VacTrac

A standards based approach to population health management of vaccinations for COVID-19
Vaccines Available - New Barriers to Address

- Multiple sites for vaccination
  - Patients vaccinate where they can
- Multiple dose regimens
- No standardized approach to vaccination certification (passports)
- Potential need for boosters for specific viral variants
  - Differential efficacy of vaccination types against evolving virus
- Missed doses of other vaccines due to remote care
Vaccines Available—Still Addressing Old Barriers

- Underfunded public health data infrastructure
- Interoperability
- Security/privacy
- Cost effective population health
- Health disparities
  - Digital divide
  - Race, ethnicity
  - Rural/Urban
  - Poverty
FHIR applications for public health at MUSC/HSSC

• Enhancing controlled access to EHR data for eCR and case investigation
• Enhancing access to data for research using FHIR translators
• Mirroring IIS systems in FHIR repositories for population health management
A Modified Public Health Automated Case Event Reporting Platform for Enhancing Electronic Laboratory Reports With Clinical Data: Design and Implementation Study

PACER Project with Georgia Tech

Early "eCR Now" like implementation Using FHIR
N3C and STAR PCORnet
Contributions for MUSC

Early implementation of MedMorph like protocol using FHIR subscriptions
Informatics for public health and health system collaboration: Applications for the control of the current COVID-19 pandemic and the next one

Leslie A. Lenert,^1,2^ Wei Ding,^1^ and Jeff Jacobs^2^
Smile CDR is a robust FHIR server that can support standards-based public health—clinical care collaboration.
Use case #1: Finding high risk adults who have not been vaccinated for COVID-19

• Student led outreach to patients who have not been vaccinated or boosted
  • 1500 patients contacted
  • Cases prioritized by either Social determinants of health or by clinical risk factors

• Similar use cases:
  • Vaccination gaps for high schoolers for HPV
    • School nurse manages a list
  • Vaccination gaps for older patients for Zoster
    • Healthcare provider manages a list
Use case #2: Evaluation of the impact of vaccination on long haul COVID symptoms

- RECOVER—NIH study of Post Acute Covid Syndrome
  - 305,294 patients included in MUSC cohort
    - Positive for COVID-19, immunized, or relevant ICD-10 diagnosis (respiratory illness, COVID-19, PASC etc.)
  - 106,409 patients have documented COVID-19 immunization in EHR
  - 198,885 patients who need vaccination status updated from state IIS
Designed Around a Hybrid Cloud Approach
Additions to the HAPI FHIR Server for implementation

• Provider patient list storage and management
  • Storage of lists, editing, removal of patients from report lists
  • Users FHIR list capability

• Patient identity merging and deduplication
  • Bulk FHIR query protocol expanded to support patient matching across health systems
  • Uses Master Data Management with eMPI for de duplication
  • Integrates with provider patient lists functions to return data for all matches for each patient on a provider’s list
  • Implemented as “:mdm” functionality in HAPI/SmileCDR
Maintain Group resource with list of members

```
{ "resource": { "resourceType": "Group" },
  "identifier": [ { "system": "urn:hssc:musc:groupid", "value": "Group_0001" } ],
  "name": "MUSC Group 0001",
  "member": [
    { "entity": { "reference": "Patient/87451" } },
    { "entity": { "reference": "Patient/87453" } },
    { "entity": { "reference": "Patient/86303" } },
    { "entity": { "reference": "Patient/86305" } },
    { ... }
  ]
}
```

Issue Bulk FHIR request of all Immunizations for the Group of members with MDM (eMPI) matching

GET http://hssc-covid-d:8000/Group/87452/$export?_outputFormat=application/fhir+ndjson&_type=Immunization&_mdm=true

Query for status of bulk export job

GET http://hssc-covid-d:8000/$export-poll-status?_jobId=70d18ee8-bbe3-42a9-8283-578181064108

Get encoded binary file(s)

GET http://hssc-covid-d:8000/Binary/108802
Set up an organization in VACTRAC
Use an Excel spreadsheet to input data on the patients whose vaccination status you want to track.

Upload your Group Demographic File

Please complete the survey below.
Thank you!

Initialization Date
* must provide value

You can choose to Bulk Upload an Employee/Personnel list file or manually input your list
* must provide value

Bulk Upload
Manually Input

Click the link below to download your request data template as an Excel file. Save it locally to your computer and then open it to begin filling it with the data you wish to import.

Attachment: COVID-19 Vaccination Tracker Template.xlsx (0.01 MB)

Upload the Employee COVID-19 Vaccination Tracking Sheet
* must provide value

Submit
Save & Return Later
Document the date of the patient’s last consent to treat form to prove eligibility to track this patient.
Add Social Determinants Data to Prioritization
Upload your group vaccination tracking sheet and submit it. You will get an email when your report is ready.
Sort patients by risk for complications with COVID or by residence in high social need area.
Display and View plots and Stats in REDCap

**First Dose - Date:** (vaccine_date_1st)

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<thead>
<tr>
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<tbody>
<tr>
<td>598</td>
<td>7 (1.2%)</td>
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**Missing values:** 1, 1 (#127), 1 (#252), 1 (#321), 1 (#37)

**Second Dose - Date:** (vaccine_date_2nd)

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<td>605 (100.0%)</td>
</tr>
</tbody>
</table>

**The Priority for the COVID-19 Vaccines** (vaccination_phase)

<table>
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<tr>
<th>Total Count (N)</th>
<th>Missing*</th>
<th>Unique</th>
</tr>
</thead>
<tbody>
<tr>
<td>605</td>
<td>0 (0.0%)</td>
<td>4</td>
</tr>
</tbody>
</table>

Counts/Frequency: PHASE 1a (520, 86.0%), PHASE 1b (34, 5.6%), PHASE 1c (24, 4.0%), PHASE 2 (27, 4.5%)
Outreach to patients using tools in REDCap

<table>
<thead>
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<th>Total times contacted</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person contacted?</td>
<td>Yes □ No □ Voicemail left □ Text □ Declined the intervention</td>
</tr>
<tr>
<td>Date of contact/attempted contact</td>
<td>2021-03-31</td>
</tr>
<tr>
<td>Subject receptiveness (1 = Least responsive, 5 = most responsive)</td>
<td>1 □ 2 □ 3 □ 4 □ 5 □ n/a</td>
</tr>
<tr>
<td>Contact Method</td>
<td>Phone □</td>
</tr>
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</table>
Conclusions

• Data requirements for IIS for population health require new approaches
  • Bulk FHIR, data lakes, etc.
  • Replication in hybrid cloud is one feasible approach

• Use cases: 1000’s to 100K’s patient accesses for one site

• Bulk FHIR extensions necessary
  • Maintenance of patient lists
  • De-duplication, e-MPI

• Apps for pop health that use Bulk FHIR
  • Feasible to add Bulk FHIR extensions to REDCap