

# Integration of real-time genomics into a multi-species NDM-1 plasmid outbreak response

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the**Alfred**

Part of **AlfredHealth**

# Background

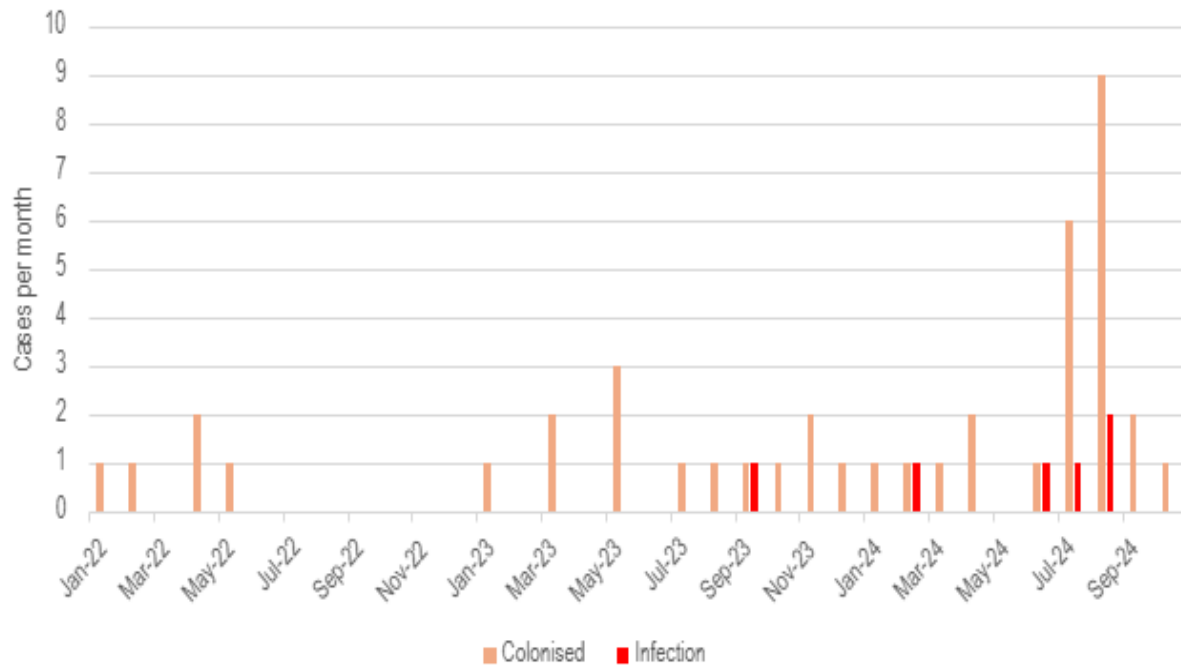
## Alfred Health:

- History of *E. cloacae* blaIMP-4 ST93 & 190 outbreaks (low NDM burden)

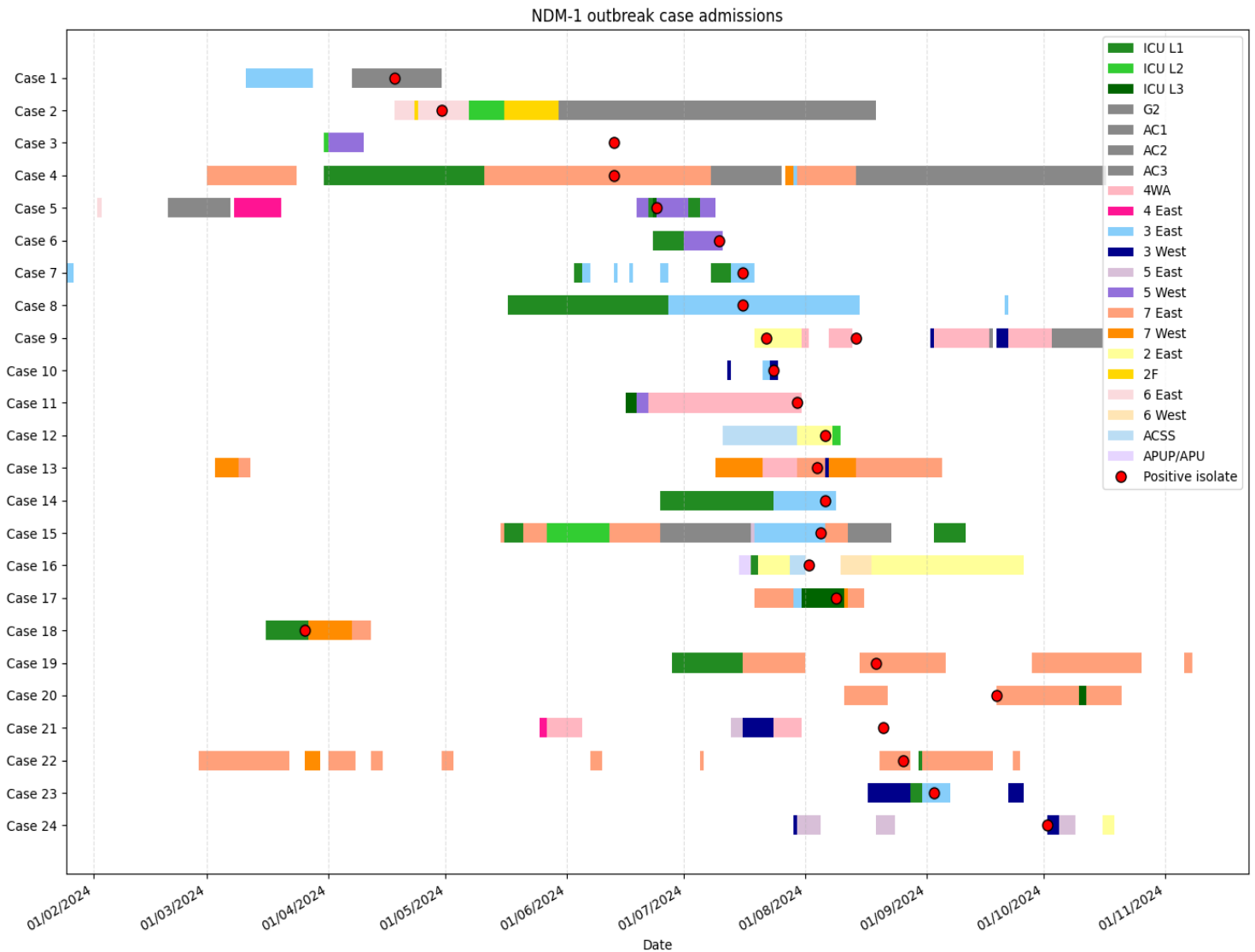
## The Alfred Clinical Infectious Disease Genomics Service:

- Established in 2023
- To provide rapid clinically actionable access to WGS data

Alfred Health NDM Jan 2020 - Oct 2024



# Problem: A large multi-clonal, plasmid-mediated outbreak of NDM-1-producing Gram-negative bacteria

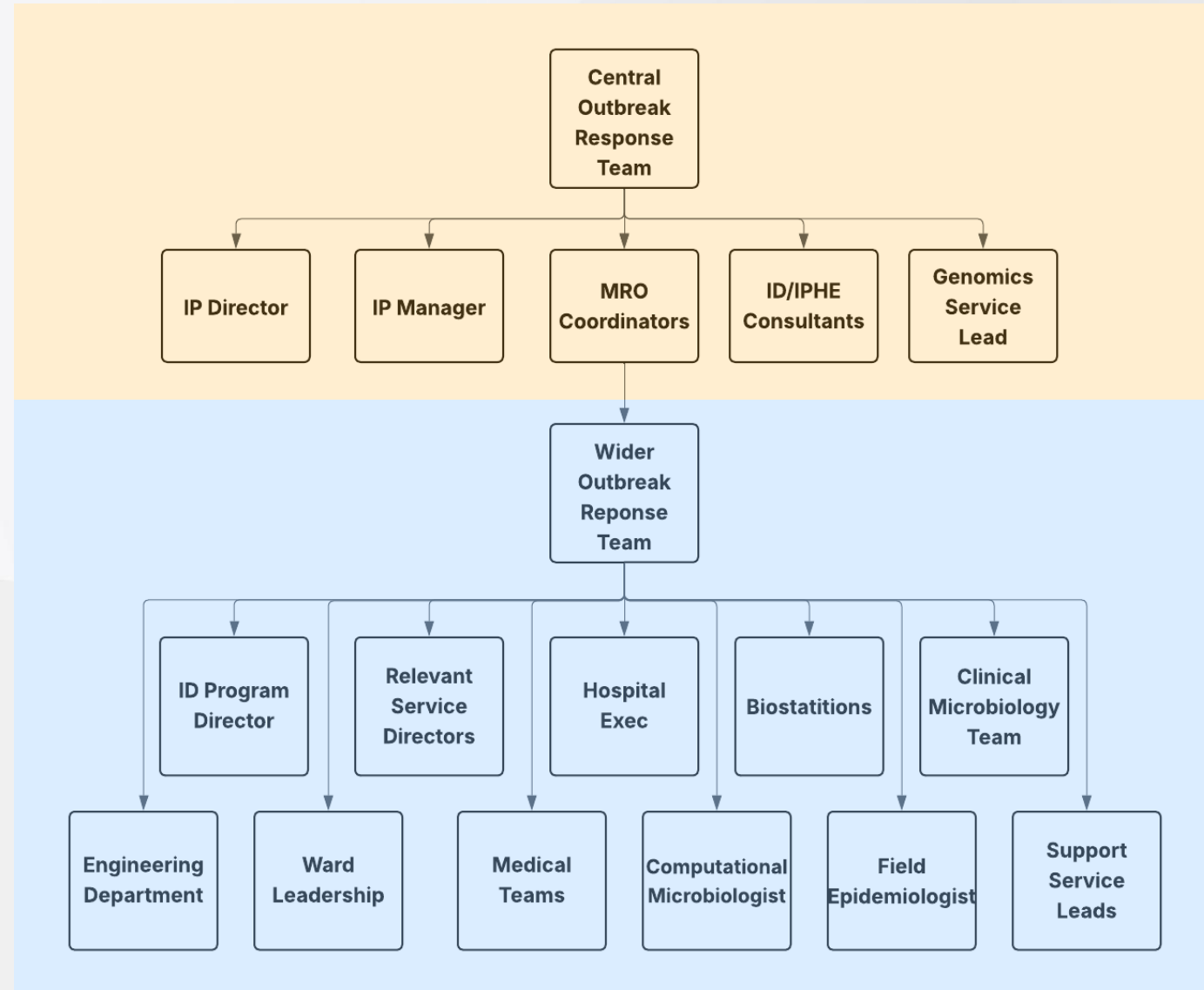


# Plan:

1) Establish a two-tier genomic focused outbreak response team

2) Review of current processes and goals:

- Isolate result availability to guide interventions
- Communication - between departments
- Allocation of IP interventions and resources



# Intervention:

- Engaging the Alfred Clinical Infectious Disease Genomics Service
- Development of clear communication and data-sharing protocols
- Establishment of prioritisation criteria for isolate sequencing (e.g. high-risk wards, patient proximity)

	Organism(s)	Resistance mech	MLST	Sub cluster	Plasmid	Isolate	Date of isolate	Rationale for screen
Case 1	K. pneumoniae	NDM-1	ST597	Linked	IncN	Rectal swab	18/04/2024	CIM pos from external HCF
Case 2	K. oxytoca/E. coli	NDM1	ST85	1	IncN	Rectal swab	30/04/2024	ICU L2 discharge screen
Case 3	K. pneumoniae	NDM-1	ST597	Linked	IncN	Urine (MDU notification)	13/06/2024	Clinical
Case 4	K. pneumoniae	NDM-1	ST643		IncN	Urine	13/06/2024	Clinical
Case 5	K. pneumoniae	NDM-1	NOVEL ST		IncN	Rectal swab	24/06/2024	ICU L3 discharge screen
Case 6	K. oxytoca	NDM-1	ST29	Linked	IncN	Rectal swab	10/07/2024	5 West PPS
Case 7	E. cloacae	NDM-1	ST269		Chromosome	Rectal swab	16/07/2024	3 East PPS
Case 8	K. oxytoca	NDM-1	ST29	Linked	IncN	Rectal swab	16/07/2024	3 East PPS
Case 9	C. amalonaticus /K. oxytoca	NDM-1	NOVEL ST/ST85	2	IncU	Urine	22/07/2024, 14/08/2024	Clinical
Case 10	K. oxytoca	NDM-1	ST29	Linked	IncN	Rectal swab	24/07/2024	Incidental 3 East PPS screen
Case 11	K. pneumoniae	NDM???	ST3088		IncN	Rectal swab	30/07/2024	4WA PPS
Case 12	K. oxytoca	NDM-1	ST85	2	IncU	Ascites fluid	06/08/2024	Clinical
Case 13	K. oxytoca	NDM-1	ST85	1	IncN	Rectal swab	04/08/2024	4WA Room Contact
Case 14	K. oxytoca	NDM-1	ST85	2	IncU	Rectal swab	06/08/2024	3 East PPS
Case 15	K. oxytoca	NDM-1	ST29	Linked	IncN	Rectal swab	05/08/2024	3 East PPS
Case 16	K. oxytoca	NDM-1	ST85	2	IncU	Rectal swab	02/08/2024	External admission
Case 17	K. oxytoca	NDM-1	ST85	2	IncU	Rectal swab	09/08/2024	ICU L3 discharge screen
Case 18	K. oxytoca/E. coli	NDM-1	ST85	1	IncN	Rectal swab	26/03/2024	ICU Level 1 PPS
Case 19	K. oxytoca	NDM-1	ST85	2	IncU	Rectal swab	19/08/2024	7E PPS
Case 20	K. oxytoca/E. coli	NDM-1	ST108/ST617		IncN	Rectal swab	19/09/2024	7E PPS
Case 21	K. oxytoca	NDM-1	ST29	Linked	IncN	Urine	21/08/2024	Clinical
Case 22	E. coli	NDM-1	ST3877		IncN	Rectal swab	26/08/2024	7E PPS
Case 23	K. oxytoca	NDM-1	ST205		IncN	Rectal swab	03/09/2024	3 East PPS (wk 4 for TRA end date)
Case 24	K. pneumoniae	NDM-1	ST17		IncN	Rectal swab	02/10/2024	Ward Contact screen

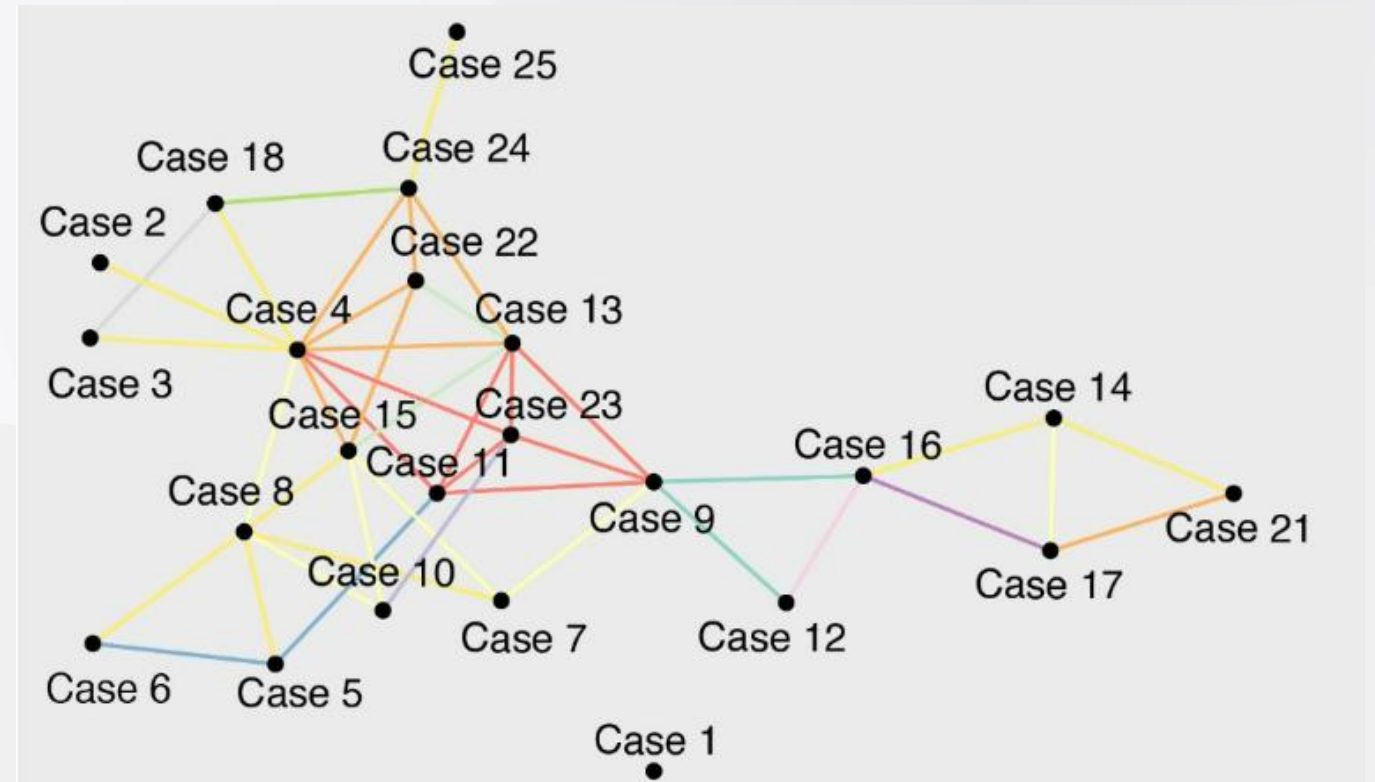
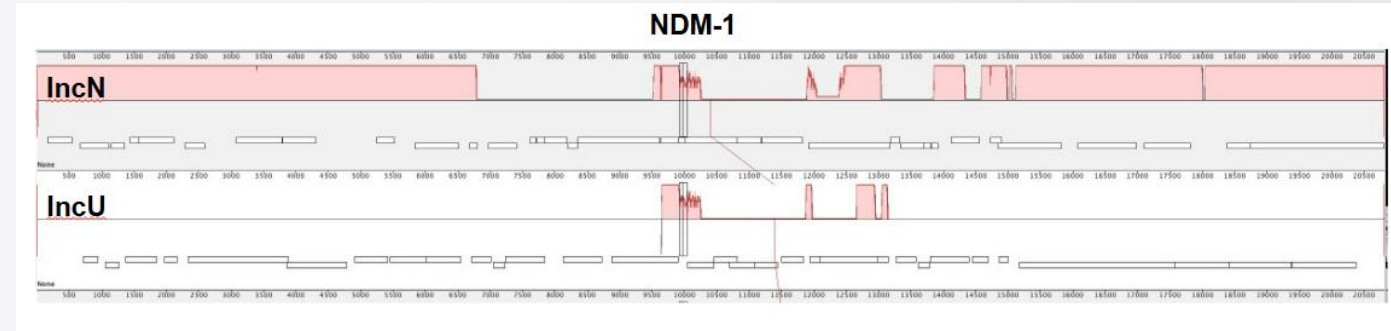
# Outcome:

Rapid long-read only approach provided essential information QUICKLY, which enabled us to:

- Exclude non-NDM-1 variants
- Exclude non-outbreak plasmids
- Exclude transposon (nasty jumping gene) spread between plasmids/chromosome
- Target resources and enhanced interventions to wards at higher risk

Non-IMP sequencing is now part of process:

- Have used this sequencing to assist in early identification of CPA outbreak 2025



# Thank You and Please Meet Our Collaborative Team!

