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Evaluation of SARS-CoV-2 environmental surface sampling protocols

Antony Spencer

UKHSA, Biosafety, Air and Water Microbiology group

UK Health Security Agency

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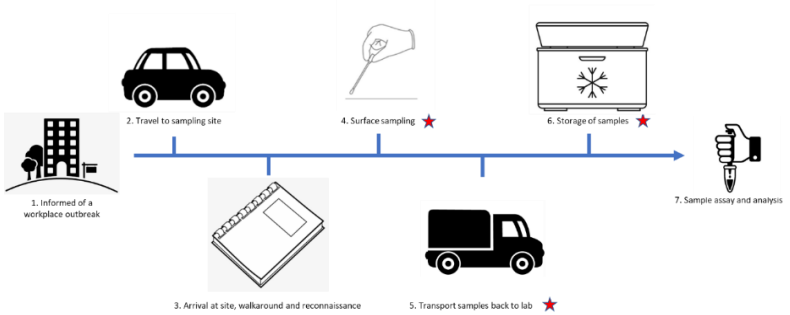
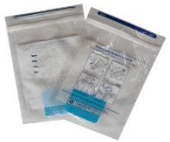
Introduction

- Preliminary study for surface sampling of SARS-COV-2
- Objectives:
  - Suitable materials for sampling
  - Loss during sampling
  - Suitable transport/stabilisation media
  - Difference between sampling for viral RNA and infectious virus
  - The effect storage time and temperature has on samples




TSC Blue sponges


3M Yellow sponges


TSC Blue sponges on a stick


COPAN FloqSwabs

Tex wipe Clean tip swabs


SIGMA Virocult swabs

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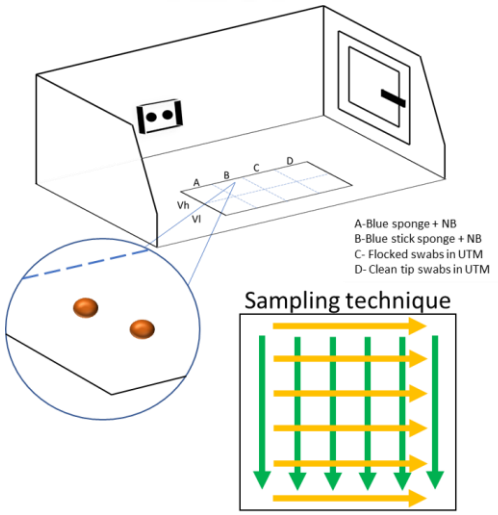
Study

- This study:
  1. Spike sampling material or surface with high or low titre of SARS-COV-2
  2. Samples extracted from material
  3. Stored at -80°C, 4°C or 20°C for 24 or 72hrs
  4. All samples stored at -80°C until assayed
  5. Plaque Assay and qPCR



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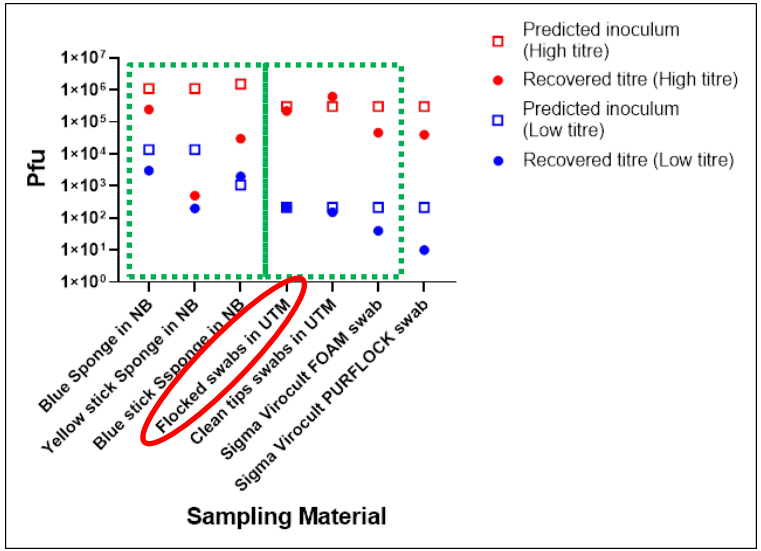
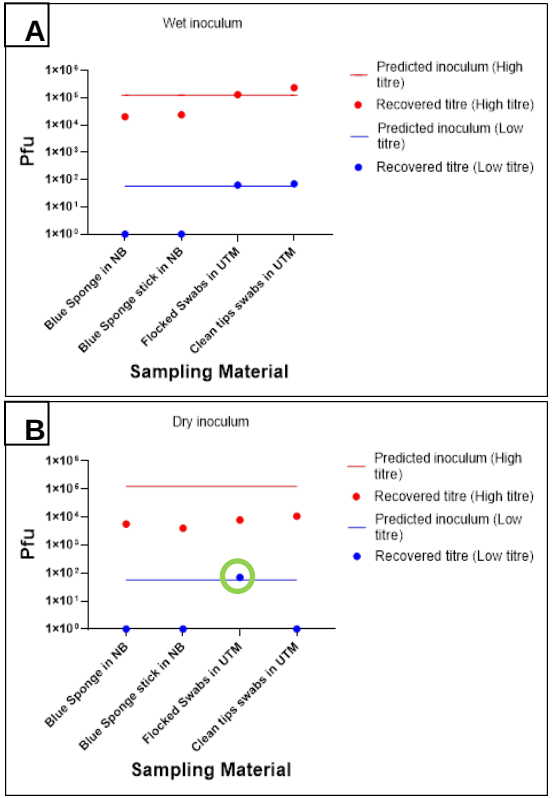
Results

Suitable materials for sampling and loss of infectious virus during surface sampling



Infectious virus recovered from various sampling materials directly inoculated with high and low titre SARS-CoV-2. NB = neutralising buffer; UTM = universal transport media.



Infectious virus recovered from either wet or dried droplets of high titre SARS-CoV-2 (**A**) or low titre SARS-CoV-2 (**B**). NB = neutralising buffer; UTM = universal transport media.

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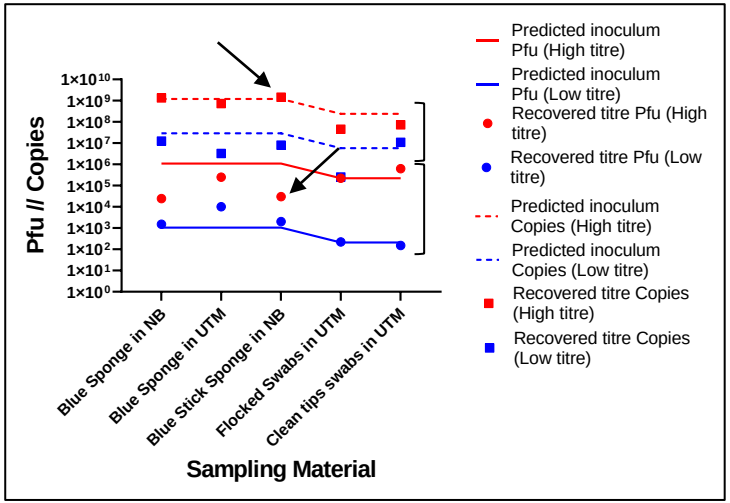
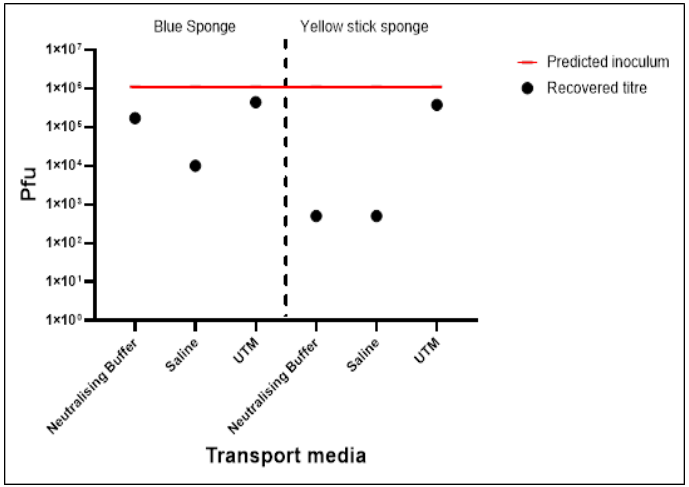
Results

Difference between sampling for viral RNA and infectious virus and suitable transport media



SARS-CoV-2 infectious virus and genomic RNA recovered from various sampling materials. NB = neutralising buffer; UTM = universal transport media



Infectious SARS-CoV-2 virus recovered from sponge materials supplemented with a variety of stabilising buffers. UTM = universal transport medium.

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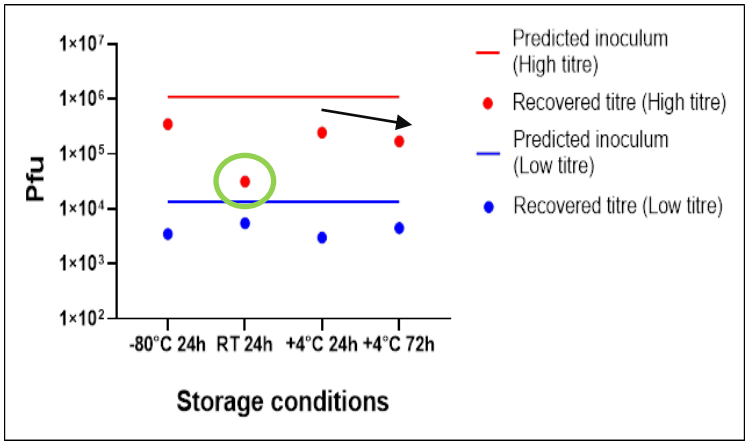
Results

Transport of samples for 4 hours at room temperature and effect storage conditions have on samples

Sample	Starting Titre (pfu/mL)	+4hrs recovered titre (pfu/mL)	% Recovered
High titre sample	2.30E+07	2.15E+07	93.48
Low titre sample	1.80E+04	1.55E+04	86.11

Infectious viral titres of SARS-CoV-2 at experiment start time and after 4hrs at room temperature.



The effect different storage times and temperatures on recovery of infectious virus from stick sponge sampling materials. Room temperature (20°C ± 1°C). NB = neutralising buffer; RT = room temperature

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Conclusion

- Flocked swabs performed better than other sampling materials
- RNA > Viable virus in samples, high levels of RNA detected in samples with low amounts of viable virus recovered
- Underestimation of significance of the result if viral isolation is performed
- Recovery efficiencies improved by switching to UTM
- Transport for 4 hours at room temperature showed no impact on viable virus recovered
- Samples stored at room temperature for 24 hours resulted in loss of infectious virus, however, samples can be stored at 4°C for up to 72 hours with limited impact upon recovery of viable virus

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