



FUTURE DIAGNOSTICS



Every Home Should Have One...

About Senzo: Senzo Health is a diagnostics technology company developing future testing solutions for healthcare and industry, based in London, Cambridge and the USA.



The Underestimated Threat of Acute Respiratory Tract Infections (RTIs) Worldwide

“Acute Respiratory Infections (ARIs) are the leading cause of mortality and morbidity among children under 5 years old and about 1.3 million annually worldwide.”

(<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10155954/>)

“According to the World Health Organization, RTIs account for 6% of the global disease burden.”

(<https://www.fortressdiagnostics.com/news/2023/december/respiratory-tract-infections>)

Acute respiratory tract infections (RTIs) are placing a massive burden on our healthcare systems, contributing significantly to morbidity and mortality across the world. These infections, encompassing a range of illnesses from the common cold to more severe diseases such as pneumonia and bronchitis, are a leading cause of death worldwide. According to the World Health Organization, respiratory infections account for nearly 4 million deaths annually. This stark statistic highlights the widespread impact of RTIs on individual health and their profound implications for public health systems, which face the dual challenge of managing acute cases and preventing outbreaks. The burden of RTIs necessitates a concerted effort to enhance diagnostic capabilities, improve treatment accessibility, and foster global cooperation in disease surveillance and response.

Slow Diagnosis, Slow Treatment: The Current Failure of Diagnostics in RTI Treatment

“The IMPACT study, designed to investigate the relationship of time-to-treatment with the illness duration and other efficacy parameters, has confirmed that greater and incremental benefits can be gained from treating influenza as soon as possible after the appearance of symptoms.”

(<https://academic.oup.com/jac/article/51/1/123/771010?searchresult=1>)

Treatments for respiratory tract infections (RTIs) are most effective when administered promptly after the onset of symptoms. The timeliness of treatment is crucial in mitigating the severity of the illness, shortening its duration, and reducing the risk of complications and transmission to others. Studies have shown that timely treatment of RTIs can meaningfully improve patient outcomes (www.ncbi.nlm.nih.gov/books/NBK56853/).

This research underscores the importance of early intervention in the management of RTIs, highlighting the need for rapid diagnosis to unlock patient treatment.

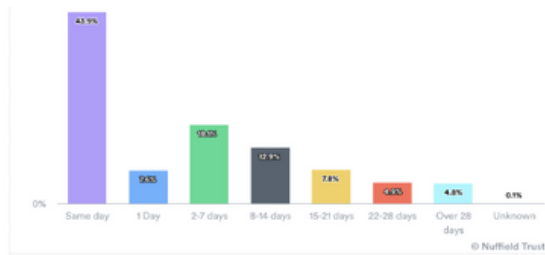
Diagnostic Dilemmas - Overlapping RTI Symptoms and the Primary Care Bottleneck

“Respiratory tract infections (RTIs) are one of the most common reasons for seeking healthcare, but are amongst the most challenging diseases in terms of clinical decision-making. Proper and timely diagnosis is critical in order to optimise management and prevent further emergence of antimicrobial resistance by misuse or overuse of antibiotics.
(<https://openres.ersjournals.com/content/8/3/00113-2022>)



Laboratory diagnostics for respiratory tract infections (RTIs) have seen significant advancements in accuracy, speed, and the ability to detect a wide range of pathogens.

Despite these improvements, a major bottleneck remains: the requirement for a healthcare professional (HCP) to order these tests. This dependency creates an often-insurmountable bottleneck in the diagnosis and subsequent treatment of RTIs.



According to the World Health Organization, access to healthcare services varies greatly, with over half of the world's population lacking access to essential healthcare services. To unlock treatment as quickly as possible, RTI tests need to be rapid, accurate, and at-home. These new tests would also reduce burden on primary care providers whilst protecting others from infection by stopping the spread.

From Symptom to Treatment: The Benefits Of Speed

The urgency of diagnosing respiratory tract infections (RTIs) cannot be overstated, as the window for effective treatment is narrow. Even with the advent of telemedicine, which can expedite the ordering of tests and treatments, the turnaround time for results can still take days. In the fast-paced progression of RTIs, patients require a diagnosis within hours of symptom onset to begin the appropriate treatment regime promptly. A report by the Centers for Disease Control and Prevention (CDC) indicates that the timely initiation of antiviral treatment for infections like influenza is critical within the first 48 hours of symptom onset to significantly reduce morbidity and mortality. This gap between symptom onset and diagnosis highlights the need for a new approach.

The Trouble With RTI Symptom Overlap

Given the commonality of symptoms across different RTIs, such as coughing, fever, and sore throat, selecting the correct test to run, from Rhinoviruses, to Flu A / B, to RSV, to SARS-CoV-2, to Strep is a problem. Because it is impractical, inefficient, and expensive to run 2 or 3 or 4 individual tests each time symptoms appear, it is essential to make the at-home tests multiplex, able to identify multiple targets from a single sample. Laboratory diagnostics have for a long time used multiplex testing to address the challenge of symptom overlap by identifying the specific cause of an infection. For at-home diagnostics to offer a comparable level of diagnostic efficiency, they must similarly be able to test for and distinguish between a range of pathogens in one go.

Infection	Virus / Bacteria	Symptom	Diagnosis	Treatment
Rhinoviruses	Virus	Common cold symptoms	Clinical diagnosis	Symptomatic relief
Influenza viruses (Flu A and B)	Virus	Fever, cough, muscle aches	POC/lab tests, clinical diagnosis	Antiviral drugs, symptomatic relief
Respiratory Syncytial Virus (RSV)	Virus	Cough, difficulty breathing in infants	Clinical diagnosis, lab tests	Supportive care, antiviral for severe cases
Coronaviruses (including SARS-CoV-2)	Virus	Fever, cough, shortness of breath	RT-PCR, rapid antigen tests	Symptomatic treatment, antivirals for severe
Streptococcus pneumoniae	Bacteria	Cough, fever, chest pain	Chest X-ray, sputum test	Antibiotics
Haemophilus influenzae	Bacteria	Ear, throat, sinus infections	Culture, X-ray for complications	Antibiotics
Mycoplasma pneumoniae	Bacteria	Cough, fever, chest pain	Chest X-ray, PCR	Antibiotics
Bordetella pertussis	Bacteria	Whooping cough, severe coughing fits	PCR, culture	Antibiotics, vaccination
Adenoviruses	Virus	Cough, fever, pink eye	PCR, antigen tests	Symptomatic relief

The Key to Solving RTI Diagnostic Challenges: Embracing ASSURED

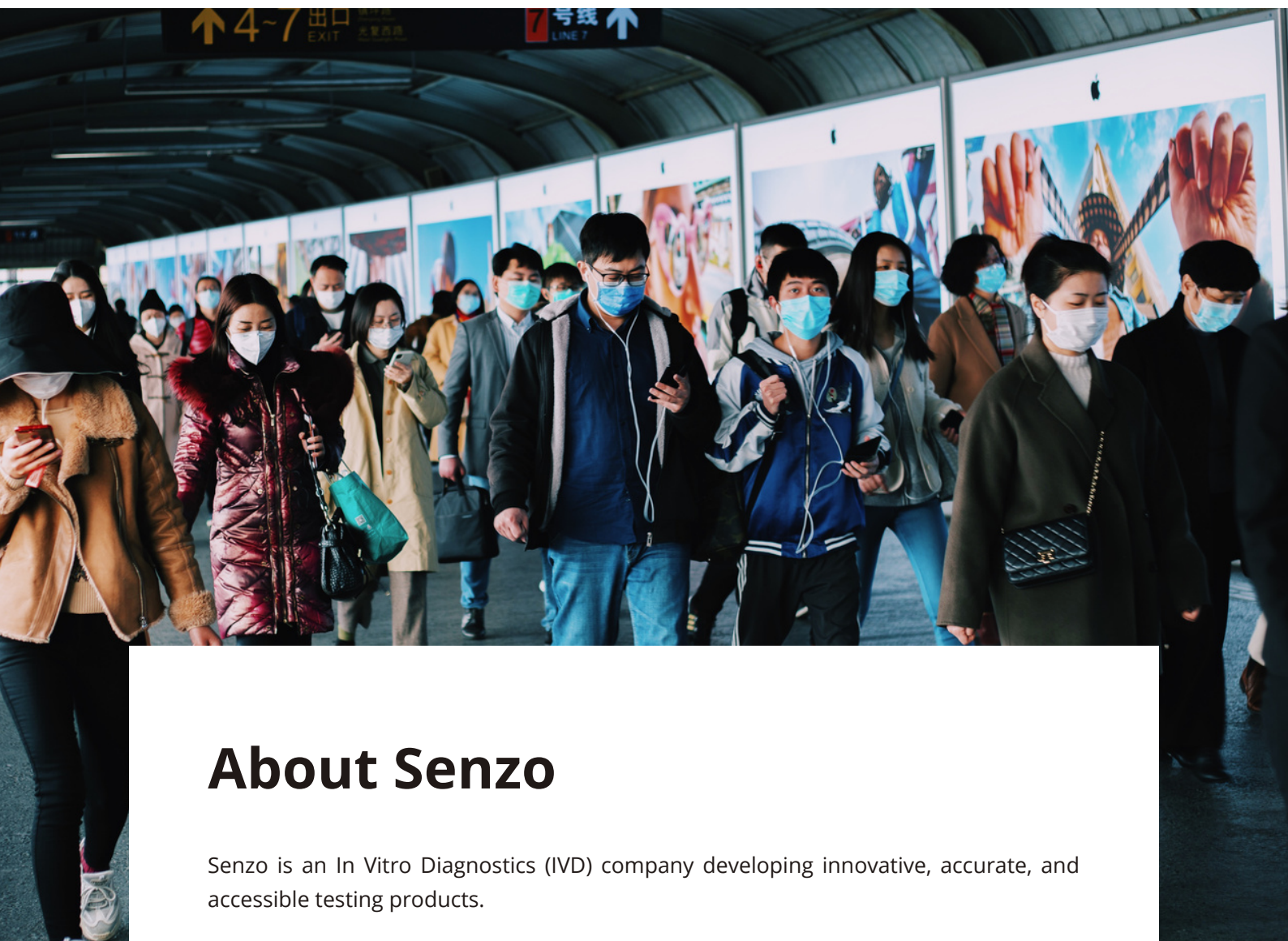


To address the critical need for timely diagnosis of respiratory tract infections (RTIs), a paradigm shift towards point-of-care (POC), at-home, self-administered tests is essential. These tests should adhere to the ASSURED criteria set by the World Health Organization, which stands for Affordable, Sensitive, Specific, User-friendly, Rapid and robust, Equipment-free, and Deliverable to end-users. Ideally, such diagnostics should be readily available for consumers, akin to common household medical supplies, in the family medicine cabinet. This accessibility would drastically increase testing, and reduce the time to diagnosis and treatment.

	Current Lateral Flow Antigen Tests	Point Of Care Molecular Tests	Central Laboratory Tests	ASSURED
Affordable	Yes	No	No	Yes
Sensitive	No	Yes	Yes	Yes
Specific	Yes	Yes	Yes	Yes
User-friendly	Yes	No	No	Yes
Rapid and robust	Yes	Yes	No	Yes
Equipment free	Yes	No	No	Yes
Deliverable	Yes	No	No	Yes

Currently there are no diagnostics which meet the ASSURED criteria and this needs to change. Patients need diagnostics which can unlock treatments without having to navigate increasingly overburdened healthcare systems.

By developing improved RTI diagnostics we can ensure that individuals have the tools at their disposal to quickly identify the cause of their symptoms and seek appropriate treatment, thereby minimizing the spread of infections and the strain placed on primary and secondary healthcare..



About Senzo

Senzo is an In Vitro Diagnostics (IVD) company developing innovative, accurate, and accessible testing products.

Senzo was founded with the vision of utilising novel technologies, with a focus on enhanced sensitivity, to create mobile, point-of-care and self-testing products and devices with the ability to accurately, quickly, and cost-effectively conduct testing where and when healthcare professionals and patients need it most.

Senzo is creating game-changing products and systems which bring testing to the patient, eliminating the need for the current slow, expensive central-lab testing paradigms. With insights generated at the point of care, patients can make better decisions faster, and healthcare professionals can identify life-threatening diseases at an earlier stage, improving treatment outcomes and saving lives.

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