



The Human Advantage

Deciphering the Microbiology of Respiratory Infection Using Precision Metagenomics Analysis

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THE HUMAN ADVANTAGE
IN LABORATORY TESTING

Introduction

- Pulmonary infections are the major cause of morbidity and mortality worldwide.
- Co-infection of bacteria, fungi, viruses, and parasites is common in Pulmonary infections.
- Rapid and accurate pathogen identification enables targeted therapy.
- Metagenomic Next generation sequencing (mNGS) is a powerful emerging tool in clinical diagnosis to overcome the limitations of routine microbiological and PCR methods.
- Precision Metagenomics uses a targeted sequencing of clinically relevant targets using the hybridization capture-based targeted regions.
- The approach may improve diagnostic accuracy for guiding antibiotic prescriptions.

Objective

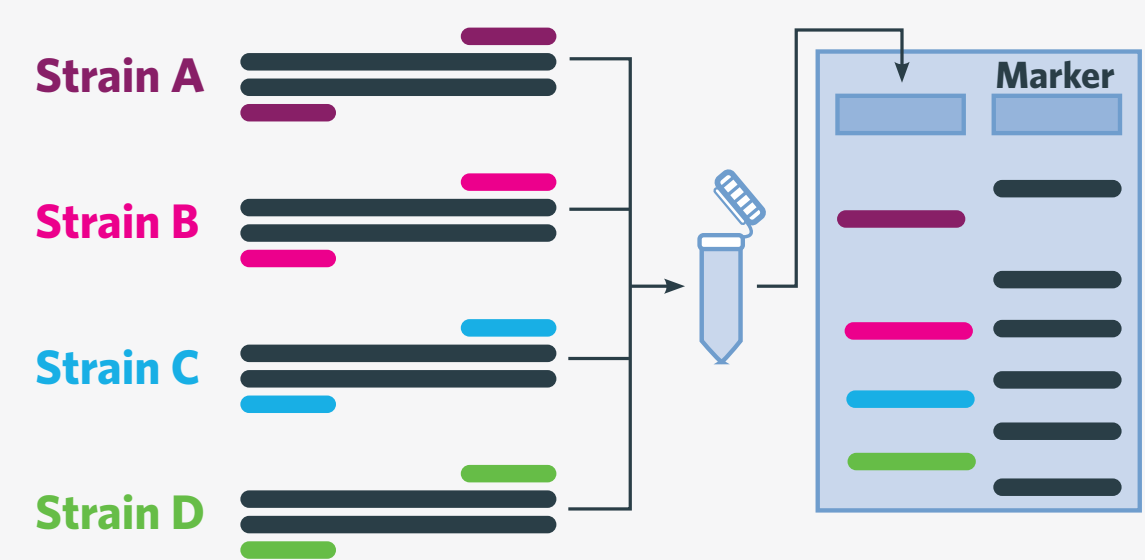
- To evaluate microbial diversity in respiratory infection using precision metagenomic sequencing.
- To Compare the analytical power of PCR and NGS-based method to diagnose Respiratory pathogens.
- To explore the analytical and clinical advantage of precision metagenomics over the syndromic PCR panel in respiratory infection.

Materials & Methods

Study Design

Nasopharyngeal Samples (n=20)

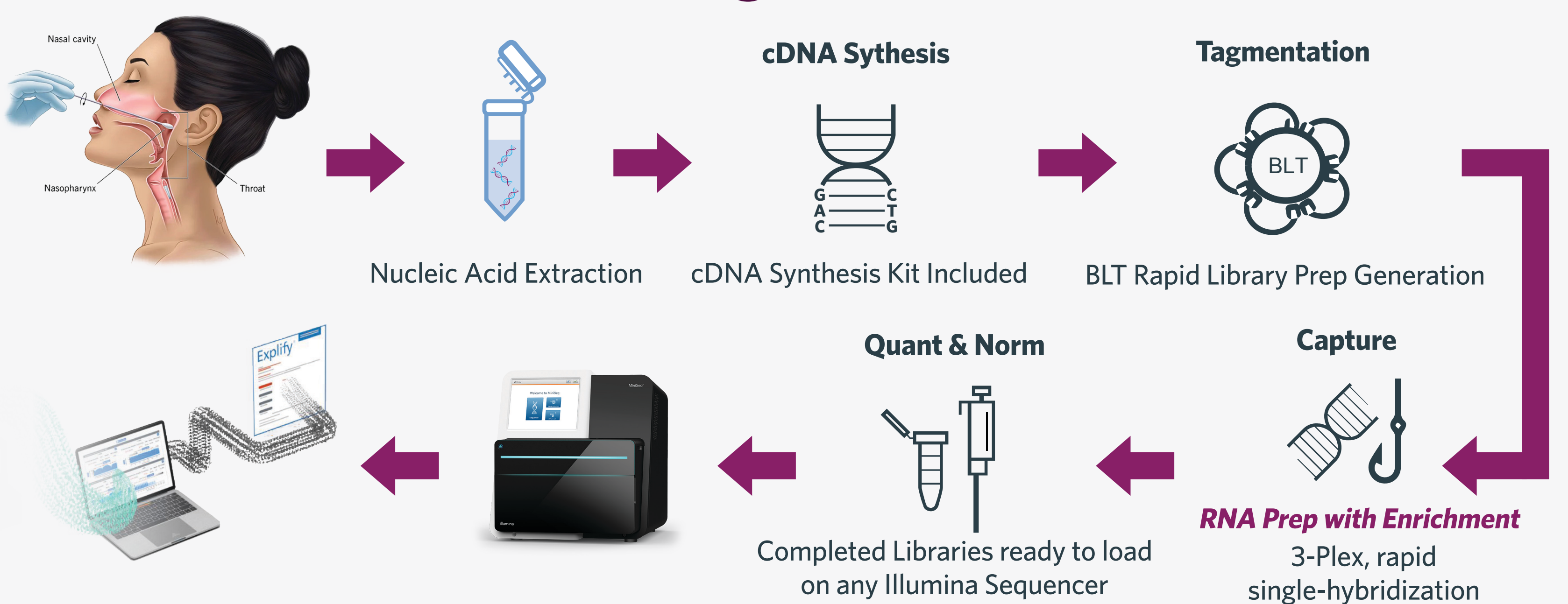
Nucleic Acid Extraction



**Multiplex PCR
Syndromic PCR Panel**
Bacteria: 12
Viruses: 21
Fungi: 53
AMR: 2

**Precision Metagenomics
Hybridization Capture-based Targeted Sequencing**
Bacteria: 187
Viruses: 42
Fungi: 53
AMR: 1218

Precision Metagenomics Workflow



Targets Included on NGS & PCR Panels

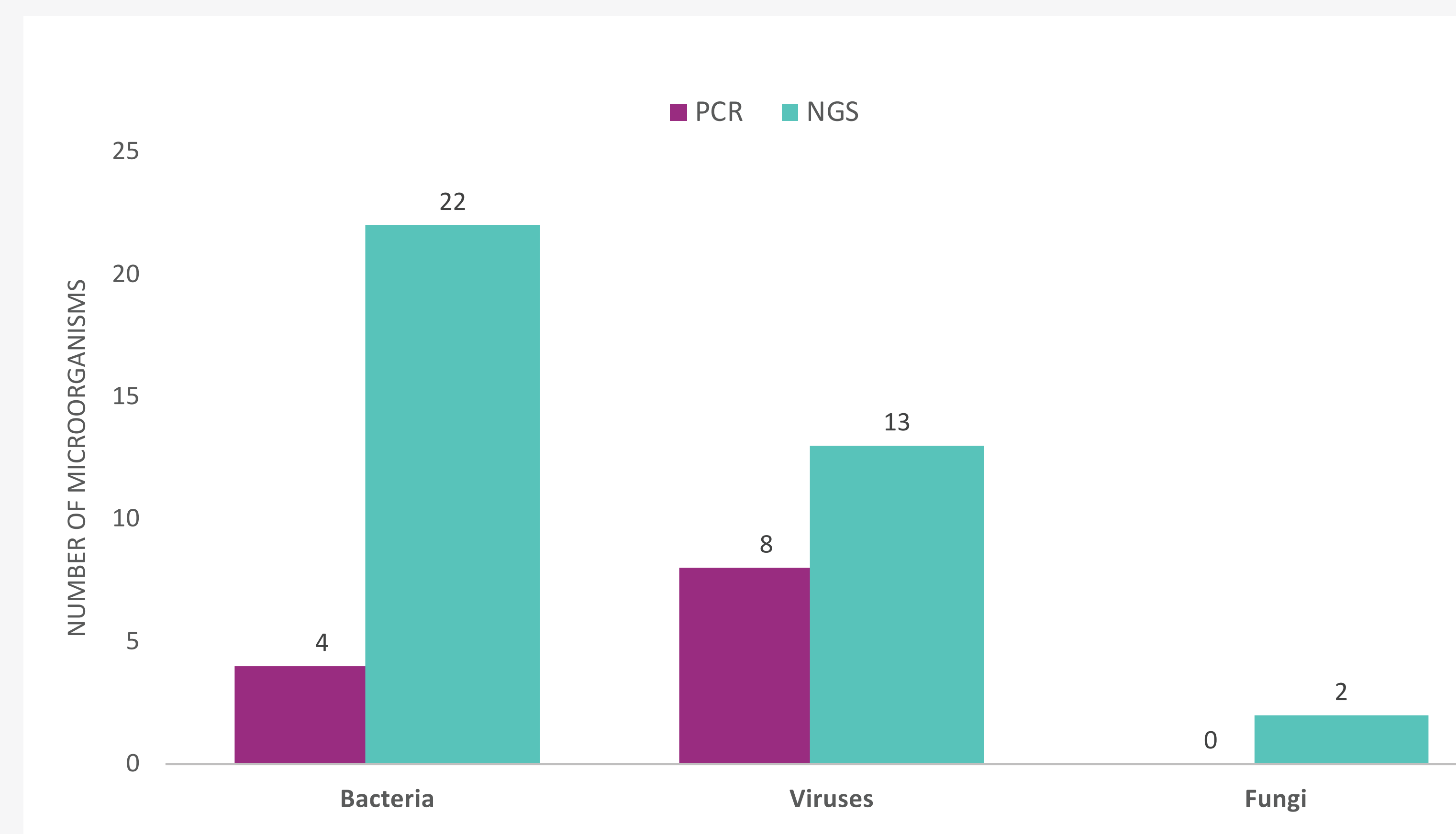
Panels Detail	Bacteria	Virus	Fungus	AMR	Control	Total
Total Organisms Targeted in Capture-based NGS Panel	187	42	53	1218	10	292
Total Organisms Targeted in Syndromic PCR Panel	12	21	-	2	1	36

Results

Comparative Analysis of Upper Respiratory Track Microbial Community Using PCR & NGS

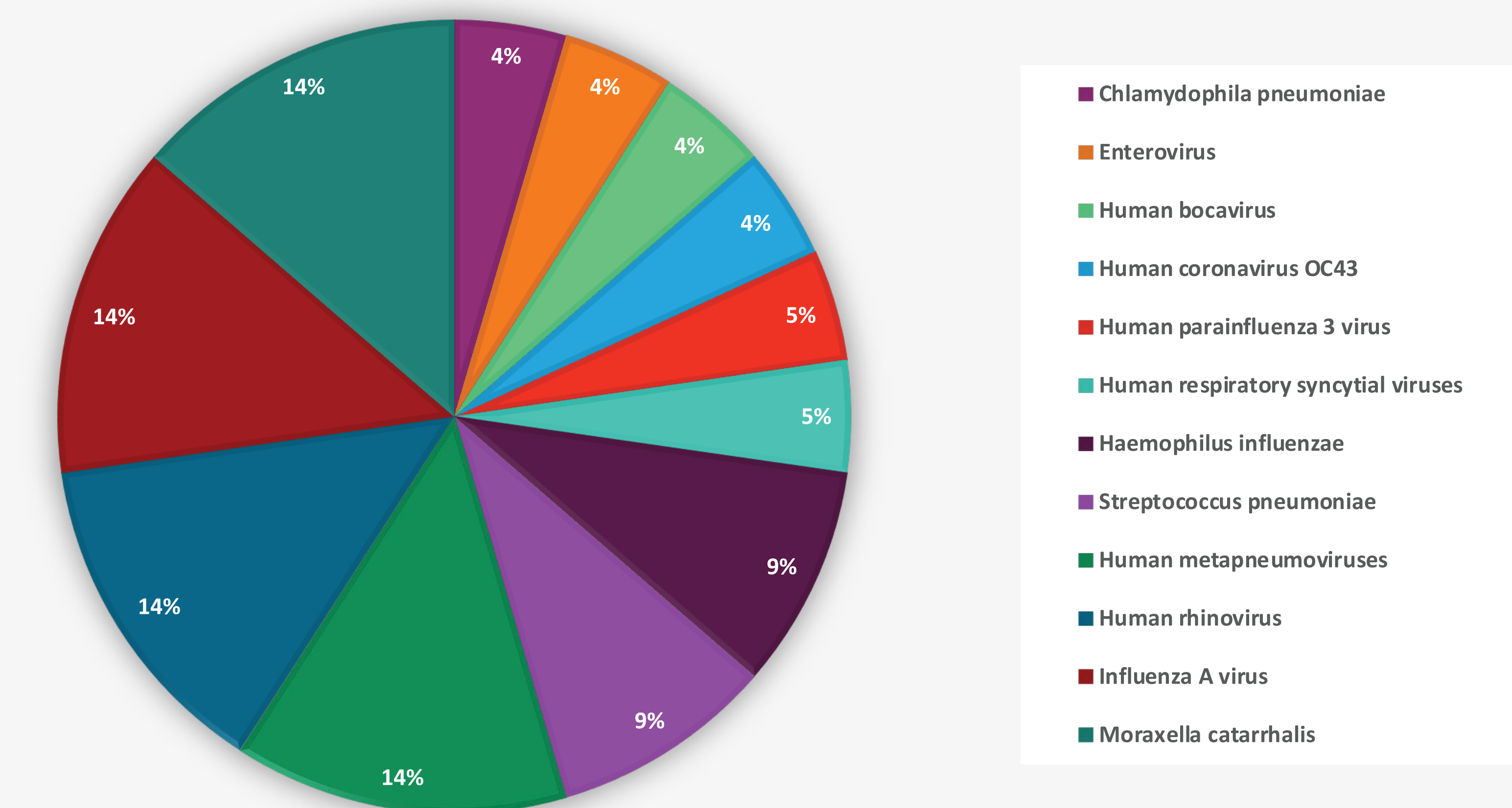
Results	Bacteria	Virus	Fungi	Total
Detected by PCR	4	8	-	12
PCR (+) & NGS (-)	0	0	-	0
PCR (-) & NGS (+)	18	5	2	25
Detected by NGS	22	13	2	37

Number of Bacterial, Viral, and Fungal Species Detected by PCR and NGS

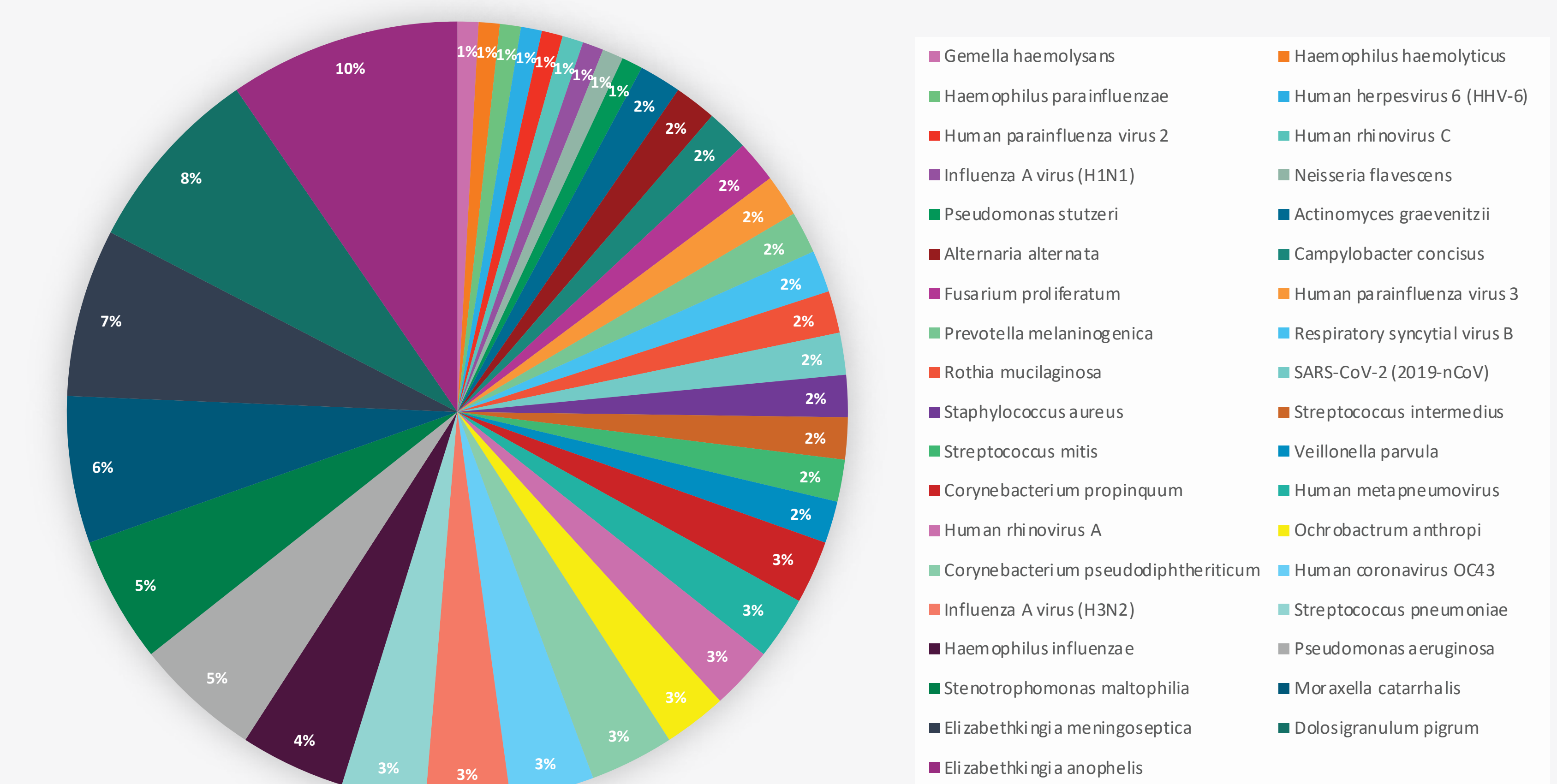


Comparative Distribution of Organisms Detected by PCR & NGS

Organisms Detected in Respiratory Samples by Syndromic PCR Panel



Organisms Detected in Respiratory Samples Using Explify Precision Metagenomic Analysis



Conclusion

- Precision metagenomics has a broader detection range compared to PCR.
- Precision metagenomic analysis using the Explify platform exclusively identified 25 microorganisms (5 Viruses, 18 Bacteria, and 2 Fungi) not included in PCR panel.
- NGS can potentially alter the landscape of infection diagnosis significantly. Due to the lack of pathogen targeting, a single workflow may be used for all specimens, regardless of symptom, potentially expanding to non-viral pathogens, resulting in a pan-microbial diagnostic test.