

Cost-Effectiveness Analysis Of Follow-Up Strategies For Localised Or Locally Advanced Renal Cell Carcinoma From The UK NHS Perspective

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Background

There is no clinical consensus or clear evidence on the optimal follow-up strategy for people who have completed treatment for localised or locally advanced renal cell carcinoma (RCC). Follow-up is crucial for early detection of disease recurrence and the evaluation of long-term sequelae. Tumours detected earlier are more likely to be asymptomatic and have a better prognosis than symptomatic ones. Evidence from the multinational RECUR study, including UK participants, suggests that increased imaging scans during follow up could not demonstrate a survival benefit for the overall population. This study explored the cost-effectiveness of a range of follow-up strategies for groups at low, intermediate and high risk of progression.

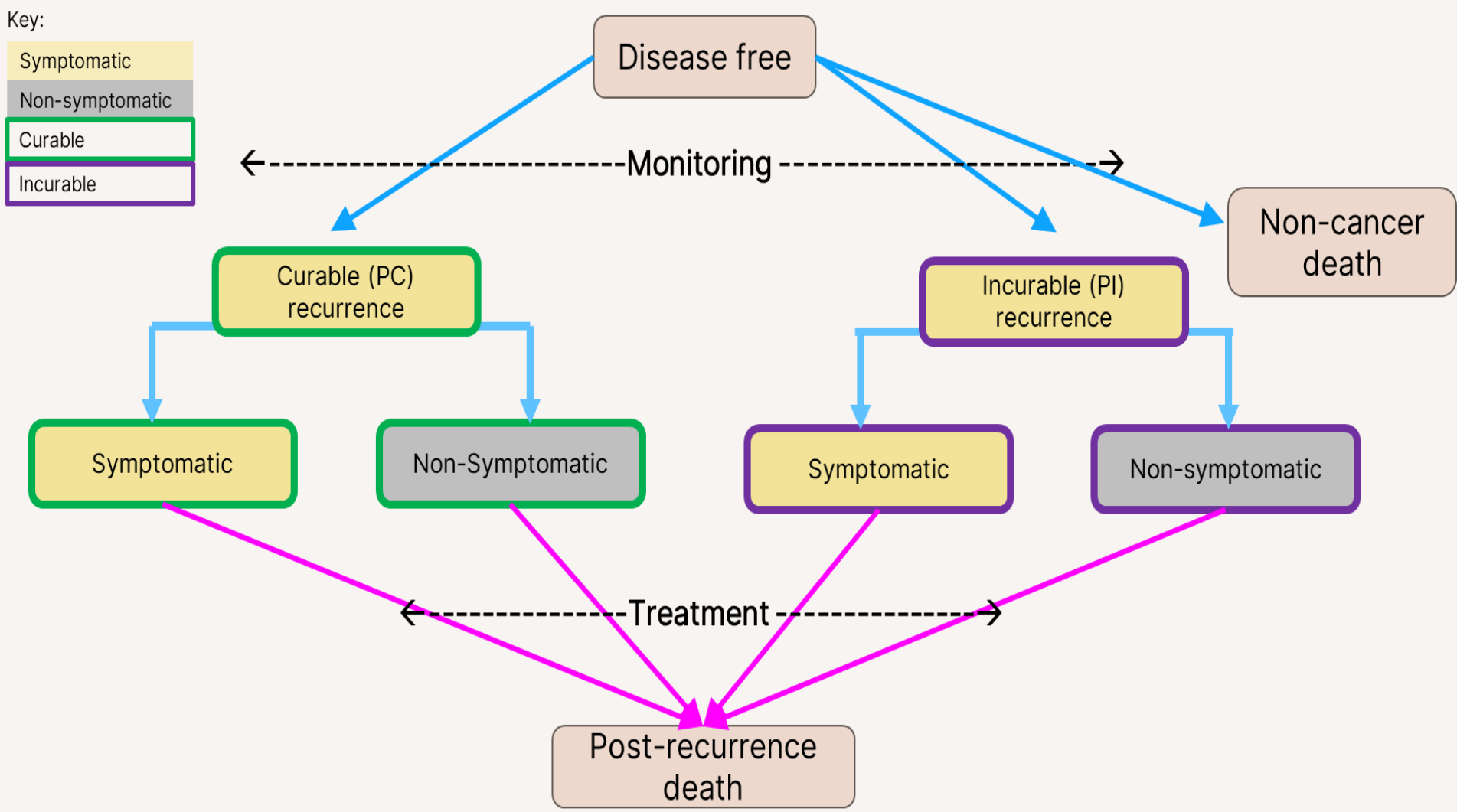
Methods

A lifetime semi-Markov model was developed in R to compare the cost effectiveness of two follow-up strategies for people who have undergone nephrectomy. The strategies compared were high proportion versus a low proportion of cross-sectional imaging strategy (“low CSI” and “high CSI”), and a low versus a high imaging frequency strategy (“low IF” and “high IF”).

The population was stratified by recurrence risk: low, intermediate and high. Recurrence rates, survival following recurrence and probability of detecting recurrence were derived from the RECUR study^{1,2,3}. Parametric models were fitted to the Kaplan-Meier curves to extrapolate long-term recurrence and survival outcomes.

Resource use, costs and utility values were sourced from published literature reviews, NICE technology appraisals and national sources.

Figure 1: Economic model diagram



Patient flow and assumptions

- The risk of a detected recurrence being symptomatic or non-symptomatic depends on the follow-up strategies and risk group.
- The probability of a recurrence being symptomatic was assumed to be constant over time and constant between PI and PC recurrences.
- Detecting recurrences while asymptomatic leads to better OS than recurrences that are symptomatic when detected

Outcomes

High CSI and high IF strategies appear to be cost effective in the low- and intermediate-risk groups at a threshold of £20,000 per QALY. In the high-risk group, high CSI does not appear to be cost effective. The differences in outcomes (QALYs) were relatively small, with the majority of QALYs in the disease-free health state.

The probability that an imaging strategy detecting a recurrence being asymptomatic (compared to a symptomatic recurrence), the total cost of imaging, and the time to curable recurrence had the greatest influence on results.

Table 1: Probabilistic cost-utility results

| Strategy | Total cost | Total QALYs | Inc. NMB* | ICER | Prob cost effective |
|-------------------------|------------|-------------|-----------|---------|---------------------|
| Low-risk group | | | | | |
| Higher vs lower CSI | | | | | |
| <50% CSI | £1,801 | 12.81 | NA | - | - |
| >50% CSI | £1,969 | 12.85 | £498 | £5,046 | 100% |
| Higher vs lower IF | | | | | |
| Low intensity | £1,484 | 12.81 | NA | - | - |
| High intensity | £2,241 | 12.86 | £265 | £14,811 | 73% |
| Intermediate-risk group | | | | | |
| Higher vs lower CSI | | | | | |
| <50% CSI | £2,858 | 10.51 | NA | - | - |
| >50% CSI | £3,127 | 10.59 | £1,271 | £3,490 | 99% |
| Higher vs lower IF | | | | | |
| Low intensity | £2,491 | 10.53 | NA | - | - |
| High intensity | £3,441 | 10.61 | £583 | £12,398 | 85% |
| High-risk group | | | | | |
| Higher vs lower CSI | | | | | |
| <50% CSI | £2,915 | 9.01 | NA | - | - |
| >50% CSI | £2,910 | 8.90 | £2,183 | Dom. | 0% |
| Higher vs lower IF | | | | | |
| Low intensity | £2,479 | 8.91 | NA | - | - |
| High intensity | £3,322 | 8.95 | -£48 | £21,208 | 47% |

* Based on £20,000 per QALY

Figure 2: Sensitivity analysis: high CSI vs low CSI imaging strategy

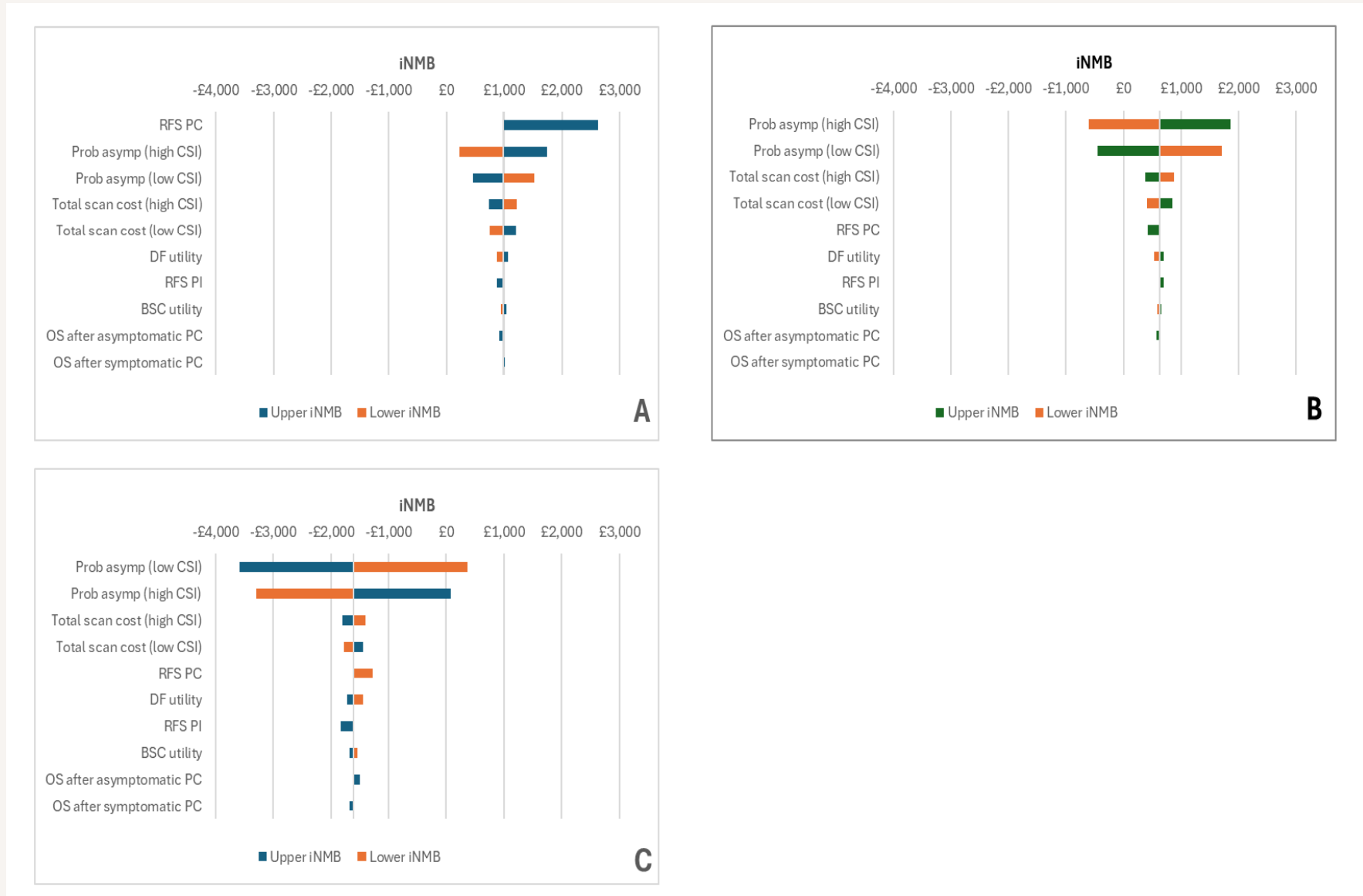
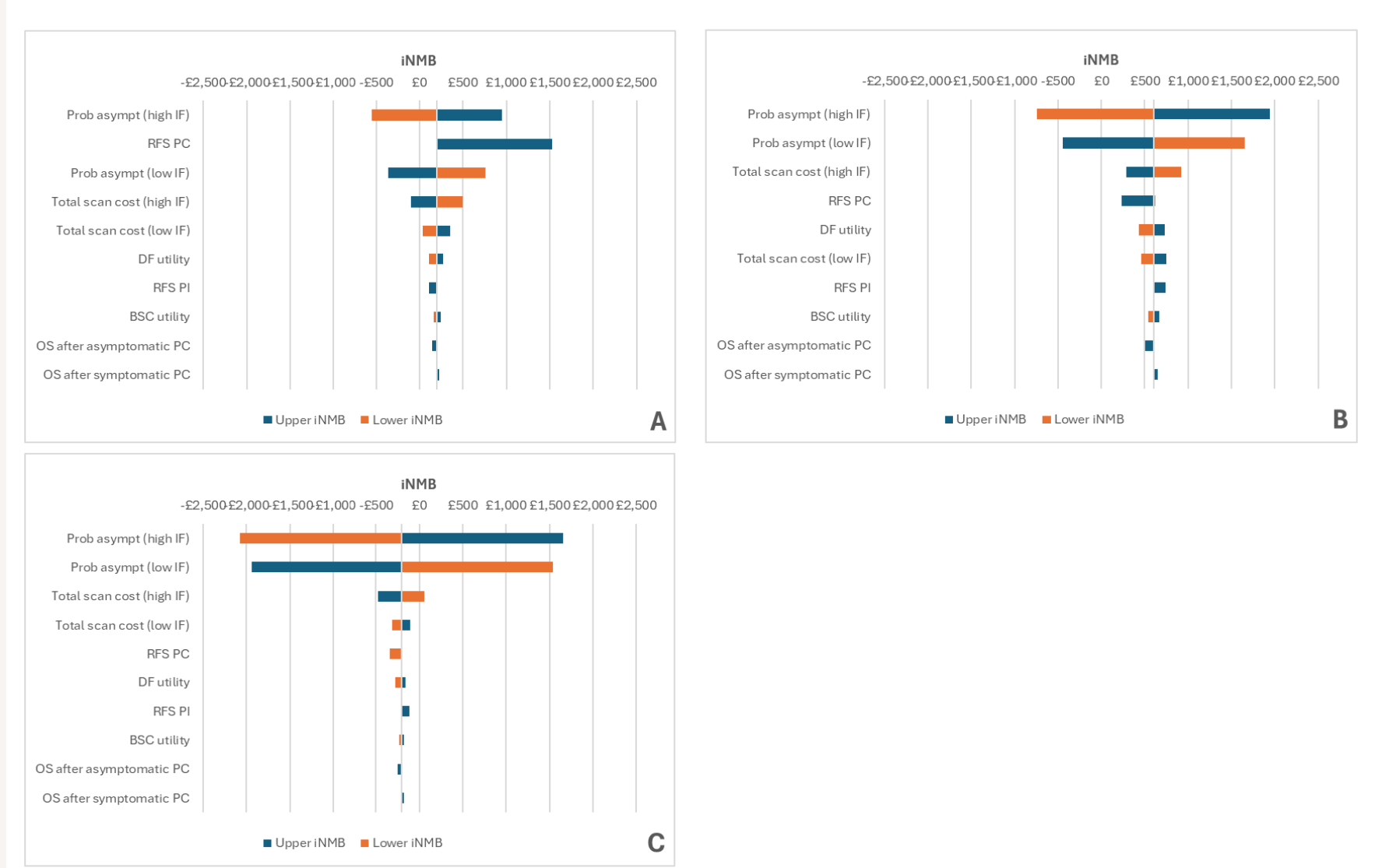


Figure 3: Sensitivity analysis: high vs low intensity IF



Discussion

In the high-risk group, high CSI was not cost-effective while high IF remained uncertain. This was due to clinically implausible and counterintuitive findings from the RECUR study, such as more non-symptomatic recurrences detected in low CSI than high CSI. Any patterns in effectiveness across risk groups are likely to be due to the issues with the underlying effectiveness evidence rather than any actual difference in effectiveness.

Conclusions

The cost effectiveness results are subject to uncertainty due to limitations with the underlying clinical effectiveness data. Further research is warranted to establish the benefits of different risk-stratified imaging strategies.

References

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