Clinically driven digital innovation using voice recognition integrated into the EPR to accelerate outpatient letter delivery

Sudhir Singh
Consultant Physician

on behalf of
Paul Altmann
Chief Clinical Information Officer
The OUH

- 4 hospitals
- Tertiary centre, strong academic links with Oxford and Brookes Universities
- Oxford has an AHSC, AHSN, and BRC
- 1.8 million outpatient visits/year
- Budget £900 million
- Until recently clinical correspondence generated by two off-site transcription providers, and a significant residual of in-house transcription
- Letters from transcription providers go to GPs electronically, but all copies printed manually (in-house transcribed letters all printed)
The OUH Go Digital Platform

- Our Go Digital platform: the Cerner Millennium electronic patient record (EPR)
- Used at scale across the whole Trust
- 12500 staff – 11,521 unique users of EPR per month

<table>
<thead>
<tr>
<th></th>
<th>Sept 2015 Total</th>
<th>Sept 2016 Total</th>
<th>Sept 2017 Total</th>
<th>May 2018 Total</th>
<th>12th June (1 day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>User-triggered Trans</td>
<td>27,400,000</td>
<td>35,800,000</td>
<td>42,400,000</td>
<td>47,800,000</td>
<td>1.9 m</td>
</tr>
<tr>
<td>Meds Administered</td>
<td>546,972</td>
<td>524,337</td>
<td>575,958</td>
<td>602,739</td>
<td>20,000</td>
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<tr>
<td>Plain clinical notes signed</td>
<td>91,935</td>
<td>116,089</td>
<td>130,906</td>
<td>150,210</td>
<td>6,143</td>
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<tr>
<td>PowerNotes signed</td>
<td>31,115</td>
<td>35,336</td>
<td>44,971</td>
<td>63,958</td>
<td>2,693</td>
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<tr>
<td>PowerPlans ordered</td>
<td>19,565</td>
<td>22,029</td>
<td>25,058</td>
<td>30,317</td>
<td>1,136</td>
</tr>
<tr>
<td>Diagnoses created</td>
<td>12,647</td>
<td>24,630</td>
<td>26,355</td>
<td>27,177</td>
<td>911</td>
</tr>
<tr>
<td>Unique users</td>
<td>9,640</td>
<td>10,414</td>
<td>10,868</td>
<td>11,521</td>
<td>7,082</td>
</tr>
<tr>
<td>Chart opens</td>
<td>1,100,000</td>
<td>1,300,000</td>
<td>1,400,000</td>
<td>1,600,000</td>
<td>64,248</td>
</tr>
<tr>
<td>Appointments</td>
<td>164,796</td>
<td>170,927</td>
<td>178,414</td>
<td>185,718</td>
<td>9,063</td>
</tr>
<tr>
<td>Unique Logins</td>
<td>377,212</td>
<td>430,669</td>
<td>427,199</td>
<td>449,443</td>
<td>16,755</td>
</tr>
</tbody>
</table>
## Getting Digital

### 2011 → not a big bang

<table>
<thead>
<tr>
<th>Registration</th>
<th>Basic clinical docs</th>
<th>Vital Signs (SEND)</th>
<th>Advanced Clinical Docs</th>
<th>Clinical Docs ** &amp; Care Plans</th>
<th>Document Scanning</th>
<th>Specimen Collection PPID + PDID</th>
<th>PowerTrials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scheduling</td>
<td>Assessment forms</td>
<td>Neuro ICU</td>
<td>Patient Worklist/Whiteboard</td>
<td>Ambulatory Organiser</td>
<td>Note Viewer + (inc Search)</td>
<td>PatientFlow ... Dynamic Worklist</td>
<td>IV Pump Connectivity</td>
</tr>
<tr>
<td>Radiology scheduling</td>
<td>Maternity</td>
<td>Oxfordshire Care Summary</td>
<td>Enterprise Data Warehouse &amp; Analytics</td>
<td>Clinic Letters</td>
<td>Fluid Balance +</td>
<td>PowerChart Touch</td>
<td>SurgiNet incl Pre-assessment</td>
</tr>
<tr>
<td>Radiology images</td>
<td>A&amp;E</td>
<td>ePrescribing &amp; Medicines Admin</td>
<td>Clinical photos</td>
<td>Voice Recognition</td>
<td>Analytics +</td>
<td>Population Health, HIE</td>
<td>Anaesthesia</td>
</tr>
<tr>
<td>Requests &amp; Results</td>
<td>Decision Support e.g. VTE; Cognition; AKI; sepsis; blood Tx</td>
<td>Take home drugs &amp; Discharge summary</td>
<td>Theatres SurgiNet NOC only</td>
<td>Millennium-PACS link</td>
<td>Revenue Cycle</td>
<td>Digital ECG</td>
<td>Patient self-service</td>
</tr>
</tbody>
</table>

- ▪️ = started but goals not achieved yet  
- ** = includes the Specialties  
- + = enhancements

[A-ICU, C-ICU, P-ICU, Eye Hospital, Trauma, Cancer prescribing, Surgical MDT]
Voice gets Recognised

- Our Go Digital strategy included networked Nuance Dragon Medical One (DMO) voice recognition deployment
- Crisis in Renal Unit at time that first tranche of licenses were to be deployed
  - already facing problems meeting clinic letter to GP turnaround (TT) of 10 days (CCG target)
  - combination of secretarial sickness and vacancies = no secretaries to support the off-site transcription workflow
  - letter workflow more complex than other clinical areas as transcription dropped into local legacy database to produce letters with current drugs and problems derived from database – was still being printed manually and sent to print-room for enveloping and mailing
  - One nephrologist (the author) had piloted VR within EPR using a structured clinic letter template mirroring the legacy workflow (drug and problem lists), and then shared this with a handful of co-piloteers before contracts finally signed
How we did it – quite a bit of innovation

• Structured "PowerNote" created to give generic org-wide letter template
  - must-do choices such as addressee options (e.g. To GP or To Patient with GP copy)
  - ability to display drugs, diagnosis, problem list and investigation results
  - free text area for body of letter and signature line
  - optional choice of next visit date or interval
  - must-do choice of patient copy or no patient copy
  - details of copies to other recipients (internal using EPR messaging or external via snail mail)
  - minimal irrelevant information when viewed in EPR, but headers and footers plus patient demographics and addressee addresses when sent electronically or via snail mail

• All letter routing done with no further intervention (developed by our in-house Mirth interface engineers)
  - to GPs: electronically (using interface to Docman – shortly nationwide, not just Oxfordshire hub)
  - to patient and external primary or secondary recipients: by printing, auto-enveloping, snail-mailing automatically in Trust Print Services room
  - to internal recipients: using EPR message centre
  - can, but not implemented yet, also send via email, and in near future to patient portal
  - Send success notifications back into EPR
• Initial 12 week evaluation
• 67 users across 14 specialties
• Only renal converted whole department (26 clinicians) – proved to be much more effective than scattered users across specialties as just one way of doing things makes it easier for secretaries to support process if clinician does not want to enter non-GP, non-patient recipient addresses, as well as benefit of peer-to-peer support
• Training focus for EPR use much greater (Consultant staff especially), than for DMO
• Outpatient letter turnaround reduced from mean of 12 to 3 days - 2 of the 3 days due to renal clinicians reviewing blood results taking 24-48 hours to return. If no results awaited, then letters sent in near-real time
• In renal unit, adoption was complete (except for off-site satellite clinics not yet properly connected to our network) – across all 67 clinicians cost of outsourced transcription fell by 77%
Results 2

- Decreased correction rate as time went by
- Reappointment of one WTE secretarial role was avoided in renal unit
- Although initially, took longer, clinicians prefer the VR workflow stating it is much more efficient use of time
- Patients and their GPs receive clinical communication very much quicker
- Letters do not need to be scanned into GP systems
- The letter infrastructure supports any specialty in any type of clinical correspondence
- Letters are immediately visible in the record filed under specialty folder structure
- When scale of benefits were reviewed by the Trust Board the final business case for enterprise-wide deployment was approved and now in place
- With Smartphone microphone app, VR now beginning to be used for many other types of clinical documentation
Conclusions

- We were able to prove that converting from transcription services to VR was feasible and cost-effective.
- Use-case for VR of course very much greater than just letters and driving enthusiasm to Go Digital.
- Can be used to support advice requests from GPs in conjunction to our in-house engineered link between ERS and EPR for triage of referrals within context of the digital record.
- We will be able to meet the 7 day letter turnaround target now demanded by the CCG.
- Using the structured template and routing automation improves patient safety as drugs and problem lists do not have to be entered each time, and letters to one patient cannot accidentally be placed in an envelope to another.
- In future specialty specific PowerNote templates can be created improving quality of communications.

And this is what it looks like:
**PowerNote**

**Nephrology Clinic Letter**

- **Date:** 24-06-2018
- **Title:** NPHROLOGY

### Document Template

<table>
<thead>
<tr>
<th>Document Template</th>
<th>Shared</th>
<th>Last Changed By</th>
<th>Date/Time</th>
<th>Sentences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical Cloning</td>
<td></td>
<td>Paul Altmann</td>
<td>01/06/2016</td>
<td>18:32:57</td>
</tr>
<tr>
<td>Day surgery example</td>
<td></td>
<td>Paul Altmann</td>
<td>23/05/2015</td>
<td>08:37:52</td>
</tr>
<tr>
<td>Generic Clinic Letter v3.0</td>
<td></td>
<td>Paul Altmann</td>
<td>23/11/2017</td>
<td>23:17:32</td>
</tr>
<tr>
<td>Generic Clinic Letter OLD version</td>
<td></td>
<td>Paul Altmann</td>
<td>01/06/2018</td>
<td>16:36:51</td>
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<tr>
<td>Generic FORMATTED Letter v3.0</td>
<td></td>
<td>Paul Altmann</td>
<td>24/08/2017</td>
<td>12:58:32</td>
</tr>
<tr>
<td>Liz Taylor's test cloning</td>
<td></td>
<td>Paul Altmann</td>
<td>15/05/2018</td>
<td>23:56:34</td>
</tr>
<tr>
<td>NPHROLOGY v3.0</td>
<td></td>
<td>Paul Altmann</td>
<td>15/05/2018</td>
<td>23:56:57</td>
</tr>
<tr>
<td>NPHROLOGY HD review v3.0</td>
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<td>Paul Altmann</td>
<td>15/05/2018</td>
<td>23:56:57</td>
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<tr>
<td>TRANSPLANT NPHROLOGY HD review v3.0</td>
<td></td>
<td>Paul Altmann</td>
<td>15/05/2018</td>
<td>23:56:57</td>
</tr>
</tbody>
</table>

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**Add**

- **Type:** Nephrology Clinic Letter

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**Add**

- **Date:** 24-06-2018

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**List**

- **Type:** Nephrology Clinic Letter

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**Hide Note Details**

- **Type:** Nephrology Clinic Letter

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**Date:** 24-06-2018

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**Title:** NPHROLOGY
Smartphone:
iOS or Android only – only needs 4G or WiFi connection to internet; iOS has better noise filtering.

Or USB tethered microphone:
Less flexible and more expensive as most clinicians have iOS or Android.
### Document Template Selection

<table>
<thead>
<tr>
<th>Title</th>
<th>Document template</th>
<th>Shared</th>
<th>Last Changed By</th>
<th>Perform/Service Date/Time</th>
<th>Sentences</th>
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</thead>
<tbody>
<tr>
<td>Clinical Clerking BSTT</td>
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<td>Altmann, Paul</td>
<td>23/05/2016 08:32:57</td>
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<td>Day surgery example</td>
<td>Generic Clinic Letter</td>
<td></td>
<td>Altmann, Paul</td>
<td>23/11/2017 23:17:32</td>
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<tr>
<td>Generic Clinic Letter OBD</td>
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<td>Altmann, Paul</td>
<td>01/06/2016 16:36:51</td>
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<tr>
<td>Generic FORMATTED letter WIRE</td>
<td>Generic Clinic Letter</td>
<td></td>
<td>Altmann, Paul</td>
<td>24/03/2017 12:58:32</td>
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<td></td>
<td>Altmann, Paul</td>
<td>23/05/2016 23:56:31</td>
<td></td>
</tr>
</tbody>
</table>
OXFORD KIDNEY UNIT - NEPHROLOGY

Consultant / Clinical Lead: Dr Paul Atmann  Location: Churchill Outpatient Clinic.

Status

GP Letter

Dear Colleague

Medications

Documented
Lisinopril: Dose: 2.5 mg - oral - tablet - once a day - Dose Change Reason: N/A - Indication: nephrotic
Ranitidine: Dose: 150 mg - twice a day - Dose Change Reason: N/A - Indication: nephrotic
Prednisolone: Dose: 40 mg - oral - tablet - once a day, in the morning - Dose Change Reason: N/A - Indication: nephrotic.

Problems: Include problem list
All Problems
Hypertensive renal disease / 64282015 / Confirmed
Psychosis / 115148013 / Confirmed
Smoker / 128130017 / Confirmed.

Results Review

Impression and Plan

Kind regards

signed electronically

Paul Atmann
**Allergies:** No Known Allergies

**Age:** 24 years  
**Gender:** Male  
**DOB:** 20/10/1993  
**NHS:** Consultant: Altmann, Paul  
**MRN:** 10571651  
**Location:** JOP Referral (<No - Admit date) - 13/06/2018 13:07:48  
**Wt:** 70 kg  
**Ht:** Q: Measured  
**BMI:** 25.71 kg/m²

---

**Documented**

- Lisinopril: Dose: 2.5 mg - oral - tablet - once a day - Dose Change Reason: N/A - Indication: nephritic
- Ramipril: Dose: 150 mg - oral - tablet - twice a day - Dose Change Reason: N/A - Indication: nephritic
- Prednisone: Dose: 40 mg - oral - tablet - once a day, in the morning - Dose Change Reason: N/A - Indication: nephritic

**Problems:** Include problem list
- All Problems
  - Hypertensive renal disease / 84230215 / Confirmed
  - Psychosis / 115146013 / Confirmed
  - Smoker / 128130017 / Confirmed

**Results Review**

**Impression and Plan**


**Kind regards**

signed electronically

Paul Altmann  
Consultant Nephrologist  
Sec: Dimitra Kiakou - tel 01865 228860 - dimitra.kiakou@ouh.nhs.uk

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**Outcome**

Show Structure*  
Next clinic visit in 12 weeks.

* Copy to patient. Copy.
signed electronically

Paul Altmann
Consultant Nephrologist
Sec: Dimitra Kiakou - tel 01865 228680 - dimitra.kiakou@ouh.nhs.uk

* Outcome <Show Structure> <Use Free Text>
Next clinic visit in 12 weeks.
* Copy to patient. Copy.
Oxford University Hospitals NHS Foundation Trust
John Radcliffe Hospital

Date: 24 Jun 2018 21:24

Patient: ZZZPACSRTH, RTH
Document: Nephrology Clinic Letter
Date of Birth: 20-Oct-1993

Department

OXFORD KIDNEY UNIT - NEPHROLOGY

Consultant / Clinical Lead: Dr Paul Altman
Location: Churchill Outpatient Clinic
Status: Final
GP Letter

Dear Colleague

Medications: Medication Record (Selected)
Documented Medications

- Lisinopril: Dose: 2.5 mg - oral - tablet - once a day - Dose Change Reason: N/A - Indication: nephrotic
- Ranitidine: Dose: 150 mg - oral - tablet - twice a day - Dose Change Reason: N/A - Indication: nephrotic
- Prednisolone: Dose: 40 mg - oral - tablet - once a day, in the morning - Dose Change Reason: N/A - Indication: nephrotic

Problems: Include problem list
All Problems
- Hypertensive renal disease / 84282015 / Confirmed
- Psychosis / 115140013 / Confirmed
- Smoker / 128130017 / Confirmed.

Results Review

Impression and Plan


Kind regards

Paul Altman
Consultant Nephrologist
Sec: Dimitra Kliaou - tel 01865 228650 - dimitra.kliaou@ouh.nhs.uk

Outcome

Next clinic visit in 12 weeks.
Copy to patient: Copy.