As of 2.19.2025, found a few issues with inputs correctness:

1. Utility of false pos HCC for intervention arm should be the weighed avg of HCC utility in the intervention arm, because with screening, people would be falsely diagnosed with earlier stage HCC
2. The cost of HCC node should be cost of confirming HCC dx + cost of regular MASLD care
3. The cost of false positive HCC node should be the cost of confirming false positive HCC + cost of regular MASLD care
4. The rate of false positive in the control arm should be 0%

1. After fixing (a), the ICER decreased from around 191K to 61,202

This is because by increasing the utility of false pos in intervention arm from 0.65 to 0.68 we increased the incremental utility (denominator) of the ICER so the ICER decreases.

2. After fixing (b) as well, ICER stayed the same at 61,202

3. After fixing (c) as well, ICER stayed the same at 61,202

4. After fixing (d) as well, ICER decreased further to 34,490

Incremental improvement in utility should decrease because patients in control spend longer time in MASLD node (higher utility than false pos node). Incremental cost should increase because patients incur cost of MASLD AND imaging for false pos HCC in the intervention arm.

What actually happened: compared to the previous iteration, the average patient rewards in the control decreased as expected because patients don’t incur extra cost for the false pos imaging. Compared to the previous iteration, the average patient utilities decreased which shouldn’t happen because patients stay in the MASLD node rather than going to the HCC node. However, the percent developing HCC and cirrhosis both increased, because patients don’t go to the false positive node anymore, where patients were previously immune to both hcc and cirrhosis (patients can only transition back to MASLD after having false pos HCC).

5. Next, try changing the intervention arm transition probability from the false positive node. Make the HCC, cirrhosis, and death probability the same as the MASLD node.

This made the ICER negative. This made the % developing HCC and cirrhosis in the intervention arm even higher than the previous iteration. In this iteration, the incremental utility was negative and the incremental cost was positive. Possible reasons for the decrease in utility of the intervention arm could be related to the increase in % developing cirrhosis and HCC. Why did the % developing cirrhosis and HCC increase?

The way the dice roll works makes it such that the patient in the control and intervention can go to different health states from the MASLD node if we change the fpos rate in control 0%. This can make it possible for patient in the intervention arm to go to the HCC node while the patient in the control node stays in MASLD.

6. Next, try putting a fpos rate of 15% back in the control arm to make sure the dice rolls take patients in both the control and intervention arms to the same health states. To make the fpos rate “nonexistent” in the control arm, I changed the cost and utility for fpos node in the control to be the same as that of the MASLD node.

This made the HCC and cirrhosis cumulative % the same in both the control and intervention. However, ICER was still negative (-14471) because the utility decreased in the intervention node compared to control. This is because the fpos node in the intervention arm has a utility much lower than that of the control (0.65 vs. 0.88).

7. Next, tried increasing the utility of fpos node in intervention to be just 5% less than MASLD node, so 0.84. This method was used by [Parikh 2020](https://pmc.ncbi.nlm.nih.gov/articles/PMC7541544/#S6).

The ICER became even more negative (-73282) because the utility in the intervention increased compared to the previous iteration, but is still lower than that of the control. Since the incremental DECREASE in utility is now smaller, the ICER became more negative.

(also tried this with my new HCC distribution weighing method – the ICER did not change much)

8. Tried increasing the utility of fpos node in intervention to be the same as that of control.

As expected, the ICER is now large and positive, around 200K.

9. Tried changing the utility of fpos node to be a 3% reduction compared to MASLD utility.

ICER is now back to being in negative range. Util for intervention is still lower than util of control.

10. Testing older cohort could show better improvement in utility?

ICER is still negative. Utility still lower in intervention than control.

11. Reverted back to base case cohort. Tried reducing false positive to 5%

ICER still negative at -316988

12. Tried reducing false positive to 2%

ICER positive at around 600K