

Antibiotic residues in hospital sink p-trap water in Kilifi, Kenya

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INTRODUCTION

- Sink drains can act as reservoirs for bacteria and antimicrobial gene amplification and spread
- Disposal of antibiotics down sinks may promote resistance
- This pilot study at Kilifi County Hospital, Kenya, aimed to characterize sink infrastructure across adult, paediatric and neonatal wards
- Antibiotic dipstick testing was performed to describe the prevalence of common antimicrobials in wastewater

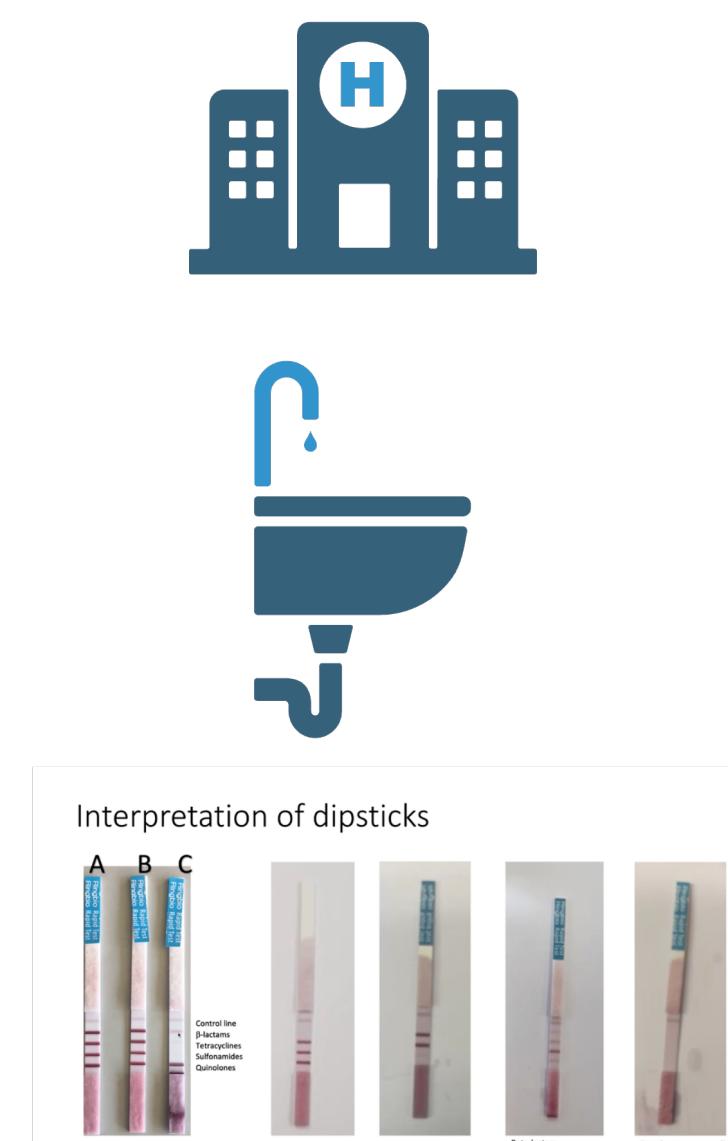
METHODS

Kilifi County Hospital, Kenya

- 60 km north of Mombasa
- Referral Hospital serving population of 1.5 million

Wards

- Newbuild “complex” building which houses triage, theatres, ICU, and renal dialysis unit, built 2020
- Newborn Unit (NBU), built 2021
- Paediatric HDU, renovated 2023
- All other wards in older colonial building



Number of beds/patients/sinks per bay and ward captured.

50ml of p-trap water from different sink types (i.e. bay, sluice, toilet) aspirated

QuaTest BTSQ 4-1 kit - validated using serial dilutions of ampicillin, doxycycline, sulfamethoxazole and ciprofloxacin¹

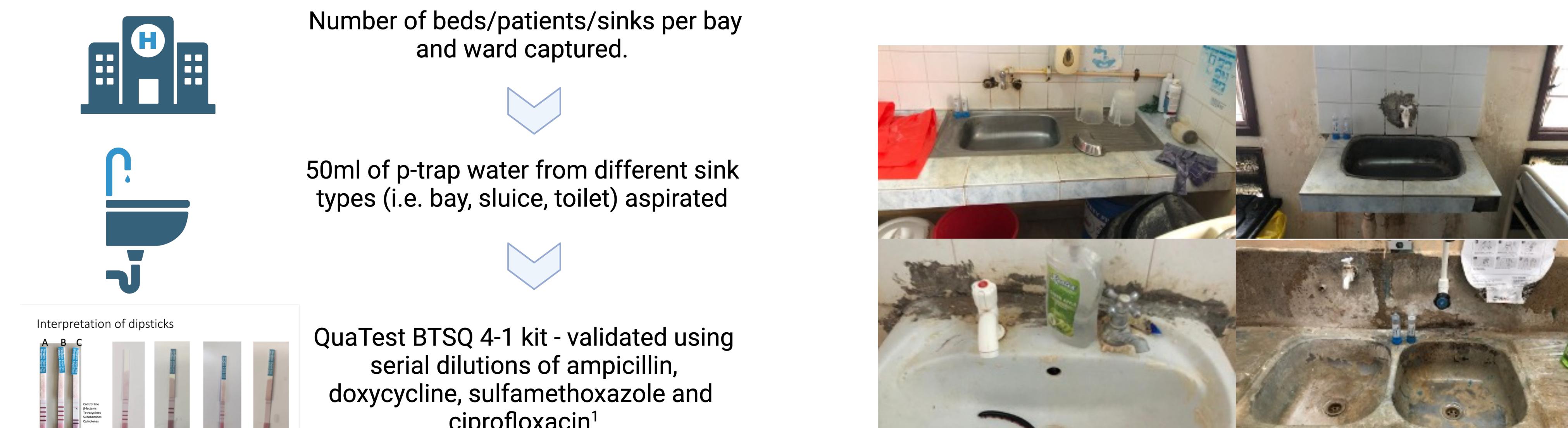


Table 1: Sink sampled by ward location

RESULTS

- 34 sinks were targeted across nine wards (Figure 1)
- 2 sinks on the neonatal birth unit (NBU) were broken or blocked and not sampled.
 - 1 sink p-trap on NBU could not be aspirated despite running water to fill the p-trap.
 - 1 sample from ICU was lost in transit from hospital to laboratory.
 - 5/30 (17%) of p-traps were dry and required the tap to be run for successful aspiration.

p-trap aspirates from 30 sinks were available for analysis (see Table 1)

Antibiotic testing failed in 1/30 (3%) samples, with absent control lines.

Ward	Sinks sampled
Complex - ICU	1 – sluice
Complex - renal dialysis	1 – bay
Complex - theatres	2 – 1 scrub, 1 sluice
Complex - triage	2 – bay sinks
Main block - female ward	3 – bay sinks
Main block - male ward	3 – bay sinks
Main block - maternity	3 – bay sinks
Main block - maternity - theatres	1 – scrub sink
Main block - paediatric	5 – 4 bay sinks, 1 toilet
Main block paediatric casualty	2 – bay sinks
Newborn unit	3 – 2 bays, 1 sluice
Paediatric hdus	3 – 2 bays, 1 toilet
Paediatric hdus - neonates section	1 – 1 bay

RESULTS

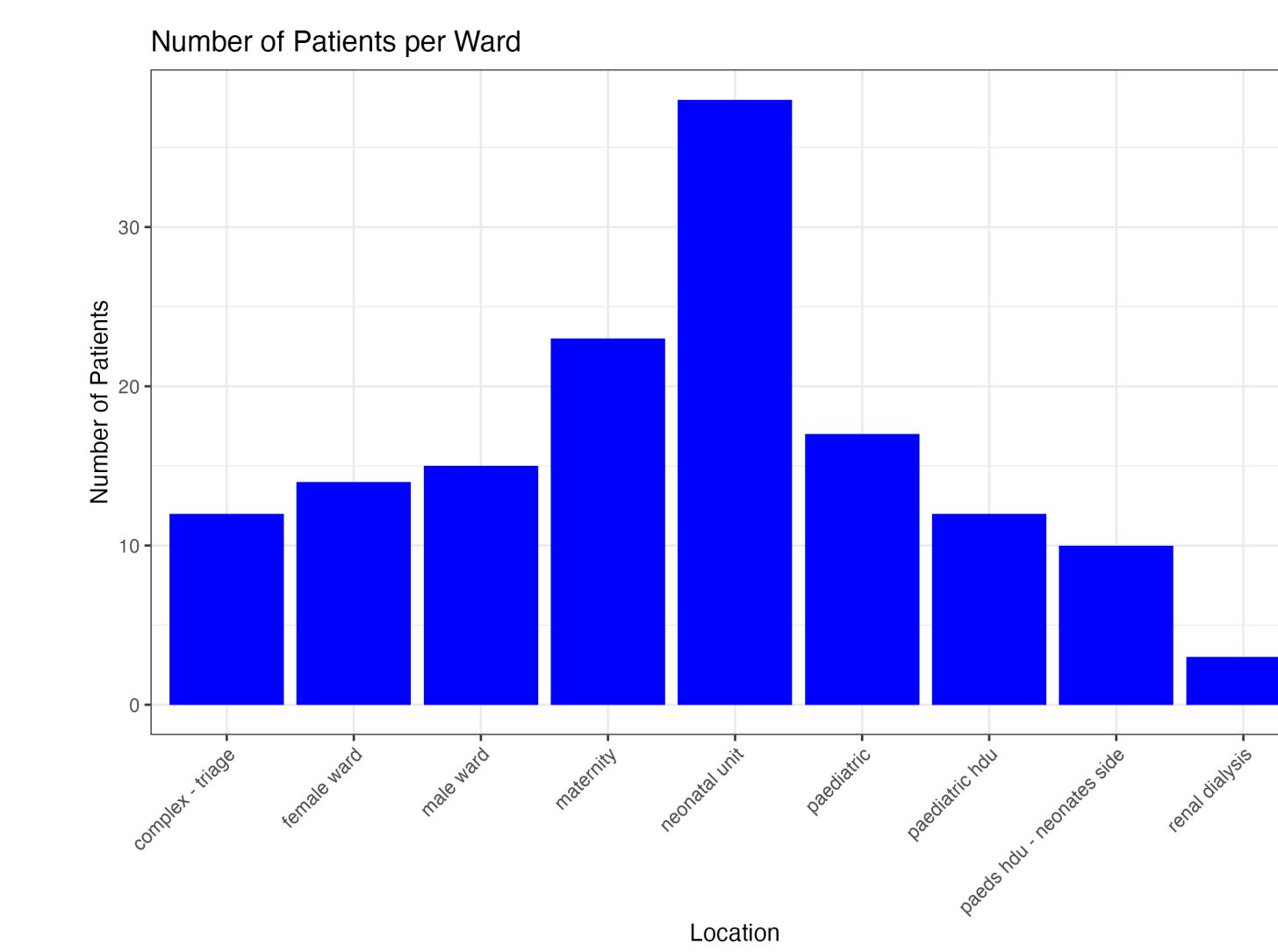


Figure 2: Number of patients per ward

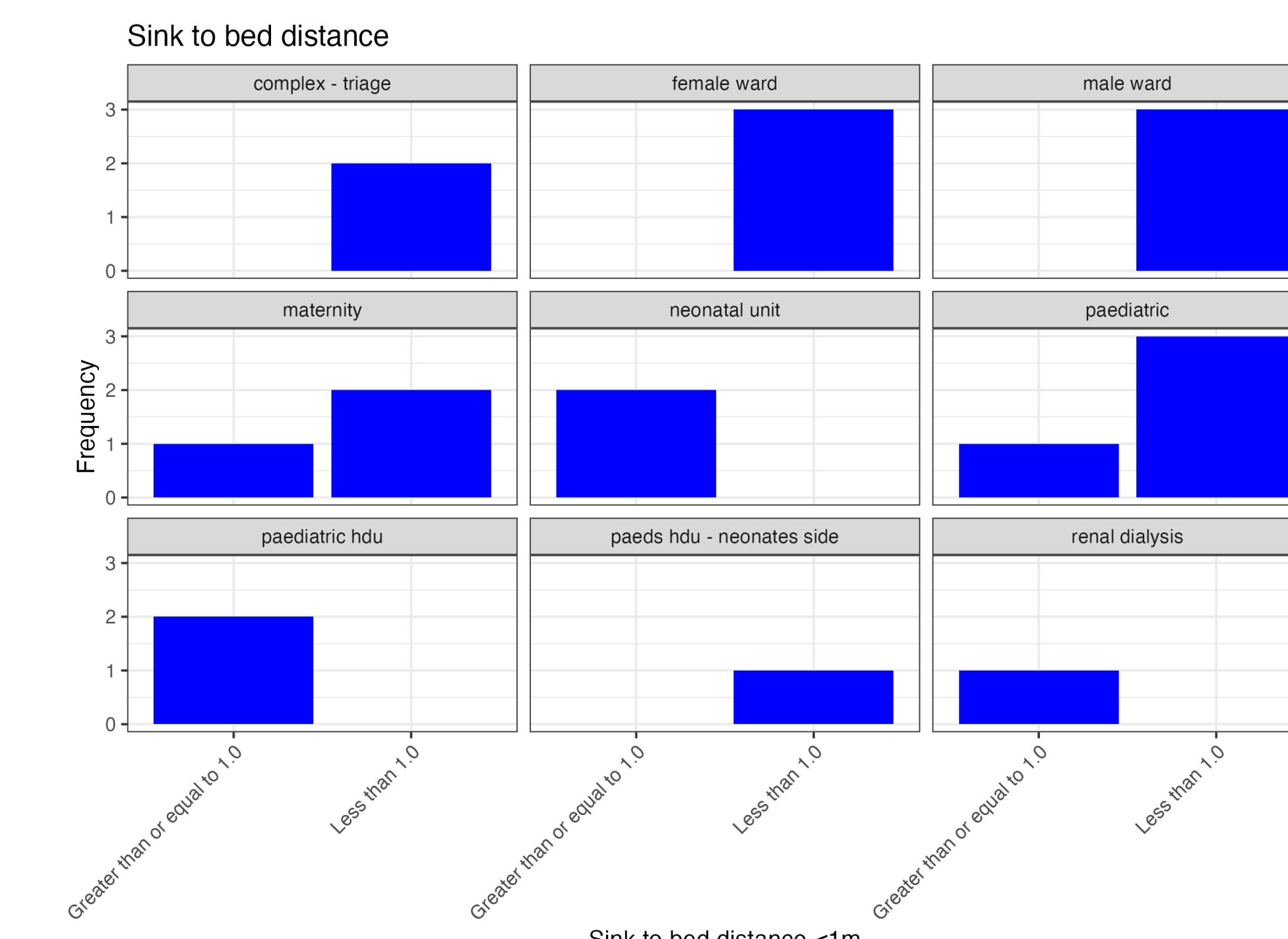


Figure 3: Bed distance <1m to sink

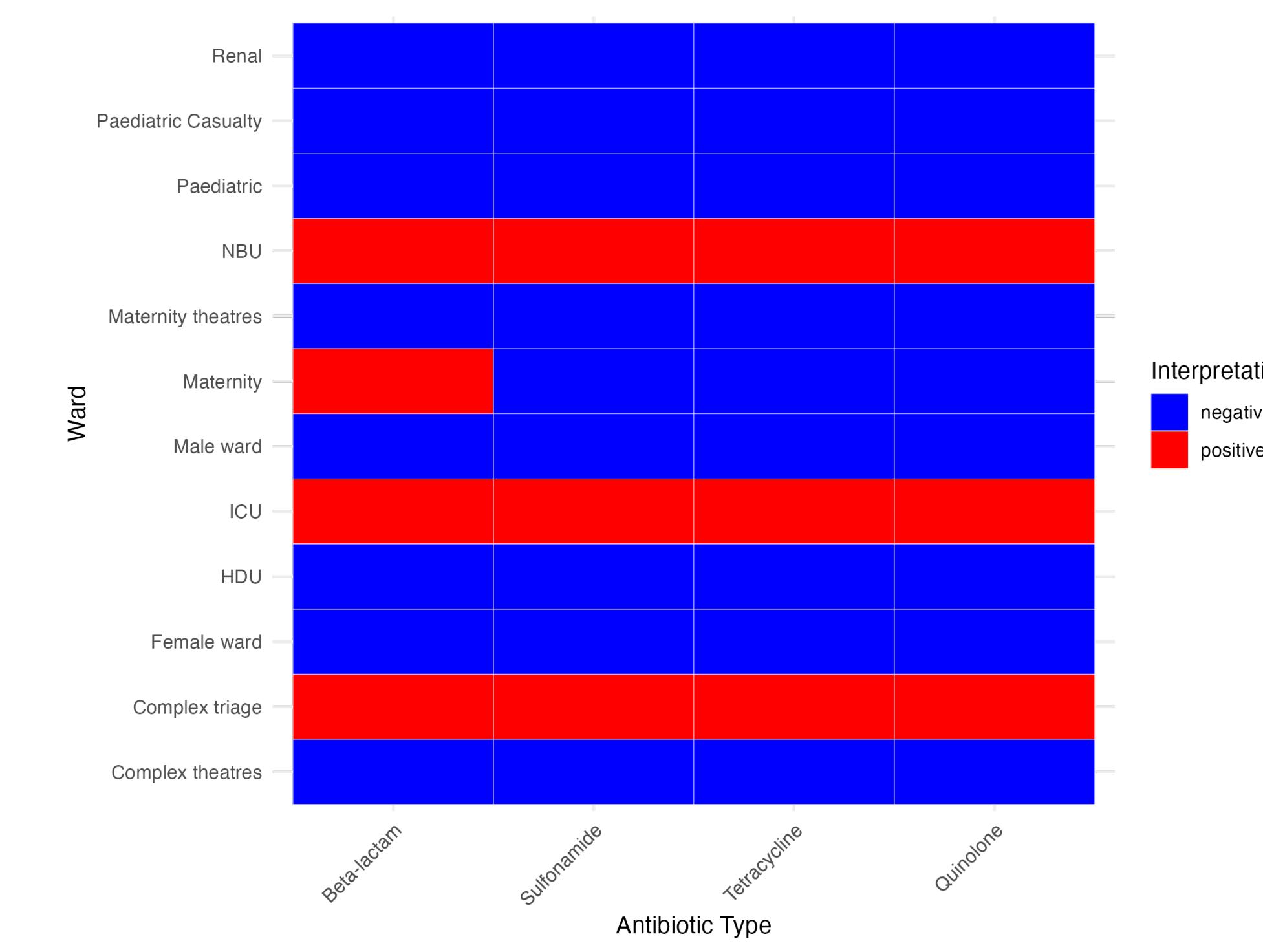


Figure 4: Antibiotics present by ward

RESULTS

The median number of patients per bay was 6 (range 0 - 38). Number per ward can be seen in Figure 2.

The mean sink to bed distance was 1.2m (Figure 3).

Antibiotics were detected in 6/30 (20%) samples (complex triage, adult ICU, maternity, NBU, paediatric HDU) (figure 4).

Most positive samples (67%, 4/6) were from patient bays, and the remainder from sluices (33% 2/6).

No association was found between the presence of any antibiotic in p-trap water and building, sink type or bed:sink distance of <1m.

The proportion of sinks in wards caring for pregnant women (50%, 2/4) and neonates (67%, 2/3) with detectable antibiotic residue was higher than wards caring for adults or children ($p=0.04$).

CONCLUSION

The detection of antibiotics in p-trap water raises concerns about selective pressures in these reservoirs, which may increase AMR.

Antibiotics were predominantly found in patient bays in wards caring for pregnant women and neonates. This finding may reflect differences in antibiotic usage and waste disposal practices across wards.

Further analysis is examining the metagenome and resistome of p-trap water is underway.

Targeted interventions with healthcare staff and hospital governance are necessary to promote responsible antibiotic and patient waste management.

ACKNOWLEDGEMENTS

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