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What is the potential impact of adapting to and managing COVID-19 on antimicrobial resistance?

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What factors could impact on AMR?

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- Focus on IPC measures.
- Social distancing.
- Avoidance of healthcare.
- Reductions in community prescribing.
- Decrease in routine procedures.
- Increased prescribing in acute care.
- Reduced isolation of other infections (TB, MDRO's).
- Overcrowding / healthcare overload.
- New methods of remote medicine.
- Disruption to established IPC & AMS programs.
- Disruption to long-term preventative measures (e.g. immunisation).

Rawson, et al. JAC 2020; Rawson et al. Nat Rev Micro 2020; Rawson et al. CMI 2020

COVID-19, antimicrobial use, and drug-resistance

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- **Low rates of bacterial co-infection.**
- **Organisms similar to pre-COVID-19 era.**
- **Acute care / high COVID-19 burden: High rates of antimicrobial prescribing.**
- **Community: Indication of falling rates of antimicrobial prescribing.**
- **WHO interim guidance on managing COVID-19.**

Rawson et al. CID 2020; Lansbury et al. JI 2020; Langford et al. CMI 2020; Zhu et al. [Under Rev.] 2020; WHO 2020

Bacterial infection in COVID-19 – acute care

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Author	Description	Community co-infection	Secondary infection	Antibiotic prescribing
Hughes et al. June 2020	836 patients United Kingdom	3% on admission	6% throughout admission	Not reported
Garcia Vidal et al. July 2020	989 patients Spain	3%	4% 57% VAP	Not reported
Townsend et al. August 2020	117 patients Ireland	-	6% respiratory co-infection	73%
Ripa et al. October 2020	731 patients Italy	Not reported	9%	Not reported
Yu et al. May 2020	226 critically ill China	-	21% 98% HAP	73%
Dudoignon et al. June 2020	54 critically ill France	-	37% respiratory infection	65%
Contou et al. September 2020	92 critically ill patients France	-	28% on admission to ICU (median 1 days from admission)	~71%

Current evidence:

7-8% bacterial or fungal infection in COVID-19.

Higher rates in critical care.

72% receive antibiotics.

Heterogeneity in studies.

Few data from LMIC.

Rawson et al. CID 2020; Lansbury et al. JI 2020; Langford et al. CMI 2020

The role of critical care and infection associated with COVID-19

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Current data:

- Reported high rates of ventilator / hospital acquired pneumonia.
- Variable reports of fungal infection (*Aspergillus spp*. and *Candida spp.*).
- Outbreaks of MDRO's.

Moving into the next phase of the pandemic:

- Increasing use of immunosuppressive therapies in COVID-19.
- Maintenance of routine procedures where possible.

Current data:

- Little comparison with baseline rates within units and centres pre-COVID-19.

Dudoignon, et al. 2020 CID; Yu et al. Crit Care 2020; Contou et al AICM 2020.

Considering changes in acute care

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During the initial surge in COVID-19 (March 20):

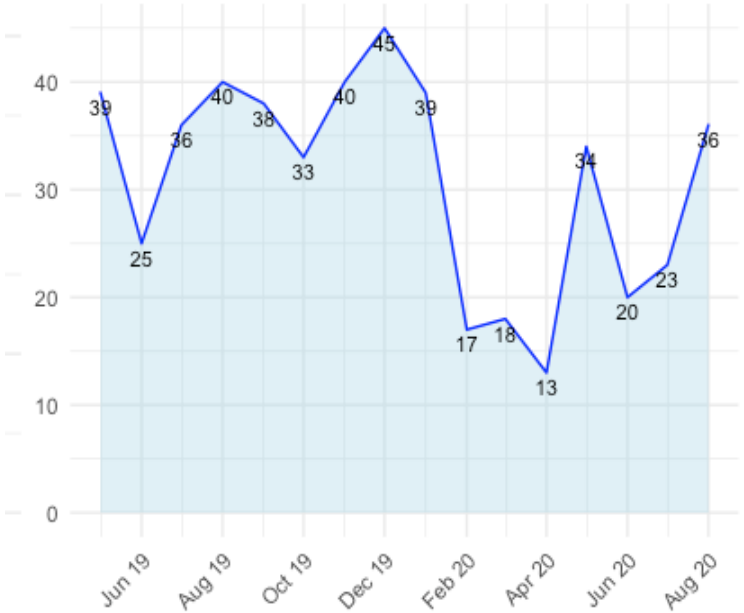
- **Critical care capacity tripled locally during peak in cases.**
  - Mechanical ventilation.
  - Long periods of paralysis.
  - Long ICU stays (mean (SD) days ventilated 11.1 (8.2)).

- **Central line associated blood stream infections:**
  - Control for these changes, rates less significant (2.1 to 3.2 per 1000 line days).

- **Risk of ventilator associated pneumonia:**
  - 9-27% rate in ventilated patients pre-COVID-19.
  - Prolonged ventilation, long periods of paralysis, male gender, ARDS are risks.

- **Reduction in Gram-negative bacteraemia.**
  - Reduction in surgery / procedures.
  - Possible missed presentations to hospital.
  - Possible changes in sampling.

Escherichia coli blood stream infections



Denny et al. [Under Rev] 2020; Kalanuria et al. 2014 Crit Care; ISARIC report May 2020

Community infections and prescribing

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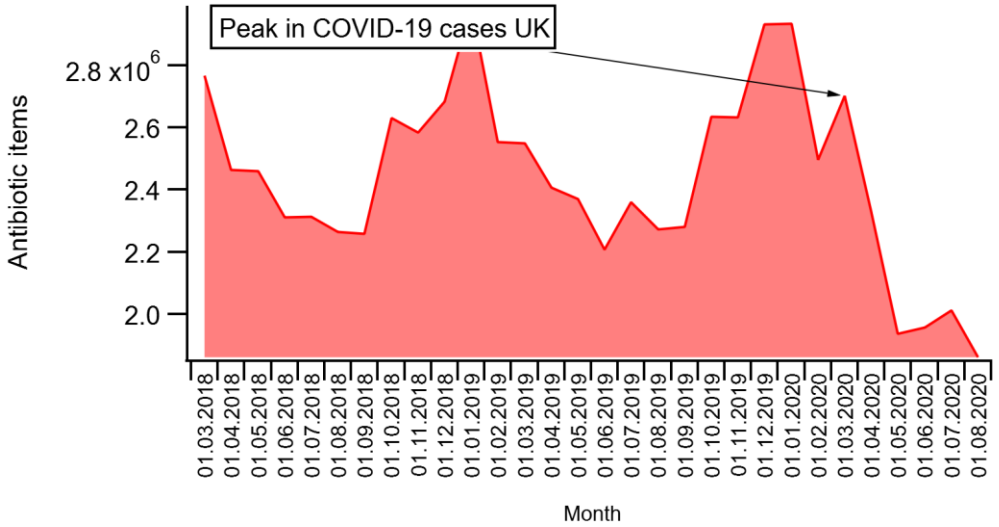
A positive impact on AMR?

Monthly antibiotic prescriptions for all age groups in England



Notifiable infections compared to 5-year average in the UK:

- Fewer respiratory infections.
- Fewer skin soft tissue infections.
- Fewer intestinal infections.

Zhu et al. [under review] 2020; RCGP Research & Surveillance Centre 2020; PresQIPP/NHS England 2020

Can artificial intelligence help guide decision making?

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Risk of bacterial infection?

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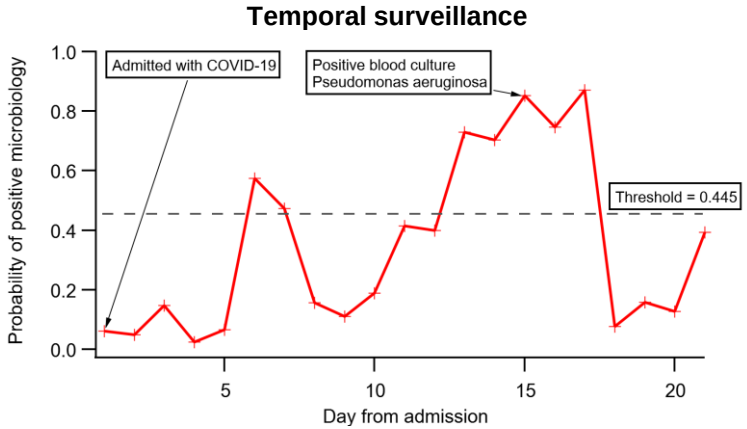
enhanced, personalized and integrated care for infection management at point of care

- Supervised machine learning.
- Utilize routine healthcare data.
- Dynamic decision support.
- Diagnosis and management of infection associated with COVID-19.



Rawson et al. [Under Review] 2020; Rawson et al. JAC 2019

Looking forwards:
Standardized frameworks are needed

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- Standardised approach for the surveillance and reporting of infections associated with COVID-19, antimicrobial prescribing, and AMR.
- Agree upon appropriate comparators to support greater understanding of changes attributable to COVID-19.
- Support comparison between centres and regions (HIC and LMIC).
- Prospective data to allow temporal trends to be assessed.
- Consider institutional level and individual patient factors.

In conclusion

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- The true impact of COVID-19 on AMR and HCAI remains unclear.
- Evolving nature means that single snapshot analysis is not enough.
- Implementation of standardised frameworks are required.
- Support evidence-base from which to promote best practice.
- Focus on mitigating negative impact of COVID-19 on AMR.
- Focus on sustaining the positive impact beyond the pandemic.

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