Staff testing scenarios

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Individual-based simulation framework

- All staff are assigned a work schedule that determines time frames when they are working. $\mathbf{I}(w_{it})$ is an indicator function for whether staff member i is working at the facility on day t.

- In addition to their work schedule, all staff are assigned a testing schedule, encoded by function $\mathbf{T}(w_{it})$.

- All staff are subject to two sources of infection: community and workplace, represented by force of infection parameters λ_c and λ_w, respectively. In addition, we introduce a partitioning parameter, α, representing the relative probability of acquiring infection in the workplace versus in the community, therefore $\lambda_w = \lambda_c\alpha$. We make the simplifying assumption that on workdays staff are subject only to the workplace foi, and on non-workdays, they are subject only to the community foi: $\Lambda_{it} = \lambda_c\alpha\mathbf{I}(w_{it}) + \lambda_c(1 - \mathbf{I}(w_{it}))$. New cases among staff at each time step are then generated by subjecting all susceptible staff to a Bernoulli trial where $p = \Lambda_{it}$

- Whenever a new staff infection is generated, parameters for the individual are drawn to determine the latent period (t_{latent}), the incubation period ($t_{incubation}$), the total infectious period ($t_{infectious}$), and whether the case will be asymptomatic or symptomatic (p_{symp}) to generate an infectiousness profile (β_{it}). Assuming constant $\mathcal{R}$ across all individuals, the expected number of workplace cases produced on day t by individual i is $r_{it} = \mathcal{R}\beta_{it}\mathbf{I}(w_{it})$

- Main outcome is expected number of cases transmitted by staff over the simulation timeframe: $\mathbf{E}[cases] = \sum_{t=1}^{t_{sim}} \sum_{i=1}^{n} \mathbf{I}(w_{it})r_{it}$

Individual based model simulations

Goal 1: Determine impact of different testing interventions on expected number of imported cases

- **S1)** No testing

- **S2)** Self isolation at symptom onset
  - SA: proportion of symptomatic cases that adhere to self-isolation

- **S3)** Random PCR testing once per work week with test report on second day following test

- **S4)** Random antigen testing once per work week with immediate test report

- **S5)** PCR testing on first day of work week with test report on second day following test
- **S6)** Antigen testing on first day of work week with immediate test report

- **S7)** Random PCR testing twice per work week with test report on second day following test

- **S8)** Random antigen testing twice per work week with immediate test report

- **S9)** PCR testing on first and third day of work week with test report on second day following test
- **S10)** Antigen testing on first and third day of work week with immediate test report

Proposed table: number of cases avoided per test conducted relative to no testing scenario for each strategy above

Goal 2: Determine optimal antigen-based testing strategy across workplace vs community driven transmission scenarios