EE508

COST OF LIVER CANCER SCREENING IN PATIENTS WITH CIRRHOSIS

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BACKGROUND

- Liver cancer is the fastest growing cause of cancer deaths among Americans.
- In at-risk individuals with cirrhosis, guidelines recommend biannual ultrasound-based screening, with or without a serum biomarker alpha fetoprotein (AFP) for early detection of hepatocellular carcinoma (HCC), the most common form of primary liver cancer.
- Per guidelines, screening test is followed by one of the diagnostic tests, including MRI, CT and biopsy for confirmation.
- The guidelines recommend lifetime screening for liver cancer, but the healthcare utilization and financial burden of such lifetime screening is not known.

OBJECTIVE

Our objective was to estimate the overall cost of liver cancer screening from a commercial healthcare system's perspective.

METHODS

- We developed a microsimulation model that simulates the natural history of HCC in patients with compensated cirrhosis **(Figure 1)**.
- We simulated biannual screening using ultrasound only, and ultrasound+AFP.
- Patients with a positive screening test result underwent a diagnostic test (MRI or CT) to confirm the results. If the diagnostic test results were indeterminate, liver biopsy was conducted for final confirmation **(Figure 1)**.
- We used published data to inform underlying liver disease progression rates, HCC tumor growth patterns, performance characteristics of screening modalities, and real-world screening adherence patterns **(Table 1)**.
- The costs of screening and diagnostic tests were estimated from the Truven MarketScan Database, and all other costs were estimated from published literature **(Table 2)**.

KEY FINDINGS

1. To the best of our knowledge, this study is the first estimate of healthcare system costs for liver cancer screening.
   - The average lifetime cost of liver cancer screening is between $6,400–$8,600 per person
   - The average cost to detect one liver cancer case is between $71,500–$87,700.
   - On an average, 117–129 screening tests are needed to detect one case of liver cancer.
2. These results could help commercial payers understand the cost burden associated with currently available liver cancer screening modalities.

Figure 1: *Model Schematic for HCC Progression and Surveillance*

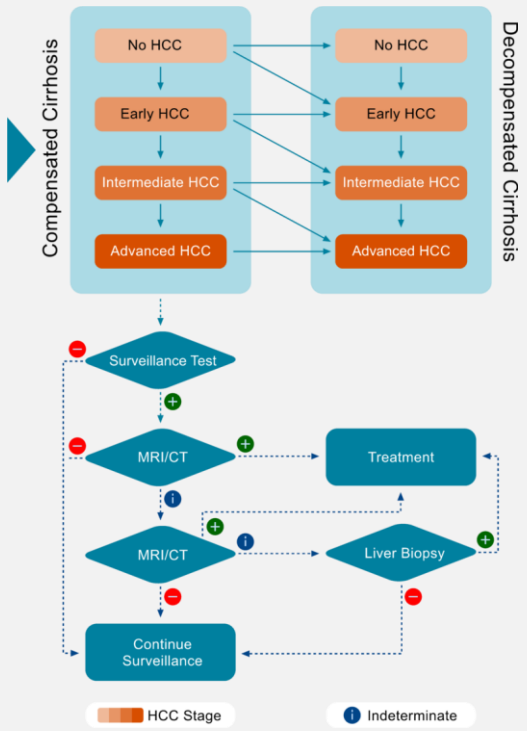


Table 1: *Performance characteristics of screening and diagnostics tests*

Ultrasound+AFP		
Sensitivity (early stages)	0.635	(1)
Sensitivity (late stages)	0.910	(1)
Specificity (overall)	0.842	(1)
ultrasound		
Sensitivity (early stages)	0.440	(1)
Sensitivity (late stages)	0.759	(1)
Specificity (overall)	0.907	(1)
CT		
Sensitivity (overall)	0.66	(2)
Specificity (overall)	0.92	(2)
MRI		
Sensitivity (overall)	0.82	(2)
Specificity (overall)	0.91	(2)
Liver Biopsy		
Sensitivity (overall)	0.62	(3)
Specificity (overall)	1	(3)

Table 2: *Cost of screening and diagnostic tests in the model*

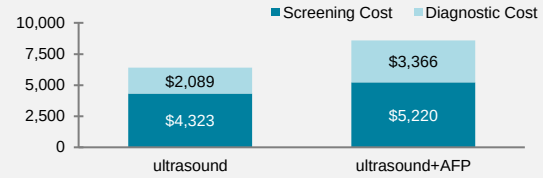
Screening/Diagnostic Tests	Value	Source
Ultrasound	$378	Truven Marketscan
AFP	$80	Truven Marketscan
MRI	$2,027	Truven Marketscan
CT	$1,061	Truven Marketscan
Liver Biopsy	$2,532	(4)

RESULTS

Lifetime Cost of Liver Cancer Screening

Figure 2 shows the average lifetime cost of liver cancer screening in 50-year-old individuals

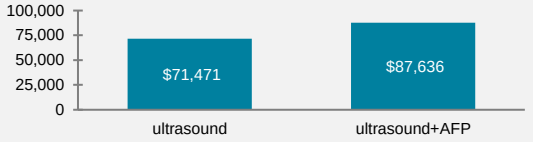
Figure 2: *Lifetime cost of screening per patient*



Cost of Detecting One Liver Cancer

Figure 3 shows the cost to detect one HCC.

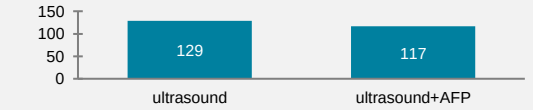
Figure 3: *Cost of detecting one liver cancer case*



Number of Tests Needed to Detect One Liver Cancer

Figure 4 shows the number of screening tests needed to detect one HCC.

Figure 4: *Number of Screening tests needed to detect one liver cancer*



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