

Organizational impact of an AI-based pre-screening tool for the diagnosis of MMR/MSI status in patients with colorectal cancer (CRC)



Elin Samuelsson¹, Hortense Deslandes¹, Selim Ramla², Stéphane Rossat², Ghislain Keller², Damien Jacobs¹, Arnaud Fouillet¹, Gwendolyn Courtois¹
¹ Waiv, ² Medipath, Frejus, France

Background

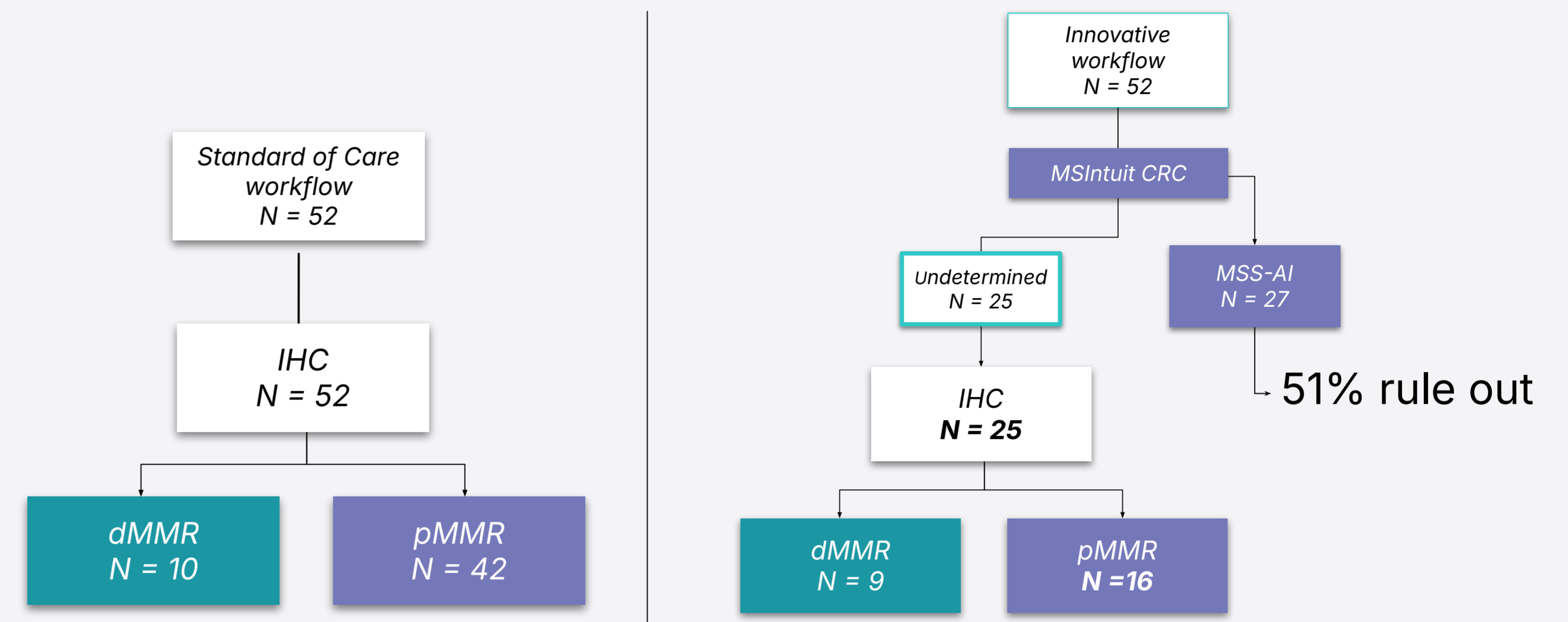
Microsatellite instability (MSI) testing is critical for guiding therapeutic decisions in patients with solid tumors, particularly for immune checkpoint inhibitor therapy. MSI biomarker is recommended to be screened in an increasing number of indications, including colorectal, endometrial, and gastric cancers by most medical organizations, adding a significant workload, which can lead to an organizational burden in pathology laboratories. Artificial intelligence (AI) has emerged as a promising pre-screening solution to mitigate these challenges by identifying patients unlikely to require confirmatory MSI testing.

Objectives

This prospective study compared a standard MMR/MSI diagnostic workflow based on systematic IHC analysis to an innovative AI-based pre-screening approach in a real-world pathology setting. Our primary aim was to evaluate the impact of this AI-powered pre-screening tool on turnaround time (TAT) for MMR/MSI status determination in colorectal cancer (CRC) patients.

Methods

Prospective timestamps (n = 52, CRC cases) were recorded from sample reception to result delivery. Two workflows were compared in parallel: the standard workflow based on systematic IHC analysis (SoC), and an innovative workflow integrating MSIntuit[®] CRC as an AI-based pre-screening step. TAT was measured for MSS-AI and Undetermined patients to evaluate the organizational impact on MMR/MSI status determination.



Cohort description

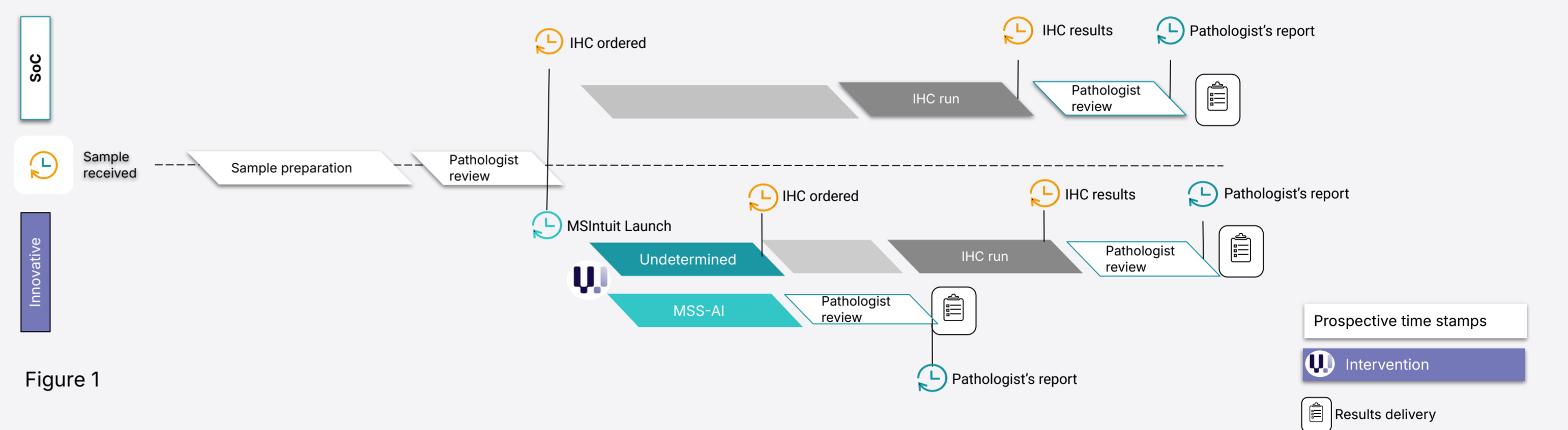
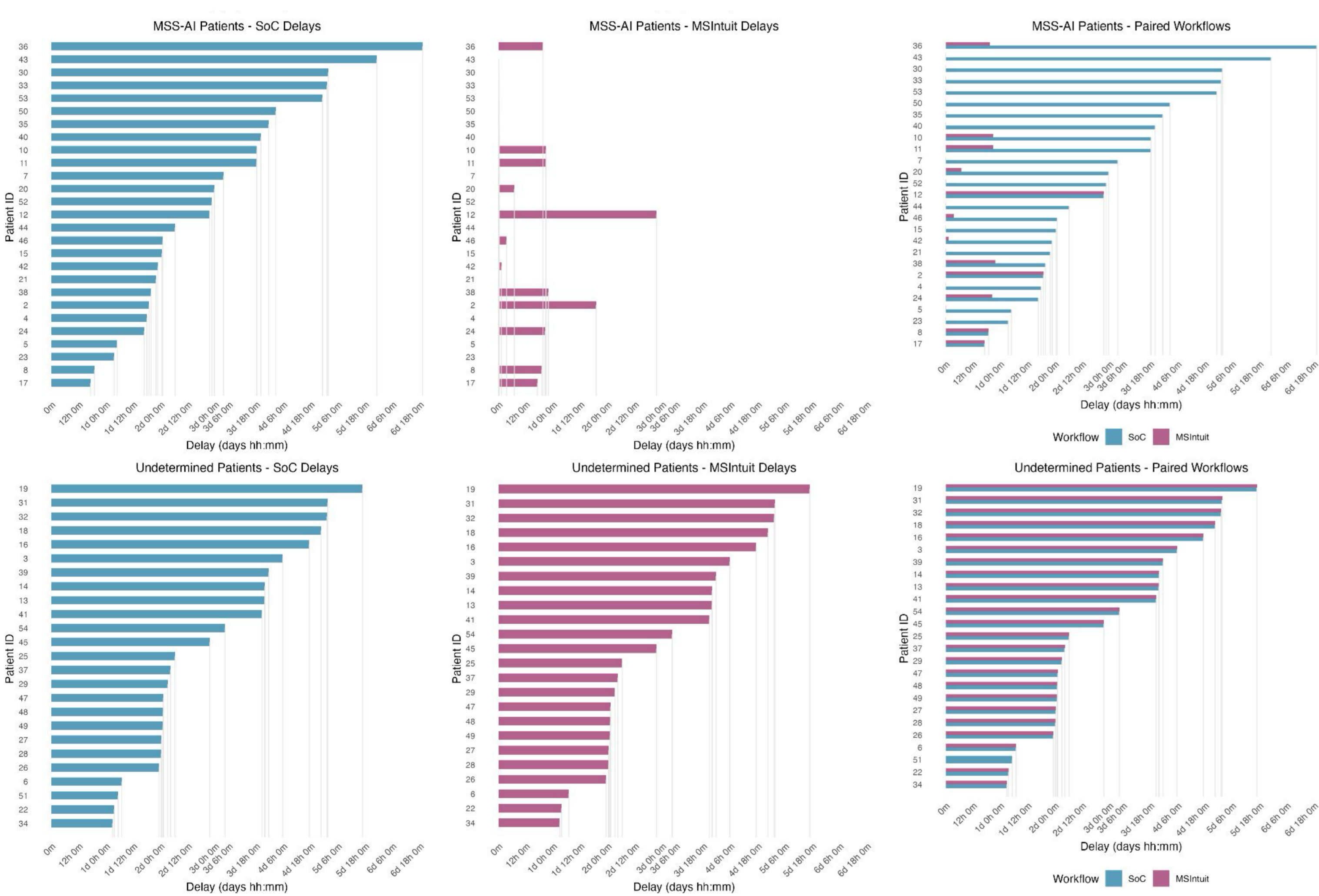


Figure 1

Results on rule out and delay



- We observe a highly significant reduction in TAT for the MSS-AI fraction compared to the SoC.
- We observe a similar TAT between the SoC and the MSIntuit CRC Undetermined fraction despite the additional pre-screening step.

Results on turnaround time

		N	Mean	Standard dev.	Min	Max	T test p-value
MSS-AI	SoC	27	2d 23:23:09	1d 14:35:07	0d 17:03:00	6d 19:06:00	
	MSIntuit	27	0d 09:47:20	0d 16:18:45	0d 00:01:00	2d 21:28:00	< 0.001
	Difference	27	-2d 13:35:49	1d 19:43:34	-5d 23:41:00	0d 00:02:00	
Undetermined	SoC	25	2d 23:52:22	1d 09:59:42	1d 02:47:00	5d 16:46:00	
	MSIntuit	25	2d 23:54:43	1d 09:59:18	1d 02:52:00	5d 16:48:00	
	Difference	25	0d 00:02:22	0d 00:01:59	0d 00:00:2:00	0d 00:07:00	
All	SoC	52	2d 23:37:12	1d 12:05:45	0d 17:03:00	6d 19:06:00	< 0.001
	MSIntuit	52	1d 15:39:21	1d 16:45:44	0d 00:01:00	5d 16:48:00	
	Difference	52	-1d 07:57:51	1d 20:03:52	-5d 23:41:00	0d 00:07:00	

- For MSS-AI patients with the MSIntuit CRC workflow, on average, they will receive their results **2 days and 13 hours earlier than Standard of Care (SoC) (-86%)**
- For Undetermined patients, there is **no significant difference** between the two workflows.
- On average, **the MSIntuit CRC workflow enables result delivery 1 day and 7 hours earlier than SoC (-45%).**

Discussion

- Unlike previous retrospective analyses, this prospective study confirms in real-world conditions that AI-based MSI pre-screening can significantly reduce TAT.
- Resource simulations at Medipath suggest that the organizational benefits extend beyond TAT, with meaningful savings in laboratory workload. Full cost-effectiveness analysis is ongoing.

Acknowledgements

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Conclusions



By ruling out the need for confirmatory MSI testing in 51% of the cases, this AI-based approach significantly improves efficiency in CRC diagnostics. Routine implementation could:



- Accelerate identification of MSS patients by delivering results up to 2 days and 13 hours earlier (-86%)
- Decrease confirmatory IHC testing demand
- Reduce pressure on lab resources in terms of slides, automate runs, and technician time



This cost-effective AI solution demonstrates meaningful organizational benefits and supports broader clinical adoption of AI in pathology workflows