefulness of the information that is exchanged, as well as the impact of exchange on health outcomes, and decide integration priorities/ funding.

EVALUATION FRAMEWORK

PERFORMANCE ASSESSMENT AND OUTCOMES EVALUATION

CONTEXTUAL FACTORS:
Variable funding, scientific and technological advancements, clinical/society attitudes, economic conditions, changing public policies, DoH priorities, Sustainability and Transformation Plans, co-ordination and co-operation with other government entities.

LITERARY SEARCHES, ANALYSE RESULTS, IDENTIFY BENEFITS/ISSUES FACED BY USERS OF HIE IN OTHER AREAS TO HELP FORMULATE THE QUESTIONNAIRES

ANALYSE AND INTERPRET QUALITATIVE AND QUANTITATIVE DATA

DEEP DIVES:
INTERVIEWS WITH SELECTED CLINICIANS

EVALUATION

OUTCOMES

PRIMARY/SHORT TERM
• Formally assess and understand the benefits from HIE
• Identify any areas of improvement
• Identify training/skills need(s)
• Share the findings through publication for use by other CCGs

SECONDARY/MEDIUM TERM
• Perform informed decisions on the priorities for integration (e.g., is integration of Social care more of a priority than Mental Health?)
• What other data would the clinicians want to be made available?
• Make decisions on funding other integration interventions
• Policy changes for betterment
• Better practice (as more data will be visible and staff will be better trained)
• Behaviour (with data available for informed decisions)
• System integration

TERTIARY/LONG TERM
• Discovery study with a wider participation covering 3m population (Trusts have been identified and will be approached once the first phase of HIE evaluation is complete)
• Policy changes for betterment
• Better practice (as more data will be visible and staff will be better trained)
• Behaviour (with data available for informed decisions)
• System integration

East London HIE Benefits Study: Logical Data Model
19. ANNEX E: QUESTIONNAIRE
DETAILED RESPONSES

FOR DETAILED RESPONSES, PLEASE EMAIL
ENQUIRIES@EASTLONDONHCP.NHS.UK
20. ANNEX F: HIE SCHEMATIC

BARTS HEALTH

HIE SCHEMATIC

Medical Interoperability Gateway [MIG]

Newham CCG GPs (Emis)

Tower Hamlets CCG GPs (Emis)

Waltham Forest CCG GPs (Emis & Systmone)

Web Service

Data out

Read only Data

Homerton University Hospital

Web Portal

Mill_CCD.csv

RiO (Comm)

RiO (Comm)

RiO_html

C&D CCD

EMIS [GP]

EMIS [GP]

EMIS [GP]

EMIS [GP]

EMIS [GP]

EMIS [GP]

EMIS [GP]

EMIS [GP]

Data out

HIE View

HOMERTON

EAST LONDON PATIENT RECORD: BENEFITS STUDY EVALUATION

Abstract
OBJECTIVES
We conducted a systematic review of studies assessing facilitators and barriers to use of health information exchange (HIE).

METHODS
We searched MEDLINE, PsycINFO, CINAHL, and the Cochrane Library databases between January 1990 and February 2015 using terms related to HIE. English-language studies that identified barriers and facilitators of actual HIE were included. Data on study design, risk of bias, setting, geographic location, characteristics of the HIE, perceived barriers and facilitators to use were extracted and confirmed.

RESULTS
Ten cross-sectional, seven multiple-site case studies, and two before-after studies that included data from several sources (surveys, interviews, focus groups, and observations of users) evaluated perceived barriers and facilitators to HIE use. The most commonly cited barriers to HIE use were incomplete information, inefficient workflow, and reports that the exchanged information that did not meet the needs of users. The review identified several facilitators to use.

DISCUSSION
Incomplete patient information was consistently mentioned in the studies conducted in the US but not mentioned in the few studies conducted outside of the US that take a collective approach toward healthcare. Individual patients and practices in the US may exercise the right to participate (or not) in HIE which effects the completeness of patient information available to be exchanged. Workflow structure and user roles are key but understudied.

CONCLUSIONS
We identified several facilitators in the studies that showed promise in promoting electronic health data exchange: obtaining more complete patient information; thoughtful workflow that folds in HIE; and inclusion of users early in implementation.


Abstract
BACKGROUND AND OBJECTIVE
Healthcare professionals, industry and policy makers have identified Health Information Exchange (HIE) as a solution to improve patient safety and overall quality of care. The potential benefits of HIE on healthcare have fostered its implementation and adoption in the United States. However, there is a dearth of publications that demonstrate HIE effectiveness. The purpose of this review was to identify and describe evidence of HIE impact on healthcare outcomes.

METHODS
A database search was conducted. The inclusion criteria included original investigations in English that focused on a HIE outcome evaluation. Two independent investigators reviewed the articles. A qualitative coding approach was used to analyse the data.

RESULTS
Out of 207 abstracts retrieved, five articles met the inclusion criteria. Of these, 3 were randomized controlled trials, 1 involved retrospective review of data, and 1 was a prospective study. We found that HIE benefits on healthcare outcomes are still sparsely evaluated, and that among the measurements used to evaluate HIE healthcare utilization is the most widely used.

CONCLUSIONS
Outcomes evaluation is required to give healthcare providers and policy-makers evidence to incorporate in decision-making processes. This review showed a dearth of HIE outcomes data in the published peer reviewed literature so more research in this area is needed. Future HIE evaluations with different levels of interoperability should incorporate a framework that allows a detailed examination of HIE outcomes that are likely to positively affect care.
OBJECTIVE
To systematically review the available research on HIE outcomes and analyse future research needs.

METHODS
Data sources included citations from selected databases from January 1990 to February 2015. We included English-language studies of HIE in clinical or public health settings in any country. Data were extracted using dual review with adjudication of disagreements.

RESULTS
We identified 34 studies on outcomes of HIE. No studies reported on clinical outcomes (e.g., mortality and morbidity) or identified harms. Low-quality evidence generally finds that HIE reduces duplicative laboratory and radiology testing, emergency department costs, hospital admissions (less so for readmissions), and improves public health reporting, ambulatory quality of care, and disability claims processing. Most clinicians attributed positive changes in care coordination, communication, and knowledge about patients to HIE.

CONCLUSIONS
Although the evidence supports benefits of HIE in reducing the use of specific resources and improving the quality of care, the full impact of HIE on clinical outcomes and potential harms are inadequately studied. Future studies must address comprehensive questions, use more rigorous designs, and employ a standard for describing types of HIE.

TRIAL REGISTRATION PROSPERO Registry No CRD42014013285; http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42014013285 (Archived by WebCite at http://www.webcitation.org/6dZhqDM8t).

Abstract
OBJECTIVES:
In this paper we aim to characterize the critical mass of linked data, methods and expertise required for health systems to adapt to the needs of the populations they serve - more recently known as learning health systems. The objectives are to: 1) identify opportunities to combine separate uses of common data sources in order to reduce duplication of data processing and improve information quality; 2) identify challenges in scaling-up the reuse of health data sufficiently to support system learning.

METHODS:
The challenges and opportunities were identified through a series of e-health stakeholder consultations and workshops in Northern England from 2011 to 2014. From 2013 the concepts presented here have been refined through feedback to collaborators, including patient/citizen representatives, in a regional health informatics research network (www.herc.ac.uk).

RESULTS:
Health systems typically have separate information pipelines for: 1) commissioning services; 2) auditing service performance; 3) managing finances; 4) monitoring public health; and 5) research. These pipelines share common data sources but usually duplicate data extraction, aggregation, cleaning/preparation and analytics. Suboptimal analyses may be performed due to a lack of expertise, which may exist elsewhere in the health system but is fully committed to a different pipeline. Contextual knowledge that is essential for proper data analysis and interpretation may be needed in one pipeline but accessible only in another. The lack of capable health and care intelligence systems for populations can be attributed to a legacy of three flawed assumptions: 1) universality: the generalizability of evidence across populations; 2) time-invariance: the stability of evidence over time; and 3) reducibility: the reduction of evidence into specialised sub-systems that may be recombined.

CONCLUSIONS:
We conceptualize a population health and care intelligence system capable of supporting health system learning and we put forward a set of maturity tests of progress toward such a system. A factor common to each test is data-action latency; a mature system spawns timely actions proportionate to the information that can be derived from the data, and in doing so creates meaningful measurement about system learning. We illustrate, using future scenarios, some major opportunities to improve health systems by exchanging conventional intelligence pipelines for networked critical masses of data, methods and expertise that minimise data-action latency and ignite system-learning.

KEYWORDS:
Health data reuse; adaptive health systems; healthcare evidence; intelligence pipelines; learning health systems; meaningful use; population health; secondary uses


Abstract
Health information exchange (HIE) systems facilitate access to patient information for a variety of health care organizations, end users, and clinical and organizational goals. While a complex intervention, organizations’ usage of HIE is often conceptualized and measured narrowly. We sought to provide greater specificity to the concept of HIE as an intervention by formulating a typology of organizational HIE usage. We interviewed representatives of a regional health information organization and health care organizations actively using HIE information to change patient utilization and costs. The resultant typology includes three dimensions: user role, usage initiation, and patient set. This approach to categorizing how health care organizations are actually applying HIE information to clinical and business tasks provides greater clarity about HIE as an intervention and helps elucidate the conceptual linkage between HIE and organizational and patient outcomes.

DATA SYNTHESIS:
257 studies met the inclusion criteria. Most studies addressed decision support systems or electronic health records. Approximately 25% of the studies were from 4 academic institutions that implemented internally developed systems; only 9 studies evaluated multifunctional, commercially developed systems. Three major benefits on quality were demonstrated: increased adherence to guideline-based care, enhanced surveillance and monitoring, and decreased medication errors. The primary domain of improvement was preventive health. The major efficiency benefit shown was decreased utilization of care. Data on another efficiency measure, time utilization, were mixed. Empirical cost data were limited.

LIMITATIONS:
Available quantitative research was limited and was done by a small number of institutions. Systems were heterogeneous and sometimes incompletely described. Available financial and contextual data were limited.

CONCLUSIONS:
Four benchmark institutions have demonstrated the efficacy of health information technologies in improving quality and efficiency. Whether and how other institutions can achieve similar benefits, and at what costs, are unclear.

Summary:
OBJECTIVE
Health information exchange (HIE) is the inter-organizational sharing of patient information and is one of many health information technology initiatives expected to transform the U.S. healthcare system. Two outcomes expected to be improved by HIE are patient-provider communication and patient satisfaction. This analysis examined the relationship between the level of HIE engagement and these two factors in a sample of U.S. hospitals.

METHODS
Independent variables came from existing secondary sources and the dependent measures were from the Hospital Consumer Assessment of Healthcare Providers and Systems. The analysis included 3,278 hospitals. Using ordinary least squares regression, implemented HIE was positively associated with the percentage of patients reporting nurses communicated well and higher satisfaction. Due to the potential for selection bias, results were further explored using a propensity score analysis.
RESULTS

Hospitals that had adopted HIE, but not yet implemented saw no benefits. Hospitals’ level of HIE was not associated with the percentage of patients reporting doctors communicated well. According to propensity score corrected estimates, implemented HIE was associated with the percentage of patients who reported nurses always communicated well and who would definitely recommend the hospital.

CONCLUSION

Few studies have examined the impact of HIE at the organizational level. This examination provides some evidence that hospitals engaging in HIE are associated with higher patient satisfaction.

REFERENCES


Abstract

BACKGROUND:

Unprecedented federal interest and funding are focused on secure, standardized, electronic transfer of health information among health care organizations, termed health information exchange (HIE). The stated goals are improvements in health care quality, efficiency, and cost. Ambulatory primary care practices are essential to this process; however, the factors that motivate them to participate in HIE are not well studied, particularly among small practices.

METHODS:

We conducted a systematic review of the literature about HIE participation from January 1990 through mid-September 2008 to identify peer-reviewed and non–peer-reviewed publications in bibliographic databases and websites. Reviewers abstracted each publication for predetermined key issues, including stakeholder participation in HIE, and the benefits, barriers, and overall value to primary care practices. We identified themes within each key issue, then grouped themes and identified supporting examples for analysis.

RESULTS:

One hundred and sixteen peer-reviewed, non–peer-reviewed, and web publications were retrieved, and 61 met inclusion criteria. Of 39 peer-reviewed publications, one-half reported original research. Among themes of cost savings, workflow efficiency, and quality, the only benefits to be reliably documented were those regarding efficiency, including improved access to test results and other data from outside the practice and decreased staff time for handling referrals and claims processing. Barriers included cost, privacy and liability concerns, organizational characteristics, and technical barriers. A positive return on investment has not been documented.

CONCLUSIONS:

The potential for HIE to reduce costs and improve the quality of health care in ambulatory primary care practices is well recognized but needs further empiric substantiation.


EAST LONDON PATIENT RECORD: BENEFITS STUDY EVALUATION
REFERENCES


Abstract
The medical record is a key component in the modern health systems, a fundamental basis of higher functionalities that guarantees quality care and the possibility of improved clinical management. The dissemination of information systems for the electronic medical record (EMR) has a growing acceptance and use in developed countries. This type of recognition however has not been widespread in Latin America. Realizing this we conducted a web survey to users of a Latin American medical portal to assess their perception of the EMRs usefulness. Among the results we found that over 90% of respondents were in favor of its use, with values that exceed 80% in the analysis of the utilities by categories. More in-depth studies are needed to determine the reasons for the lack of dissemination and implementation of EMR in our region.


Abstract
OBJECTIVE: To assess physicians’ attitudes toward health information exchange (HIE) and physicians’ willingness to pay to participate in HIE.

DESIGN: We conducted a cross-sectional mail survey of 1296 licensed physicians (77% response rate) in Massachusetts in 2007.

MEASUREMENTS: Perceptions of the potential effects of HIE on healthcare costs, quality of care, clinicians’ time, patients’ privacy concerns, and willingness to pay for HIE.

RESULTS: After excluding 253 physicians who did not see any outpatients, we analysed 1043 responses. Overall, 70% indicated that HIE would reduce costs, while 86% said it would improve quality and 76% believed that it would save time. On the other hand, 16% reported being very concerned about HIE’s effect on privacy, while 55.0% were somewhat concerned and 29% not at all concerned. Slightly more than half of the physicians (54%) said they would be willing to pay an unspecified monthly fee to participate in HIE, but only 37% said they would be willing to pay $150 per month for it. Primary care physicians and those in larger practices tended to have more positive attitudes toward HIE.

CONCLUSIONS: Physicians perceive that HIE will have generally positive effects, though a considerable fraction harbour concerns about privacy. While physicians may be willing to participate in HIE, they are not consistently willing to pay to participate. HIE business model that require substantial physician subscription fees may face significant challenges.


Abstract
PURPOSE: To characterize physician attitudes and preferences towards health information exchange (HIE), which is the ability to transmit health information electronically across institutions, and identify factors that influence physicians’ interest in using HIE for their clinical work.

METHODS: A survey was conducted of physicians affiliated with institutions that are stakeholders of a regional health information organization in the United States (U.S.). Surveys were administered between May and October, 2009 at educational conferences and on site at physician practices.

RESULTS: Of the 328 physicians asked to participate, 44% (n=144) completed the survey. Sixty-eight percent (n=88) of physicians expressed interest in using HIE for their clinical work. Most physicians expected HIE to improve provider communication (89%), coordination and continuity of care (87%) and efficiency (87%). Potential barriers to adopting or using HIE included start-up costs (57%) and resources to select and implement a system (38%). A majority reported that technical assistance (70%) and financial incentives to use (65%) or purchase (54%) health IT systems would positively influence their adoption and use of HIE. Physicians who believe that financial incentives would be helpful, that HIE would be easy to use, or who prefer viewing patient health information electronically were found to be at least three times more likely to indicate they would adopt and use HIE.
CONCLUSIONS:
These findings suggest that providers largely consider HIE as potentially valuable and a majority would be willing to use HIE. Recent U.S. federal health IT policies that provide financial incentives as well as technical assistance may address potential barriers to adoption and usage of HIE.


Abstract
BACKGROUND
Health information exchange (HIE) systems are implemented nationwide to integrate health information and facilitate communication among providers. The Nebraska Health Information Initiative is a state-wide HIE launched in 2009.

OBJECTIVE
The purpose of this study was to conduct a comprehensive assessment of health care providers’ perspectives on a query-based HIE, including barriers to adoption and important functionality for continued utilization.

METHODS
We surveyed 5618 Nebraska health care providers in 2013. Reminder letters were sent 30 days after the initial mailing. RESULTS A total of 615 questionnaires (11%) were completed. Of the 100 current users, 63 (63%) indicated satisfaction with HIE. The most common reasons for adoption among current or previous users of an HIE (N = 198) were improvement in patient care (N = 111, 56%) as well as receiving (N = 95, 48%) and sending information (N = 80, 40%) in the referral network. Cost (N = 233, 38%) and loss of productivity (N = 220, 36%) were indicated as the ‘major barriers’ to adoption by all respondents. Accessing a comprehensive patient medication list was identified as the most important feature of the HIE (N = 422, 69%).

CONCLUSIONS
The cost of HIE access and workflow integration are significant concerns of health care providers. Additional resources to assist practices plan the integration of the HIE into a sustainable workflow may be required before widespread adoption occurs. The clinical information sought by providers must also be readily available for continued utilization. Query-based HIEs must ensure that medication history, laboratory results and other desired clinical information be present, or long-term utilization of the HIE is unlikely.


Abstract
INTRODUCTION
The objective of the study was to understand the immediate utility of health information exchange (HIE) on emergency department (ED) providers by interviewing them shortly after the information was retrieved. Prior studies of physician perceptions regarding HIE have only been performed outside of the care environment.

METHODS
Trained research assistants interviewed resident physicians, physician assistants and attending physicians using a semi-structured questionnaire within two hours of making a HIE request. The responses were recorded, then transcribed for qualitative analysis. The transcribed interviews were analysed for emerging qualitative themes.

RESULTS
We analysed 40 interviews obtained from 29 providers. Primary qualitative themes discovered included the following: drivers for requests for outside information; the importance of unexpected information; historical lab values as reference points; providing context when determining whether to admit or discharge a patient; the importance of information in refining disposition; improved confidence of provider; and changes in decisions for diagnostic imaging.

CONCLUSION
ED providers are driven to use HIE when they’re missing a known piece of information. This study finds two additional impacts not previously reported. First, providers sometimes find additional unanticipated useful information, supporting a workflow that lowers the threshold to request external information. Second, providers sometimes report utility when no changes to their existing plan are made as their confidence is increased based on external records. Our findings are concordant with previous studies in finding exchanged information is useful to provide context for interpreting lab results, making admission decisions, and prevents repeat diagnostic imaging.


EAST LONDON PATIENT RECORD: BENEFITS STUDY EVALUATION
Abstract

BACKGROUND

Health information exchange (HIE) has the potential to improve the quality of healthcare by enabling providers with better access to patient information from multiple sources at the point of care. However, HIE efforts have historically been difficult to establish in the US and the failure rates of organizations created to foster HIE have been high.

OBJECTIVES
We sought to better understand how RHIO-based HIE systems were used in practice and the challenges care practitioners face using them. The objective of our study were to so investigate how HIE can better meet the needs of care practitioners.

METHODS
We performed a multiple-case study using qualitative methods in three communities in New York State. We conducted interviews onsite and by telephone with HIE users and non-users and observed the workflows of healthcare professionals at multiple healthcare organizations participating in a local HIE effort in New York State.

RESULTS
The empirical data analysis suggests that challenges still remain in increasing provider usage, optimizing HIE implementations and connecting HIE systems across geographic regions. Important determinants of system usage and perceived value includes users experienced level of available information and the fit of use for physician workflows.

CONCLUSIONS
Challenges still remain in increasing provider adoption, optimizing HIE implementations, and demonstrating value. The inability to find information reduced usage of HIE. Healthcare organizations, HIE facilitating organizations, and states can help support HIE adoption by ensuring patient information is accessible to providers through increasing patient consents, fostering broader participation, and by ensuring systems are usable.

References


EAST LONDON PATIENT RECORD: BENEFITS STUDY EVALUATION

ultrasounds (20.7% of ultrasound cases), and 29,703 repeat chest x-rays (19.5% of x-ray cases). HIE was associated with reduced probability of repeat ED imaging in all 3 modalities: -8.7 percentage points for CT [95% confidence interval (CI): -14.7, -2.7], -9.1 percentage points for ultrasound [95% CI: -17.2, -1.1], and -13.0 percentage points for chest x-ray [95% CI: -18.3, -7.7], reflecting reductions of 44%-67% relative to sample means.

CONCLUSIONS
HIE was associated with reduced repeat imaging in EDs. This study is among the first to find empirical support for this anticipated benefit of HIE.


Abstract
OBJECTIVE
The purpose of this study was to measure the number of repeat computed tomography (CT) scans performed across an established health information exchange (HIE) in New York City. The long-term objective is to build an HIE-based duplicate CT alerting system to reduce potentially avoidable duplicate CTs.

METHODS
This retrospective cohort analysis was based on HIE CT study records performed between March 2009 and July 2012. The number of CTs performed, the total number of patients receiving CTs, and the hospital locations where CTs were performed for each unique patient were calculated. Using a previously described process established by one of the authors, hospital-specific proprietary CT codes were mapped to the Logical Observation Identifiers Names and Codes (LOINC®) standard terminology for inter-site comparison. The number of locations where there was a repeated CT performed with the same LOINC code was then calculated for each unique patient.

RESULTS
There were 717,231 CTs performed on 349,321 patients. Of these patients, 339,821 had all of their imaging studies performed at a single location, accounting for 668,938 CTs. Of these, 9,500 patients had 48,293 CTs performed at more than one location. Of these, 6,284 patients had 24,978 CTs with the same LOINC code performed at multiple locations. The median time between studies with the same LOINC code was 232 days (range of 0 to 1,227); however, 1,327 were performed within 7 days and 5,000 within 30 days.

CONCLUSIONS
A small proportion (3%) of our cohort had CTs performed at more than one location, however this represents a large number of scans (48,293). A noteworthy portion of these CTs (51.7%) shared the same LOINC code and may represent potentially avoidable studies, especially those done within a short time frame. This represents an addressable issue, and future HIE-based alerts could be utilized to reduce potentially avoidable CT scans.


MATERIALS AND METHODS
We studied all ED encounters over a 13-month period in which HIE data were accessed in all major emergency departments Memphis, Tennessee. HIE access encounter records were matched with similar encounter records without HIE access. Outcomes studied were ED-originated hospital admissions, admissions for observation, laboratory testing, head CT, body CT, ankle radiographs, chest radiographs, and echocardiograms. Our estimates employed generalized estimating equations for logistic regression models adjusted for admission type, length of stay, and Charlson co-morbidity index. Marginal probabilities were used to calculate changes in outcome variables and their financial consequences.

RESULTS
HIE data were accessed in approximately 6.8% of ED visits across 12 EDs studied. In 11 EDs directly accessing HIE data only through a secure Web browser, access was associated with a decrease in hospital admissions (adjusted odds ratio (OR)=0.27; p<0.001). In a 12th ED relying more on print summaries, HIE access was associated with a decrease in hospital admissions (OR=0.48; p<0.001) and statistically significant decreases in head CT use, body CT use, and laboratory test ordering.

DISCUSSION
Applied only to the study population, HIE access was associated with an annual cost savings of $1.9 million. Net of annual operating costs, HIE access reduced overall costs by $1.07 million. Hospital admission reductions accounted for 97.6% of total cost reductions.

CONCLUSION
Access to additional clinical data through HIE in emergency department settings is associated with net societal saving.
Abstract

OBJECTIVES

Public and private organizations are implementing systems for query-based health information exchange (HIE), the electronic aggregation of patient data from multiple institutions. However, existing studies of query-based HIE system usage have addressed a limited number of settings. Our goal was to quantify the breadth and depth of usage of a query-based HIE system implemented across multiple communities with diverse care settings and patient populations.

METHODS

We performed a cross-sectional study in three communities in New York State using system access log files from January 2009 to May 2011 to measure usage patterns of a query-based HIE web portal system with respect to practice sites, users, patients, and data.

RESULTS

System access occurred from 60% (n=200) of practice sites registered to use the system in Community A, 59% (n=156) in Community B, and 82% (n=28) in Community C. In Communities A and B, users were primarily non-clinical staff in outpatient settings, while in Community C inpatient physicians were the main users. Across communities, proportions of patients whose data were accessed varied with 5% (n=11,263) in Community A, 60% (n=212,586) in Community B, and 1% (n=1107) in Community C. In Community B, users updated patient consent through the HIE portal, whereas in the other communities, users updated patient consent through a separate system. Across communities, users most frequently accessed only patient summary data displayed by default followed by detailed laboratory and radiology data.

CONCLUSIONS

This study is among the first to illustrate large-scale usage of a query-based HIE system implemented across multiple communities. Patient summary data displayed by default may be an important feature of query-based HIE systems. User role, practice site type, and patient consent workflow may affect patterns of query-based HIE web portal system usage in the communities studied and elsewhere.

REFERENCES


Abstract

BACKGROUND

Health information exchange (HIE) is an important tool for improving efficiency and quality and is required for providers to meet Meaningful Use certification from the United States Centers for Medicare and Medicaid Services. However widespread adoption and use of HIE has been difficult to achieve, especially in settings such as smaller-sized physician practices and federally qualified health centers (FQHCs). We assess electronic data exchange activities and identify barriers and benefits to HIE participation in two underserved settings.

METHODS

We conducted key-informant interviews with stakeholders at physician practices and health centers. Interviews were recorded, transcribed, and then coded in two waves: first using an open-coding approach and second using selective coding to identify themes that emerged across interviews, including barriers and facilitators to HIE adoption and use.

RESULTS

We interviewed 24 providers, administrators and office staff from 16 locations in two states. They identified barriers to HIE use at three levels-regional (e.g., lack of area-level exchanges; partner organizations), inter-organizational (e.g., strong relationships with exchange partners; achieving a critical mass of users), and intra-organizational (e.g., type of electronic medical record used; integration into organization’s workflow). A major perceived benefit of HIE use was the improved care-coordination clinicians could provide to patients as a direct result of the HIE information. Utilization and perceived benefit of the exchange systems differed based on several practice- and clinic-level factors.

CONCLUSIONS

The adoption and use of HIE in underserved settings appears to be impeded by regional, inter-organizational, and intra-organizational factors and facilitated by perceived benefits largely at the intra-organizational level. Stakeholders should consider factors both internal and external to their organization, focusing efforts in changing modifiable factors and tailoring HIE efforts based on all three categories of factors. Collective action between organizations may be needed to address inter-organizational and regional barriers. In the interest of facilitating HIE adoption and use, the impact of interventions at various levels on improving the use of electronic health data exchange should be tested.


Abstract

BACKGROUND

Electronic health information exchange (EHI) is an important tool for improving efficiency and quality and is required for providers to meet Meaningful Use certification from the United States Centers for Medicare and Medicaid Services. However, widespread adoption and use of EHI has been difficult to achieve, especially in settings such as smaller-sized physician practices and federally qualified health centers (FQHCs). We assess electronic data exchange activities and identify barriers and benefits to EHI participation in two underserved settings.

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Abstract

OBJECTIVE
To provide a case report of barriers and promoters to implementing a health information exchange (HIE) tool that supports patient transfers between hospitals and skilled nursing facilities.

METHODS
A multi-disciplinary team conducted semi-structured telephone and in-person interviews in a purposive sample of HIE organizational informants and providers in New York City who implemented HIE to share patient transfer information. The researchers conducted grounded theory analysis to identify themes of barriers and promoters and took steps to improve the trustworthiness of the results including vetting from a knowledgeable study participant.

RESULTS
Between May and October 2011, researchers recruited 18 participants: informaticians, healthcare administrators, software engineers, and providers from a skilled nursing facility. Subjects perceived the HIE tool's development a success in that it brought together stakeholders who had traditionally not partnered for informatics work, and that they could successfully share patient transfer information between a hospital and a skilled nursing facility. Perceived barriers included lack of hospital stakeholder buy-in and misalignment with clinical workflows that inhibited use of HIE-based patient transfer data. Participants described barriers and promoters in themes related to organizational, technical, and user-oriented issues. The investigation revealed that stakeholders could develop and implement health information technology that technically enables clinicians in both hospitals and skilled nursing facilities to exchange real-time information in support of patient transfers. User level barriers, particularly in the emergency department, should give pause to developers and implementers who plan to use HIE in support of patient transfers.

CONCLUSIONS
Participants’ experiences demonstrate how stakeholders may succeed in developing and piloting an electronic transfer form that relies on HIE to aggregate, communicate, and display relevant patient transfer data across health care organizations. Their experiences also provide insights for others seeking to develop HIE applications to improve patient transfers between emergency departments and skilled nursing facilities.

Abstract

OBJECTIVE
The goal of this study was to develop an in-depth understanding of how a health information exchange (HIE) fits into clinical workflow at multiple clinical sites.

MATERIALS AND METHODS
The ethnographic qualitative study was conducted over a 9-month period in six emergency departments (ED) and eight ambulatory clinics in Memphis, Tennessee, USA. Data were collected using direct observation, informal interviews during observation, and formal semi-structured interviews. The authors observed for over 180 h, during which providers used the exchange 130 times.

RESULTS
HIE-related workflow was modelled for each ED site and ambulatory clinic group and substantial site-to-site workflow differences were identified. Common patterns in HIE-related workflow were also identified across all sites, leading to the development of two role-based workflow models: nurse based and physician based. The workflow elements framework was applied to the two role-based patterns. An in-depth description was developed of how providers integrated HIE into existing clinical workflow, including prompts for HIE use.

DISCUSSION
Workflow differed substantially among sites, but two general role-based HIE usage models were identified. Although providers used HIE to improve continuity of patient care, patient-provider trust played a significant role. Types of information retrieved related to roles, with nurses seeking to retrieve recent hospitalization data and more open-ended usage by nurse practitioners and physicians. User and role-specific customization to accommodate differences in workflow and information needs may increase the adoption and use of HIE.

CONCLUSION
Understanding end users’ perspectives towards HIE technology is crucial to the long-term success of HIE. By applying qualitative methods, an in-depth understanding of HIE usage was developed.

Abstract

**BACKGROUND**

Important barriers for widespread use of health information exchange (HIE) are usability and interface issues. However, most HIEs are implemented without performing a needs assessment with the end users, healthcare providers. We performed a user needs assessment for the process of obtaining clinical information from other health care organizations about a hospitalized patient and identified the types of information most valued for medical decision-making.

**METHODS**

Quantitative and qualitative analysis were used to evaluate the process to obtain and use outside clinical information (OI) using semi-structured interviews (16 internists), direct observation (750 h), and operational data from the electronic medical records (30,461 hospitalizations) of an internal medicine department in a public, teaching hospital in Tampa, Florida.

**RESULTS**

13.7% of hospitalizations generate at least one request for OI. On average, the process comprised 13 steps, 6 decisions points, and 4 different participants. Physicians estimate that the average time to receive OI is 18 h. Physicians perceived that OI received is not useful 33-66% of the time because information received is irrelevant or not timely. Technical barriers to OI use included poor accessibility and ineffective information visualization. Common problems with the process were receiving extraneous notes and the need to re-request the information. Drivers for OI use were to trend lab or imaging abnormalities, understand medical history of critically ill or hospital-to-hospital transferred patients, and assess previous echocardiograms and bacterial cultures. About 85% of the physicians believe HIE would have a positive effect on improving healthcare delivery.

**CONCLUSIONS**

Although hospitalists are challenged by a complex process to obtain OI, they recognize the value of specific information for enhancing medical decision-making. HIE systems are likely to have increased utilization and effectiveness if specific patient-level clinical information is delivered at the right time to the right users.


Abstract

**PURPOSE**

Health information exchange (HIE), the process of electronically moving patient-level information between different organizations, is viewed as a solution to the fragmentation of data in health care. This review provides a description of the current state of HIE in seven nations, as well as three international HIE efforts, with a particular focus on the relation of exchange efforts to national health care systems, common challenges, and the implications of cross-border information sharing.

**DESIGN/METHODOLOGY/APPROACH**

National and international efforts highlighted in English language informatics journals, professional associations, and government reports are described.

**FINDINGS**

Fully functioning HIE is not yet a common phenomenon worldwide. However, multiple nations see the potential benefits of HIE and that has led to national and international efforts of varying scope, scale, and purview. National efforts continue to work to overcome the challenges of interoperability, record linking, insufficient infrastructures, governance, and inter-organizational relationships, but have created architectural strategies, oversight agencies, and incentives to foster exchange. The three international HIE efforts reviewed represent very different approaches to the same problem of ensuring the availability of health information across borders.

**ORIGINALITY/VALUE**

The potential of HIE to address many cost and quality issues will ensure HIE remains on many national agendas. In many instances, health care executives and leaders have opportunities to work within national programs to help shape local exchange governance and decide technology partners. Furthermore, HIE raises policy questions concerning the role of centralized planning, national identifiers, standards, and types of information exchanged, each of which are vital issues to individual health organizations and worthy of their attention.