Modelling the Monkeypox epidemic in England over May-August 2022

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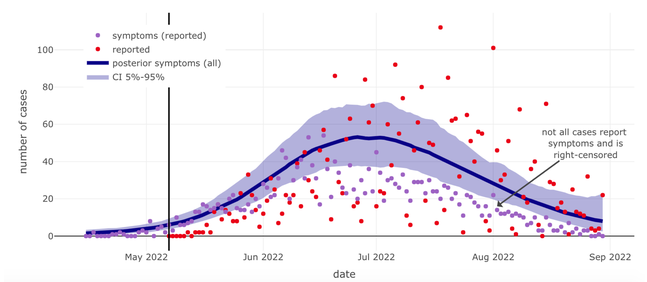
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BACKGROUND

- The monkeypox epidemic in the UK began in May 2022 with increase in cases, before unexpected and rapid decline in cases during August 2022.
- Identifying the causes of this decline requires accurate estimates of the time-varying epidemic growth rate, which in turn depend upon the time from onset of symptoms to presenting to healthcare.
- We utilise modelling and monkeypox data from the UK to quantify the changes in the time between symptom onset an healthcare presentation and their effect on the monkeypox growth rate over the period May-August 2022 in the UK.

METHODS

- Custom nowcasting Bayesian method EpiLine simulated the growth rate of symptomatic cases and the parameters of the delay distributions following Gaussian processes.
- We applied EpiLine to the monkeypox data from the UK, sampling the posterior distribution of all parameters using Markov Chain Monte Carlo methods, to quantify the time between symptom onset and healthcare presentation and the growth rate over the study period.



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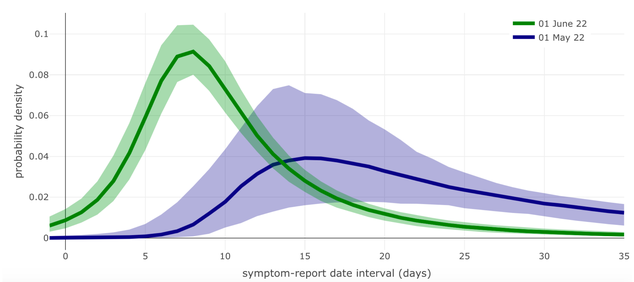
Time from symptom onset to healthcare presentation declined from 22 days in May to 7 days in August 2022.

Dynamic delays from symptom onset to healthcare presentation lead to slowly declining monkeypox epidemic.

Static delays from symptom onset to healthcare presentation lead to sharp increase followed by rapid decline in monkeypox cases.

RESULTS

- The delay between symptom onset and healthcare presentation for monkeypox in the UK decreased from an average of 22 days in early May 2022 to 10 days by early June and 7 days in August 2022.
- The time-varying growth rate declined gradually in the UK over the May-August 2022 period when accounting for these dynamic delays.
- Not accounting for varying time delays would have incorrectly characterised the growth rate by a sharp increase followed by a rapid decline in monkeypox cases.



CONCLUSIONS

- Correctly quantifying the delay between symptom onset to healthcare presentation is crucial to correctly quantify the epidemic growth of the monkeypox epidemic in the UK in 2022.
- We highlight the importance and need for public health agencies to focus on reducing delays from symptom onset to healthcare presentation early in an outbreak and when tailoring the optimal policy response.

ADDITIONAL KEY INFORMATION

EpiLine model available at
https://github.com/BDI-pathogens/EpiLine

Preprint available at:
https://doi.org/10.21203/rs.3.rs-2298855/v1

