

Using a user-friendly modeling tool to inform and guide local decision-making for Lynch syndrome screening at healthcare systems

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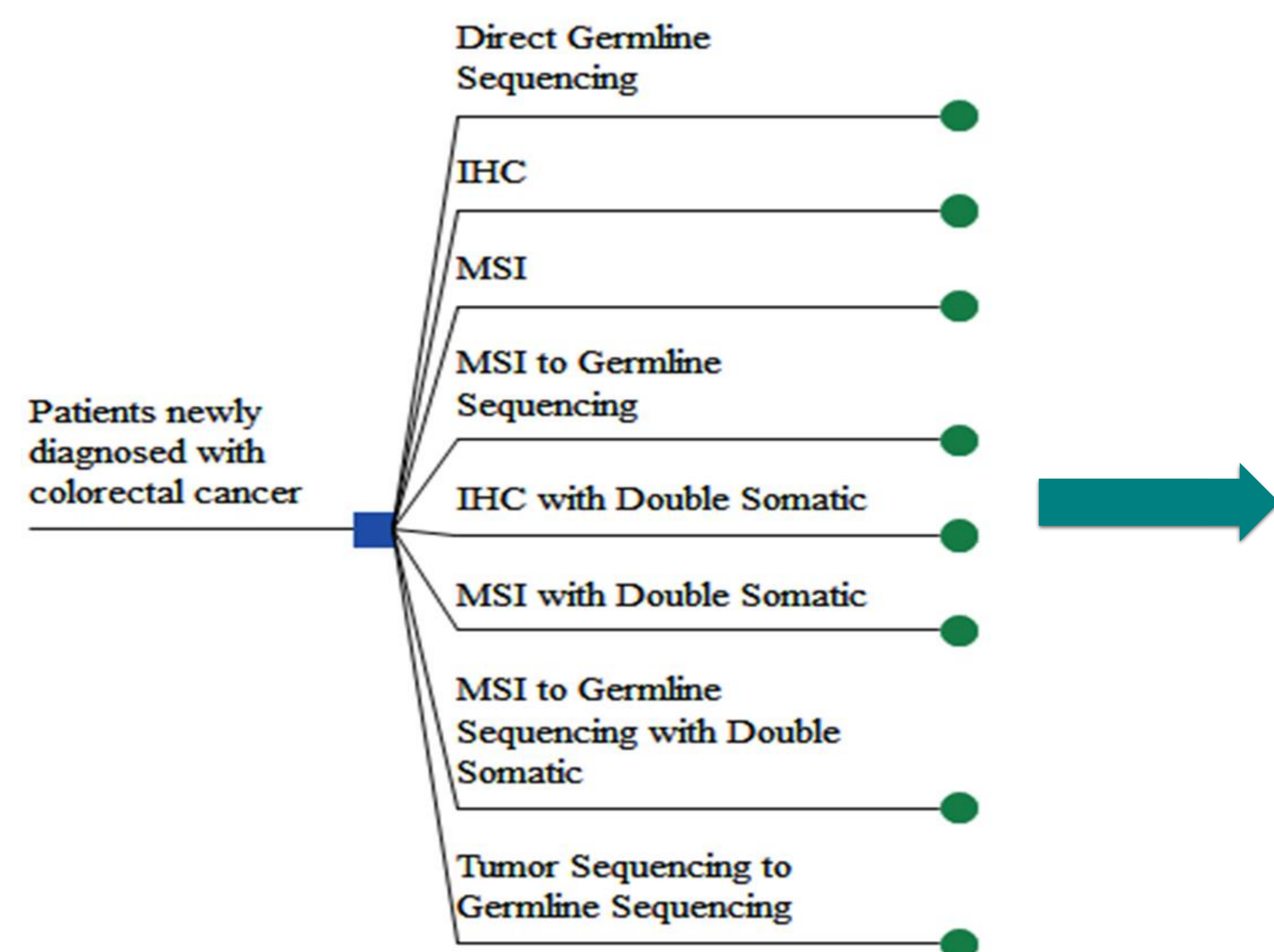
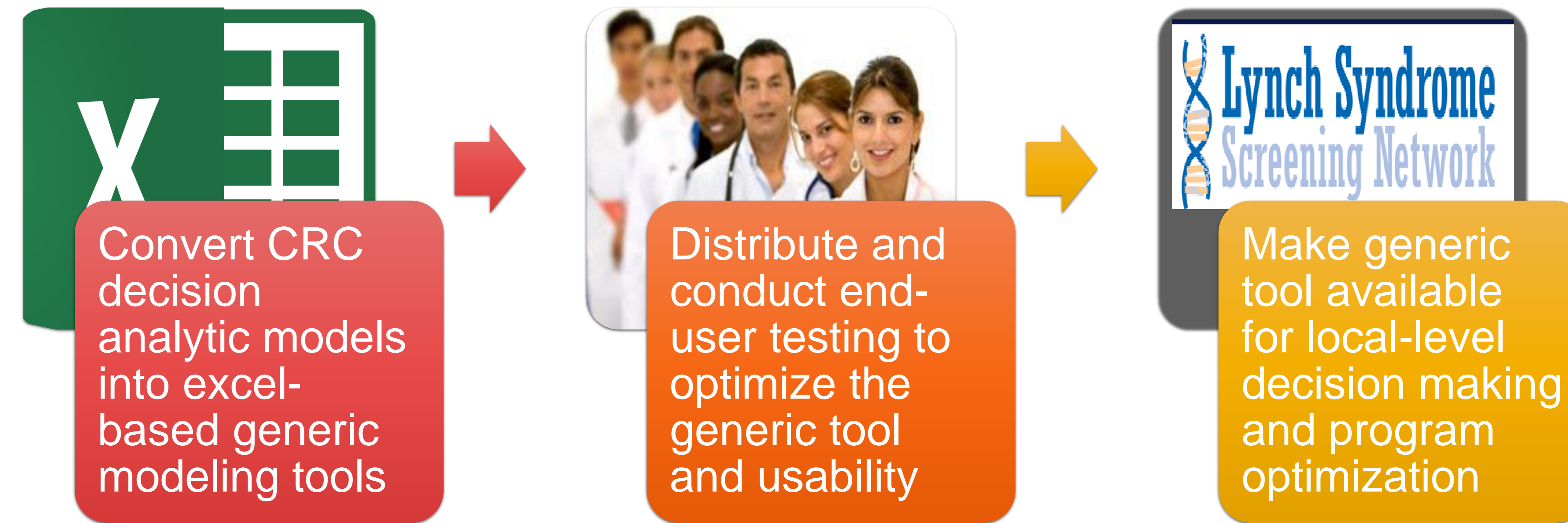
Abstract
OBJECTIVES:
 Implementation of universal Lynch Syndrome (LS) screening in newly diagnosed colorectal cancer patients remains suboptimal. We previously developed decision analytic models to compare the relative effectiveness, costs, and efficiency of eight LS screening protocols from a healthcare system perspective. The objective of this study is to convert the models into a user-friendly modeling-tool and to assess its potential applications in supporting local decision-making of LS screening implementation in healthcare systems.

METHODS:
 We converted the models into an Excel-based modeling-tool, allowing end-users to modify model variables and calculate model outputs specific to their local healthcare system. We pilot-tested and refined the tool with potential end-users from three healthcare systems. We distributed the validated and refined tool to identified end-users in genetic counseling, precision medicine, and pathology across eight healthcare systems. We then conducted semi-structured interviews with the end-users on the applications of the tool and how it was used to inform and guide local decision-making.

RESULTS:
 We have successfully developed a modeling-tool containing an overview, an input sheet with instructions and definitions of parameters, and a results table with model outcomes. We completed 9 interviews with 15 end-users across 6 of the 8 healthcare systems. The end-users highly valued the tool's capabilities to quantify and prove "why a certain protocol would be ideal over another", and to compare, contrast, and customize implementation efforts based on local experience. The tool was deemed highly helpful to set up a program or to expand upon an existing program.

CONCLUSIONS:
 Outcome metrics, including program costs to the healthcare system, are important factors in organizational decision-making. However, most decision tools do not incorporate local costs and clinical data. This newly developed tool, estimating outcomes using system-specific data, has been enthusiastically endorsed by end-users across multiple healthcare systems in informing and supporting local decision-making and implementation.

- Most decision tools do not incorporate local costs and clinical data from the healthcare system which are important factors in organizational decision-making.
- A user-friendly modeling tool, tested and optimized by end-users, allows end-users to input model variables using their local data and calculate model outputs specific to their local healthcare system to support local decision-making of Lynch syndrome (LS) screening.



Parameter Name	Description	Input Value	Default (Base-Case) Value	Reference Range	DGS	IHC	MSI
Cohort size	Number of patients with colorectal cancer (analytic colorectal cancer cases)	1,000	1,000	NA	Yes	Yes	Yes
Time period	Time period for analysis (corresponds to cohort size above per this specified time period)	1 Year	1 Year	NA	Yes	Yes	Yes
Prevalence of LS	Prevalence of Lynch Syndrome in Colorectal Cancer Population	0.03	0.03	2%-4%	Yes	Yes	Yes

Note: IHC, immunohistochemistry; MSI, microsatellite instability.

Performance of Protocol	Outcomes		
	Direct Germline Sequencing	IHC	MSI
Sensitivity of protocol	99.90%	80.56%	82.50%
Specificity of protocol	99.50%	99.98%	99.99%
Number of true LS cases expected to be identified following this protocol	29.97	24.17	24.75
Number of missed LS cases	0.03	5.83	5.25
Number of unexplained (negative LS germline testing) cases	NA	43.78	26.73
Number of CRC cases lost to follow up	0.00	0.00	0.00

Previously developed CRC decision analytic models comparing effectiveness, costs and efficiency of 8 LS screening protocols

Generic user-friendly modeling tool that allows input of local data and generates site-specific output