

Operational performance of an artificial intelligence-enabled diagnostic service for chronic obstructive pulmonary disease in primary care

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Background

- Primary care spirometry is vulnerable to operator variability, suboptimal test quality and interpretive error. Although ARTP accreditation supports high-quality testing, the training and certification burden can constrain workforce capacity, limiting access to timely diagnostic spirometry.
- N-Tidal Diagnose 1 v1.0 (NTD) is a Class IIa-certified point-of-care diagnostic for COPD that combines high resolution capnography, captured during 75 seconds of relaxed tidal breathing, and automated, cloud-based Machine Learning (ML) diagnostic models.
- This evaluation assessed the clinical feasibility and operational efficiency of NTD implemented as a first-line diagnostic test for COPD.



Fig. 1: The N-Tidal® capnometer.

Methods

- Between September 2025 and February 2026, 134 symptomatic patients referred with suspected COPD to GP Primary Choice in North East Essex utilised NTD as their first line diagnostic test for COPD.
- Operational metrics, clinical throughput, and staffing costs were compared with the previous spirometry pathway.

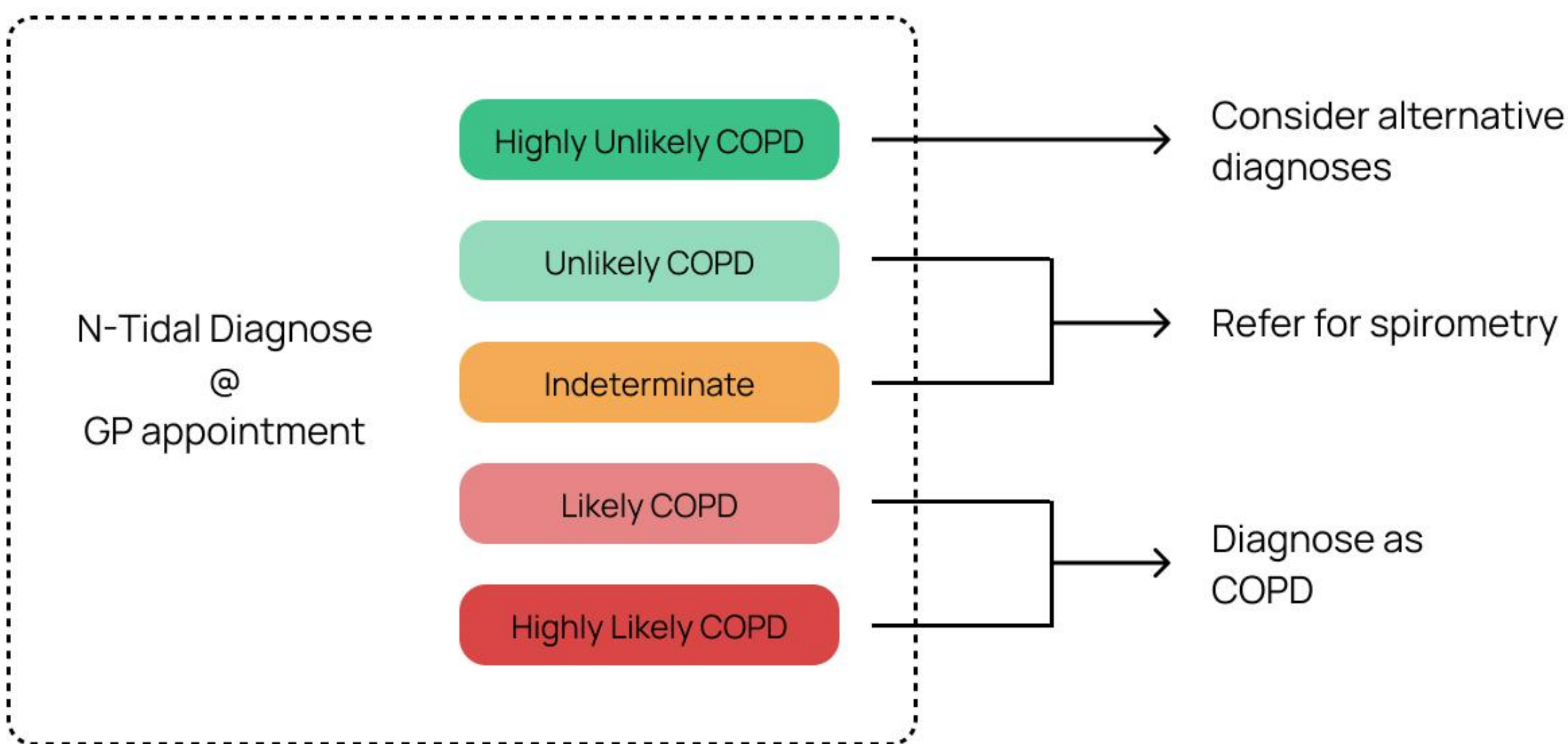


Fig. 2: Illustration of the GPPC pathway, in which participants with an output of highly likely or likely COPD were diagnosed with COPD, those with indeterminate or unlikely COPD were referred for spirometry, and those with highly unlikely COPD were discharged back to their GP for consideration of alternative diagnoses.

Results

- All 134 patients successfully generated diagnostic-grade breath records, compared to the 9.6% failure rate for spirometry performed between 2024 and 2026 - 4% failed to generate any result at initial spirometry appointment, and of the remainder that were interpreted, 6% were of insufficient quality to generate a diagnosis. Using the diagnostic output from NTD, 68% (n=91) of patients either received a positive diagnosis of COPD, or had COPD ruled out. For the remaining 32% (n=43), spirometry was performed.
- The new pathway reduced the mean time from referral to diagnostic result by 40 days, which represented a 71-day reduction for the 68% of patients who did not require spirometry. This reduction included those who required spirometry after NTD. Mean clinical staff time required decreased by 45 minutes per patient (36 minutes vs. 81 minutes). The new pathway saved 101 clinical hours and 124 hours of spirometry across the cohort, yielding a staff cost-saving of £15.21 per patient.
- Because N-Tidal Diagnose requires only relaxed tidal breathing, it has substantially fewer contraindications than spirometry, making it suitable for a broader range of patients. Contraindications include the inability to breathe through the mouth, unconsciousness, mechanical ventilation, age <18 years, or absence of a clinical suspicion of COPD.

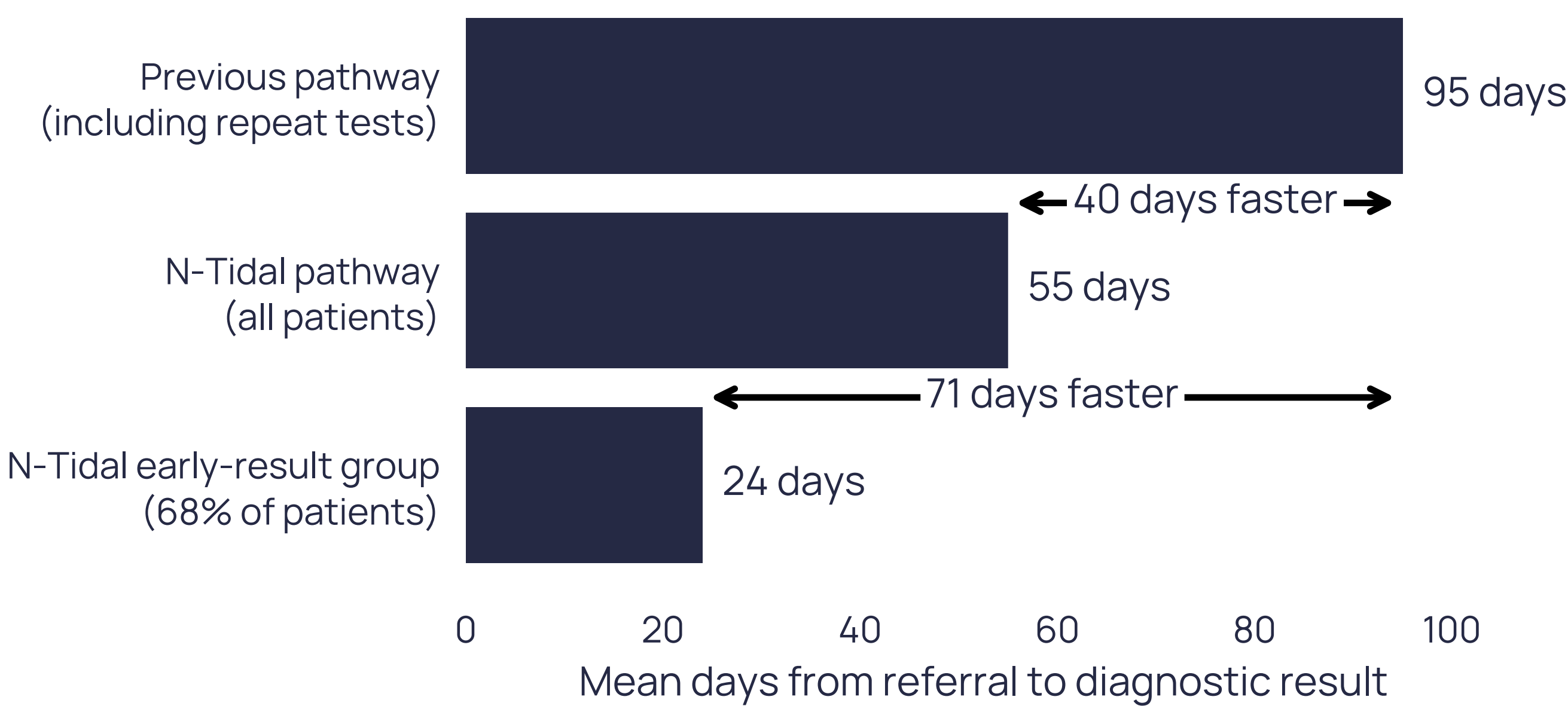


Fig. 3: Mean time from referral to diagnostic result for the previous spirometry pathway compared with the N-Tidal pathway. N-Tidal reduced average waiting time from 95 days to 55 days across all patients, and to 24 days in the early-result group representing 68% of patients.

Implementing NTD as a first-line diagnostic tool for COPD eliminated technical failures, reduced diagnostic wait times and released substantial clinical capacity. This model offers an accessible and scalable alternative to conventional spirometry in primary care.