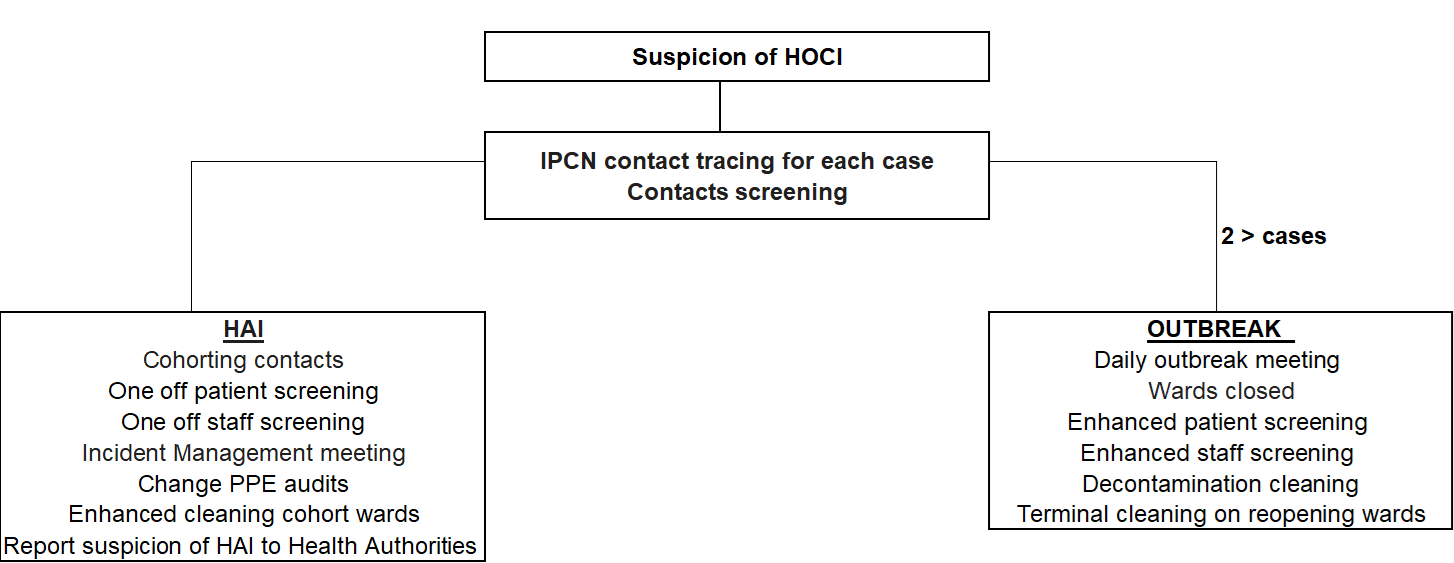
**Supplementary information**

**Supplementary Figure A1 Schematic representation of IPC management plan following a suspicion of HOCI**



**Supplementary Figure A2 Hierarchy of costs (current practice)**

**Supplementary Table A1 SARS** **-CoV-2 genome sequencing**  **micro-costing template**

**Software packages used for bioinformatics**

|  |
| --- |
| **Software packages** |
| Computer operational system LINUX |
| MinKNOW |
| RAMPART |
| Custom Scripts |
| IQTREE |
| GLUE SRT Tool |

**Unit costs applied to staff times**

|  |  |  |
| --- | --- | --- |
| **Job title** | **Employer** | **Salary** |
|  |  |  |
|  |  |  |

**Task list and staff time by stage**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Stage** | **Task** | **Staff job title** | **Time required** | **Unit (e.g. per shipment/batch of up to 24 samples/week etc)** |
| General | Updating rota/schedule |  |  |  |
| Daily quality control of fridges/freezers |  |  |  |
| Stock check and ordering consumables |  |  |  |
| Sample reception | Checking packaging in MSC II and storing samples |  |  |  |
| Updating and storing sample submission form (SSF) |  |  |  |
| Purification of viral RNA | Creating extraction spreadsheet |  |  |  |
| Sample preparation |  |  |  |
| Setting up Nimbus/Kingfisher run (2nd person required) |  |  |  |
| Checking run |  |  |  |
| Unloading/storing samples and disposing of waste |  |  |  |
| Comparing IDs from extraction run with extraction spreadsheet |  |  |  |
| Library preparation - ONT | Creating processing spreadsheet |  |  |  |
| Preparing processing plate |  |  |  |
| Preparation of ARTICv3 primer stock |  |  |  |
| Reverse transcription |  |  |  |
| Incubation |  |  |  |
| PCR set up |  |  |  |
| Running PCR |  |  |  |
| Pooling and bead clean-up |  |  |  |
| Qubit |  |  |  |
| Normalisation |  |  |  |
| End Prep |  |  |  |
| Incubation |  |  |  |
| Barcoding |  |  |  |
| Incubation |  |  |  |
| Pooling and bead clean-up |  |  |  |
| Qubit |  |  |  |
| Normalisation |  |  |  |
| Adapter ligation |  |  |  |
| Incubation |  |  |  |
| Create barcode file |  |  |  |
| Select flowcell |  |  |  |
| Running flowcell check |  |  |  |
| Update processing spreadsheet |  |  |  |
| Bead clean up |  |  |  |
| Qubit |  |  |  |
| Loading flowcell |  |  |  |
| Inform bioinformatician |  |  |  |
| Sequencing run time |  |  |  |
| Washing flowcell |  |  |  |
| Running flowcell check |  |  |  |
| Bioinformatics | Checking Quality of Run |  |  |  |
| Generating Consensus |  |  |  |
| Reporting/ delivery of report | Report Generation |  |  |  |
| Tree Building |  |  |  |
| Data archiving | Upload Sample to COG |  |  |  |
| Metadata Sheet updates |  |  |  |
|  | Data Backup |  |  |  |

**Error rates (do activities need to be repeated?)**

|  |  |
| --- | --- |
| **Stage** | **Error rate (%)** |
|  |  |
|  |  |

**Consumables used by stage**

|  |  |  |
| --- | --- | --- |
| **Stage** | **Type of consumable** | **Unit required per shipment** |
| Sample reception | Azowipes |  |
| Chemgene HLD4H Surface Disinfectant T/Spray |  |
| PET Sweetie Jar with lid |  |
| Disposable gloves |  |
| Wiper roll |  |
| **Stage** | **Type of consumable** | **Units required per 24 samples** |
| Purification of viral RNA | Mag-bind viral DNA/RNA kit (Omega Biotek) |  |
| Azowipes |  |
| Chemgene HLD4H Surface Disinfectant T/Spray |  |
| PET Sweetie Jar with lid |  |
|  |  |
| Isopropanol (2-Propanol) |  |
| Phosphate buffered saline |  |
| 96 tip comb for DW magnets (Nimbus) |  |
| Elution plates (Nimbus) |  |
| Deepwell plates |  |
| 1ml CO-RE tips with filter (Hamilton) |  |
| 50 µl CO-RE tips with filter (Hamilton) |  |
| 60 ml reagent reservoirs for NIMBUS (Hamilton) |  |
| Clear plate seals |  |
| Foil plate seals |  |
| 2ml Sarstedt Tubes |  |
| 1.5ml Eppendorf Tubes |  |
| Nuclease free water |  |
| Filter pipette tips – 200ul |  |
| Filter pipette tips – 1000ul |  |
| Serological pipettes – 10ml |  |
| Serological pipettes - 25ml |  |
| Serological pipettes - 50ml |  |
| 50 ml falcon tubes |  |
| DNA-ExitusPlus IF |  |
| Waste bags |  |
| Wiper roll |  |
| Large Bio-bin |  |
| Small Bio-bin |  |
| Autoclave bag |  |
| Disposable gloves |  |
| Library preparation - ONT | LunaScript RT SuperMix Kit |  |
| ARTICv3 primers |  |
| Q5® Hot Start High-Fidelity 2X Master Mix |  |
| Qubit ds DNA HS kit |  |
| Ampure XP beads |  |
| NEBNext® Ultra8482 II End RepairdA-Tailing Module |  |
| NEBNext® Ultra™ II Ligation Module |  |
| NEBNext® Quick Ligation Module |  |
| Ligation Sequencing Kit |  |
| Flow Cell Priming Kit |  |
| Native Barcoding Expansion 1-96 |  |
| SFB Expansion |  |
| Flow Cell (R9.4.1) |  |
| Flow Cell Wash Kit |  |
| Filter pipette tips – 10ul |  |
| Filter pipette tips – 20ul |  |
| Filter pipette tips – 200ul |  |
| Filter pipette tips – 1000ul |  |
| Inetgra 12.5ul tips |  |
| 5ml Gilson tips |  |
| Serological pipettes – 10ml |  |
| Serological pipettes - 25ml |  |
| 96 well non-skirted PCR plate |  |
| 5ml Repetman tips |  |
| 96 well skirted PCR plate |  |
| PCR strip tubes |  |
| Clear plate seals |  |
| Absolute Ethanol |  |
| Nuclease free water |  |
| 0.5mL tubes (Qubit) |  |
| 2 mL tubes |  |
| 1.5 mL tubes |  |
| 1.5 mL conical screw cap tubes |  |
| White reservoir |  |
| Bijous |  |
| RNase Away Spray |  |
| DNA Away |  |
| Disposable gloves |  |
| Waste bags |  |
| Wiper roll |  |
| Large Bio-bin |  |
| Small Bio-bin |  |
| Sticky printer Cryo labels |  |

**Equipment used by stage**

| **Stage** | **Type of equipment** | **Quantity used** | **Percentage of equipment time used for genome sequencing** |
| --- | --- | --- | --- |
| Sample reception | Laptop |  |  |
| MSC class II cabinet |  |  |
| -80oC freezer |  |  |
| 4oC fridge |  |  |
| Ice machine |  |  |
| Purification of viral RNA | Pipette – 200ul |  |  |
| Pipette – 1000ul |  |  |
| Pipetteboy |  |  |
| Laptop |  |  |
| USB |  |  |
| Barcode scanner |  |  |
| NimbusPresto with Kingfisher |  |  |
| Vortex |  |  |
| Benchtop centrifuge |  |  |
| -80oC freezer |  |  |
| -20oC freezer |  |  |
| 4oC fridge |  |  |
| Ice machine |  |  |
| Library preparation - ONT | Laptop |  |  |
| USB |  |  |
| Dymo label printer |  |  |
| Single channel pipette – 10ul |  |  |
| Single channel pipette – 20ul |  |  |
| Single channel pipette – 200ul |  |  |
| Single channel pipette – 1000ul |  |  |
| Multi-channel pipette – 10ul |  |  |
| Multi-channel pipette – 50ul |  |  |
| Multi-channel pipette – 200ul |  |  |
| Integra 12.5ul electron spacer pipette |  |  |
| Gilson Repetman |  |  |
| Pipetteboy |  |  |
| Pre-PCR hood |  |  |
| Vortex |  |  |
| Benchtop centrifuge |  |  |
| Benchtop plate centrifuge |  |  |
| Floor plate centrifuge |  |  |
| -80oC freezer |  |  |
| -20oC freezer |  |  |
| 4oC fridge |  |  |
| Ice machine |  |  |
| PCR machine |  |  |
| Qubit Fluorometer |  |  |
| Plate magnet |  |  |
| Tube magnet |  |  |
| Hula mixer |  |  |
| Timer |  |  |
| GridION / MinION |  |  |
| Bioinformatics | Custom gaming laptop with 6-8GB GPU memory for data processing. |  |  |
| Reporting/ delivery of report |  |  |  |
| Data archiving | QNAP TVS-1282T3 |  |  |

**Supplementary Table A2 Total cost of provision of training and meetings to read the SRT per site**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sites** | **Site 1** | **Site 2** | **Site 3** | **Site 4** | **Site 5** | **Site 6** | **Site 7** | **Site 8** | **Site 9** | **Site 10** | **Site 11** | **Site 12** | **Site 13** | **Site 14** | **TOTAL** |
| **SRT tool training** | | | | | | | | | | | | | | | | |
| No of sessions |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Implementation | 2 | 1 | 2 |  | 1 | 1 | 1 | 1 | 2 | 2 |  | 2 | 1 | 1 |  |
| Self-directed genomics | 1 | 1 |  | 1 |  |  | 1 |  |  |  |  |  | 2 |  |  |
| Bioinformatics |  |  | 1 |  | 1 |  | 2 |  |  | 8 |  | 2 |  |  |  |
| **TOTAL COST** | **£189** | **£143** | **£194** | **£10** | **£161** | **£64** | **£463** | **£107** | **£249** | **£469** | **£0** | **£542** | **£286** | **£23** | **£2,898.26** |
| **SRT report reading** | | | | | | | | | | | | | | | | |
| Weekly |  | √ |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 times/week |  |  |  |  |  |  |  |  | √ | √ |  |  |  |  |  |
| 3 times/week |  |  |  |  |  |  | √ | √ |  |  |  | √ |  |  |  |
| 4 times/week |  |  | √ |  |  |  |  |  |  |  |  |  |  |  |  |
| When are available | √ |  |  | √ | √ | √ |  |  |  |  | √ |  | √ | √ |  |
| **TOTAL COST** | **£352** | **£226** | **£1,369** | **£327** | **£463** | **£675** | **£198** | **£932** | **£1,071** | **£254** | **£1,752** | **£801** | **£115** | **£307** | **£8,839.64** |
| **Rapid turnaround** | **£352** | **£125** | **£1,369** | **£327** | **£425** | **£675** | **£0** | **£358** | **£849** | **£46** | **£1,752** | **£690** | **£19** | **£307** |  |
| **Longer turnaround** | **£0** | **£100** | **£0** | **£0** | **£38** | **£0** | **£198** | **£573** | **£222** | **£207** | **£0** | **£111** | **£95** | **£0** |  |

More senior-level participants (e.g., consultant virologist, consultant microbiologist, senior virologist) attended the training sessions at site 7, site 9, site 10, and site 12. IPCTs attended the training at site 6 and site 8. Site 11 participated in the development of the SRT and therefore no further training needed. Site 4 also participated in the development of the SRT; however, the sequencing interpretation expert was supported by an academic registrar who was provided with an in-house training.

Most of the sites reviewed SRTs once they were available, with other sites reviewing them from once to several times per week. Each of these meetings lasted 30-60 minutes and were attended by 2 to 8 staff per site. There was a total of 43 (range 0 to 7 per site) meetings in the rapid phase and a total of 96 (range 0 to 10 per site) meetings in the longer turnaround phase.

**Supplementary Table A3 Sensitivity analyses**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Cost of base case** | **Variation** | **Cost** |
| SARS-CoV-2 genome sequencing | £86,546 | Lowest per-sample sequencing costs   * £22.48 (Illumina rapid phase) * £44.34 (Illumina longer turnaround phase) * £43.43 (Nanopore rapid phase) * £22.77 (Nanopore longer turnaround phase)   Highest per-sample sequencing costs   * £120.36 (Illumina rapid phase) * £107.08 (Illumina longer turnaround phase) * £131.07 (Nanopore rapid phase) * £111.03 (Nanopore longer turnaround phase) | £49,233  £164,418 |
| SRT tool training | £2,898 | No self-directed genomics/bioinformatics training | £1,606 |
| Patient screening | £3,563 | Daily screening  Twice per week  Once a week | £7,905  £2,430  £1,380 |

**Supplementary Table A4 Isolation costs**

|  |  |  |
| --- | --- | --- |
|  | **Number (per day)** | **Total cost** |
| Gloves per nurse | 20 | £6.2 |
| Gowns per nurse | 4 | £29.4 |
| Cleanser alcohol hand rub Liquid Bottle 151-500ml | 1 | £1.2 |
| Eye protection - face visor | 1 | £0.9 |
| Mask face respirator FFP2 | 4 | £1.4 |
| **Cost of isolation/per day** |  | **£39.06** |

**Supplementary Table A5 Personal protective equipment (PPE) unit costs**

|  |  |
| --- | --- |
|  | **Price Per Item** |
| 1x Apron | £0.03 |
| 1x Surgical face mask | £0.12 |
| 1x FFP3 mask | £2.50 |
| 1x Surgical gown | £2.74 |
| 1x Face shield | £1.50 |
| 1x Cleaning detergent solution – chlorine based detergent tablets | £0.02 |
| 1x Alcohol hand gel | £5.71/L |
| 1x Hand soap | £2.00 |
| 1x Detergent wipes – Clinell detergent wipes | £0.01 |
| 1x Hand Cream (Based on 500ml price) | £2.00 |
| 1x Alginate bags | £1.45 |
| 1x Safety goggles | £3.90 |
| 1x Clinical waste bags | £0.05 |
| 1x Pair of gloves | £0.30 |