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OBJECTIVES

The objective of this study was to quantify the economic value of a sequential rapid molecular point of care (mPOC) testing approach for COVID-19 and influenza compared to laboratory-based reverse transcription polymerase chain reaction (RT-PCR) testing (central lab) in the United Kingdom (UK), Germany and France.

INTRODUCTION

While influenza rates have been lower than usual during the COVID-19 pandemic, likely due to nonpharmaceutical interventions, management of symptomatic patients during future influenza seasons may become more complicated as symptoms of COVID-19 and influenza overlap.

As mask mandates and social distancing requirements become less common, rapid diagnosis of both COVID-19 and influenza will be increasingly important for clinical management and reducing disease transmission, particularly when considering antiviral treatments which are more effective when used earlier in the disease course. POC tests provide results within minutes, enabling rapid decisions on treatment and quarantine/isolation.

This analysis compared a sequential mPOC testing approach (testing for COVID-19 followed by influenza A/B testing when COVID-19 is negative) to centralized laboratory RT-PCR testing.

METHODS

A decision tree model was used to compare the economic costs of two diagnostic testing strategies (Figure 1):

- Sequential mPOC:** Patients tested for COVID-19 and if negative, are tested for influenza, with testing completed in 15-30 minutes
- Central lab RT-PCR:** Patients tested for both COVID-19 and influenza, samples sent to a central laboratory and results available in 24-48 hours

Two scenarios were evaluated:

- Mild Symptom Scenario:** Patients with mild symptoms who are treated and self-isolate/quarantine at home
- Hospitalized Scenario:** Patients with moderate/severe symptoms who are isolated and treated in a healthcare facility

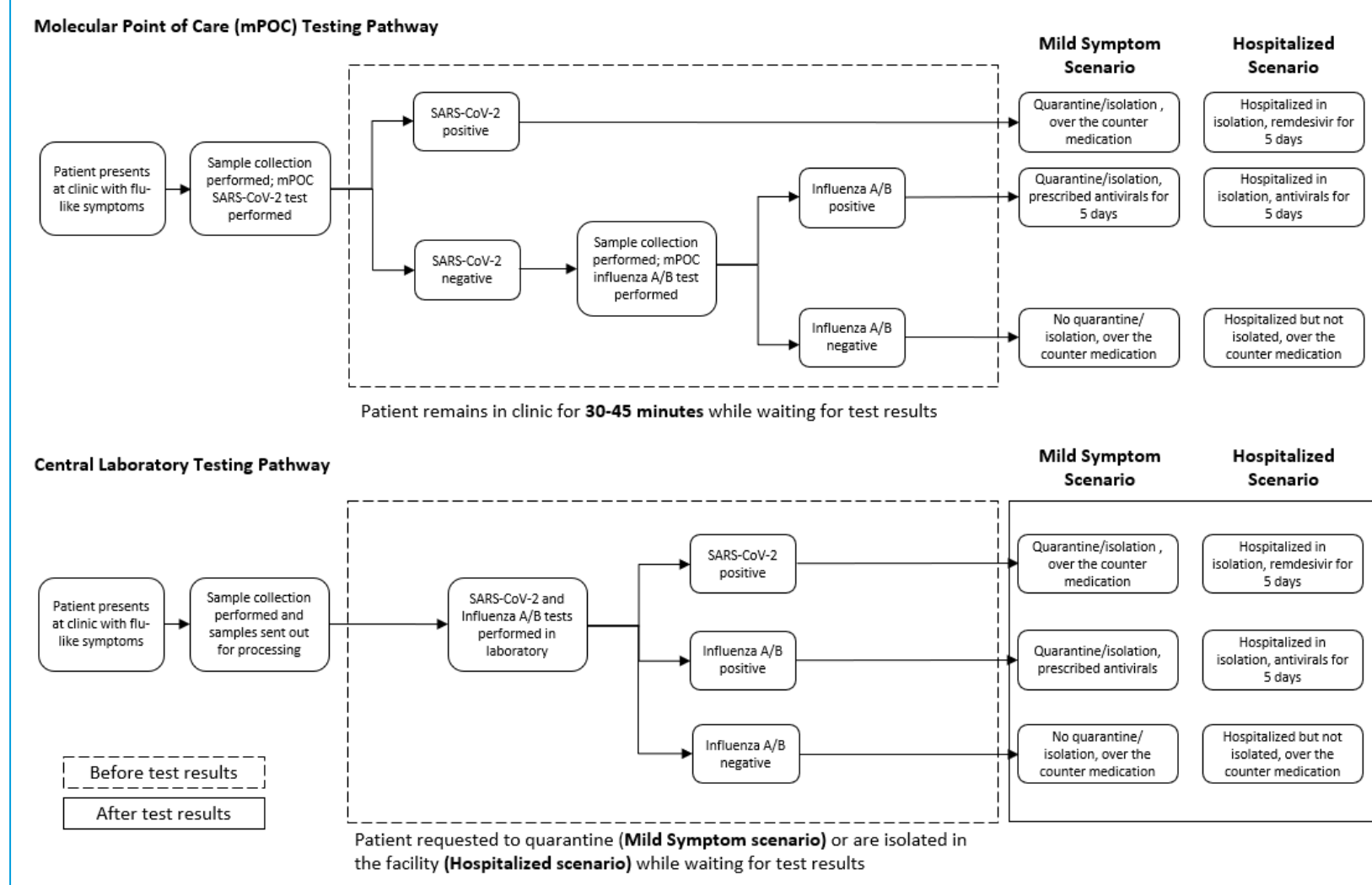
The model considers the time horizon from symptomatic patients presenting for testing until the end of treatment or quarantine /isolation and captures potential additional transmission due to delayed test results.

Net economic value consisted of testing costs, treatment costs, productivity losses, cost of facility isolation, and medical costs to treat secondary transmissions.

Societal (including productivity costs) and payer perspectives were used.

METHODS

Figure 1. Diagnostic Pathways



The economic value was evaluated for the UK, France and Germany, with inputs identified from the literature and other relevant data sources. Costs were adjusted to 2021 Euro or GBP. Results are presented assuming disease transmission rates during respiratory virus season (i.e., flu season). Key model inputs (Table 1) included time to test result, COVID-19/influenza prevalence, and reproduction numbers.

Table 1. Key Model Inputs

PARAMETER	ESTIMATE	SOURCE
Time to Result Received by Clinician - mPOC	15-30 minutes	(1)
Time to Result Received by Clinician - PCR	Germany: 48 hours UK: 24 hours France: 12 hours	(2,3)
Percentage of Patients Quarantining while waiting for Test Results (Mild Symptom Scenario)	57%	(4)
Probability of SARS-COV-2 among Patients with Respiratory Symptoms / COVID-19 prevalence	9.5%	(5)
Probability of Influenza among SARS-COV-2 Negative Patients with Respiratory Symptoms	Positive: 4% Negative: 96%	(5)
Disease Transmission for SARS-COV-2 (R-value)	Germany: 0.84 UK: 1.1 France: 1.1	(6-8)
Disease Transmission for Influenza	1.28	(9)
Influenza Prevalence (during flu season)	8%	(10)
Test Costs - mPOC (COVID-19/Influenza A/B)	Germany: €35/ €35 UK: €20 / €20 France: €27 / €20	(11)
Test Costs - Central Lab PCR (COVID-19/Influenza A/B)	Germany: €35/ €43 UK: €8 / €8 France: €38 / €16	(12-14)

RESULTS

Societal and Payer results are presented in Figures 2-7. Sequential testing with mPOC was cost saving compared to central lab in all 3 countries with the societal perspective (including productivity losses from quarantine/isolation). mPOC was cost-saving for France and Germany with the payer perspective but not for the UK (in the Mild Symptom scenario) due to the low cost of PCR testing in this setting.

GERMANY

Figure 2. Societal Cost per Suspected COVID-19/Flu Case (Germany)

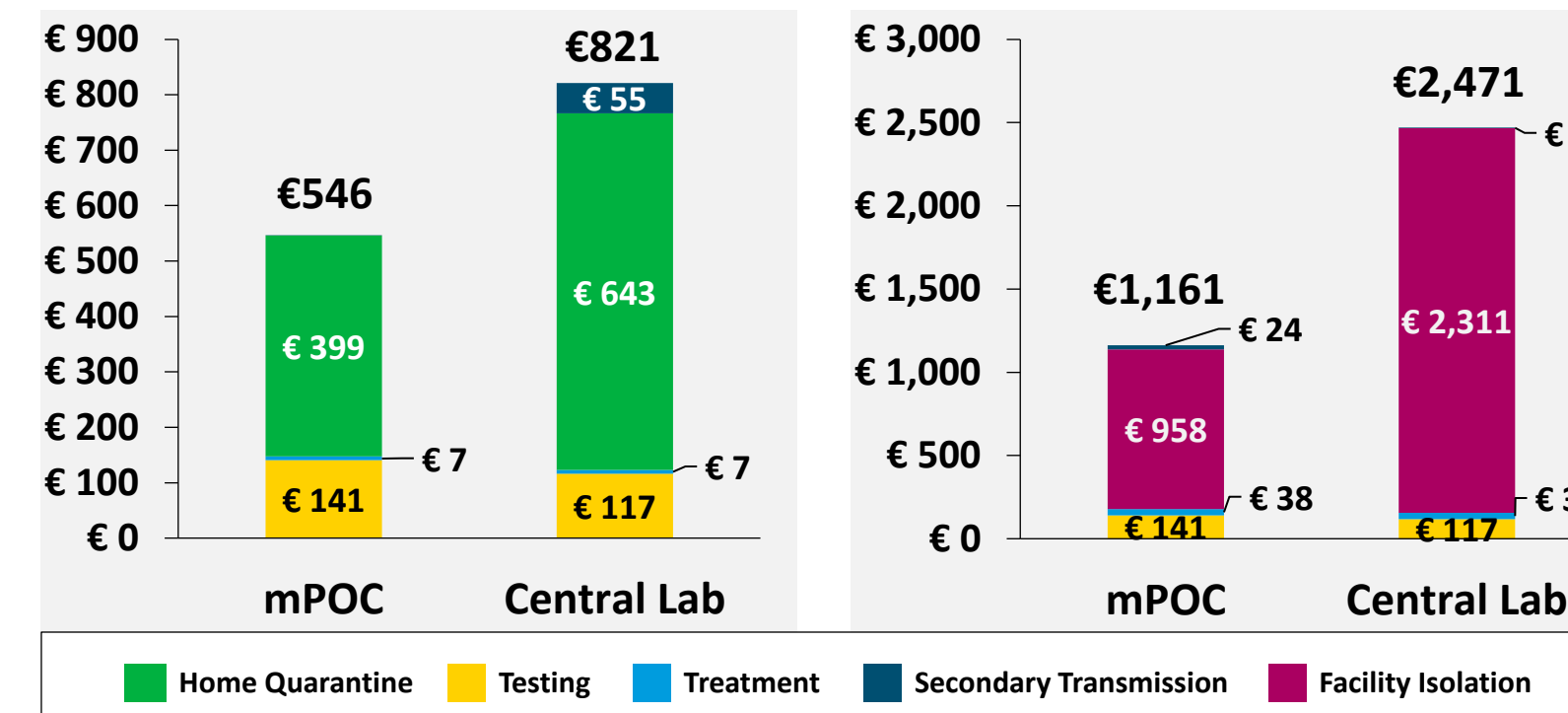
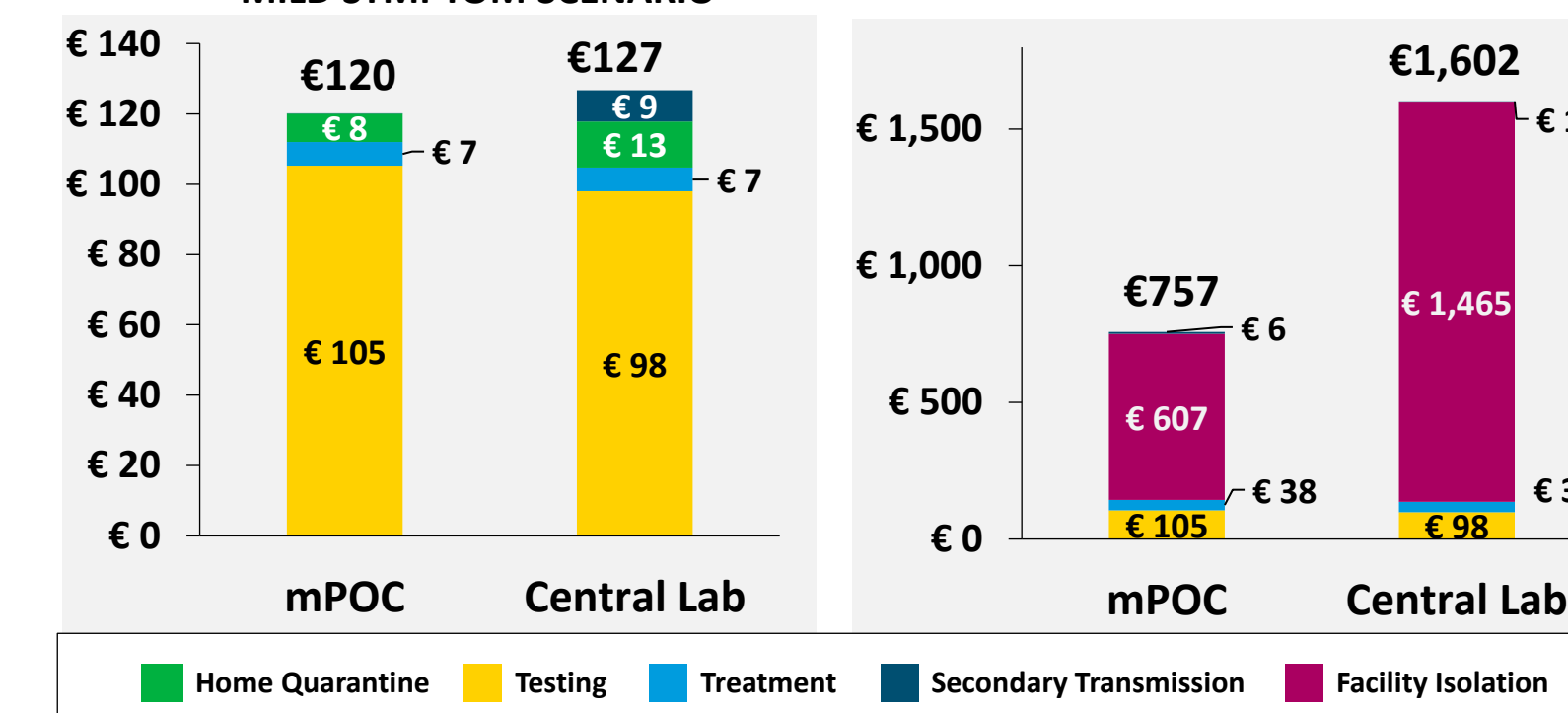


Figure 3. Payer Cost per Suspected COVID-19/Flu Case (Germany)



UK

Figure 4. Societal Cost per Suspected COVID-19/Flu Case (UK)

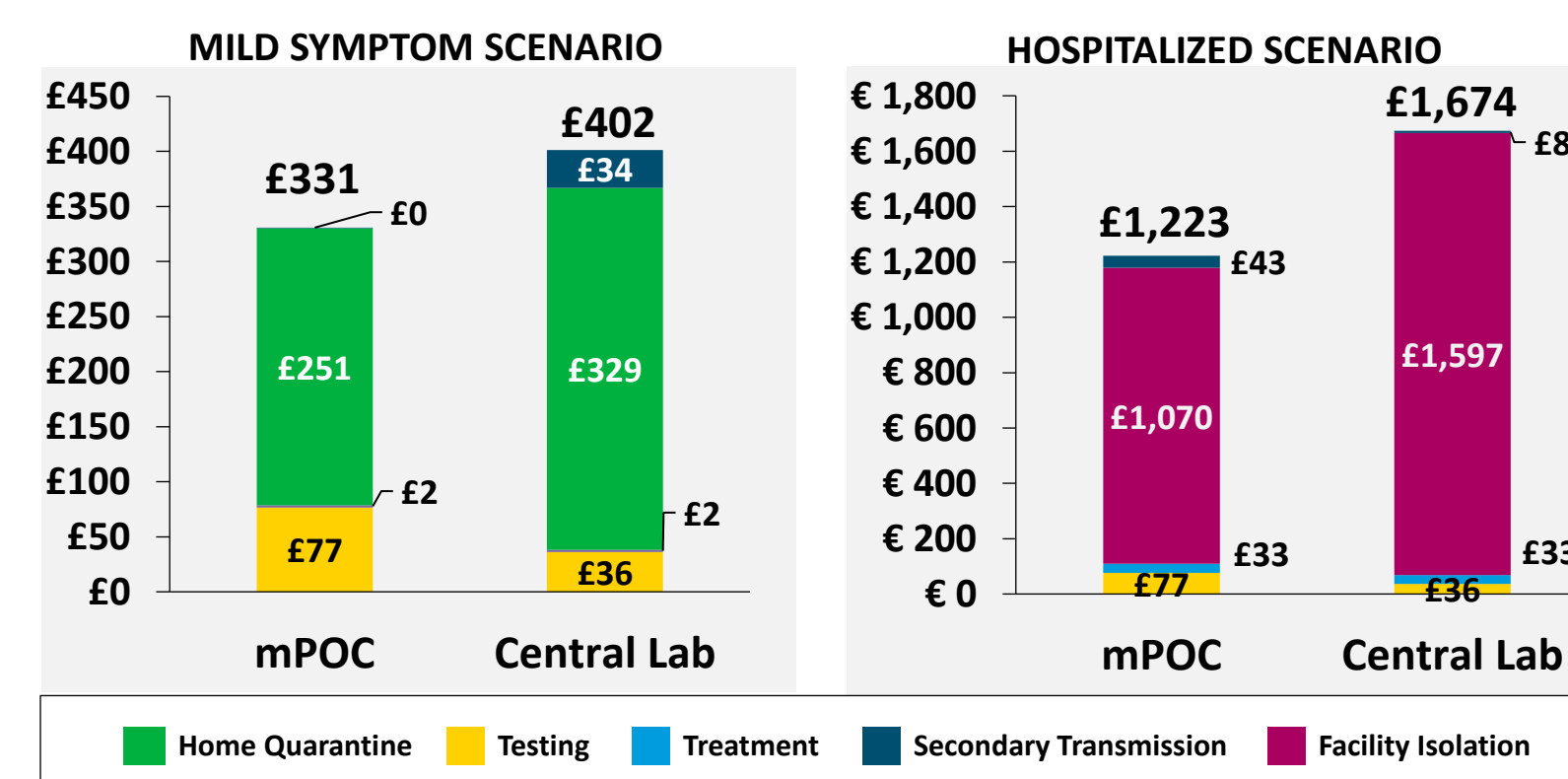
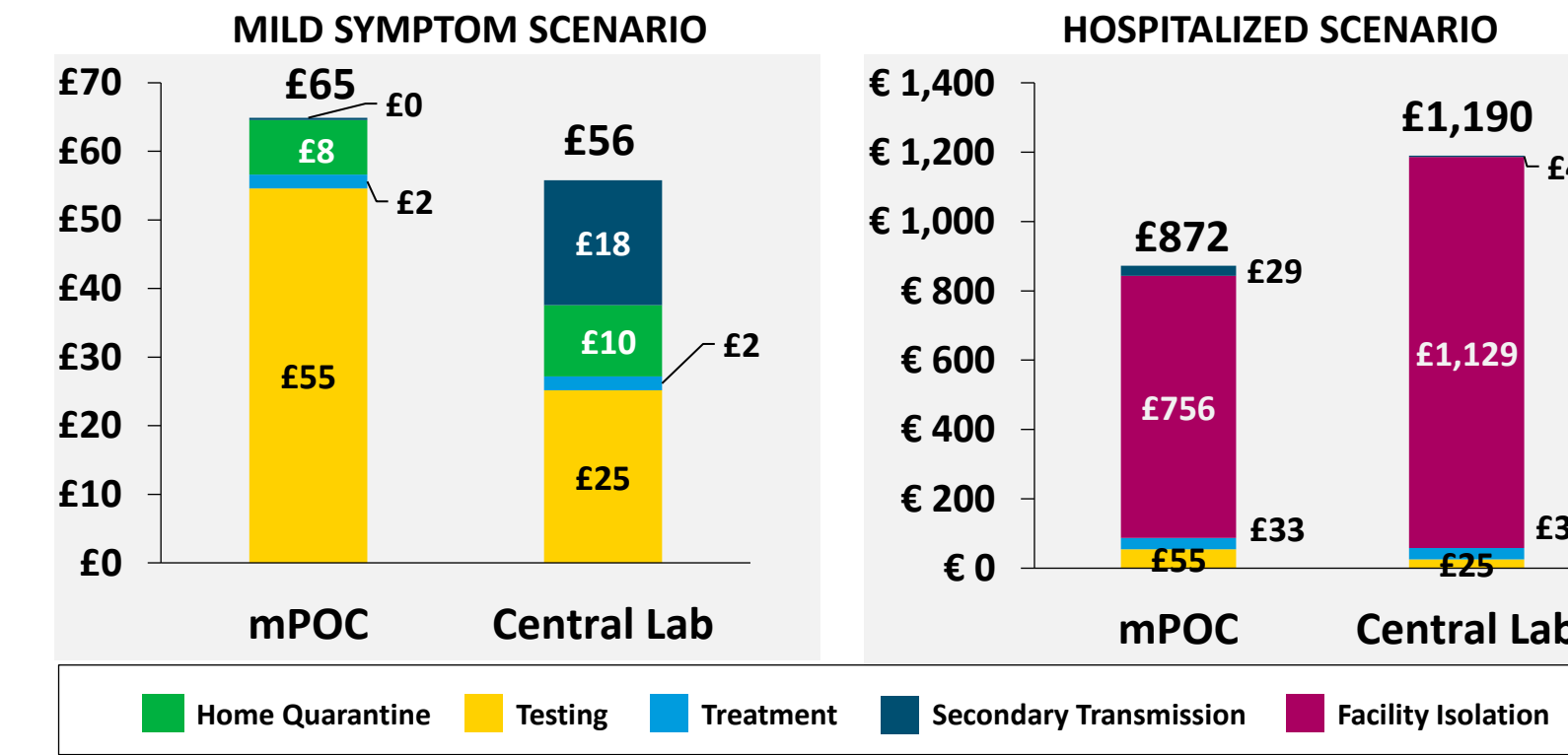


Figure 5. Payer Cost per Suspected COVID-19/Flu Case (UK)



FRANCE

Figure 6. Societal Cost per Suspected COVID-19/Flu Case (France)

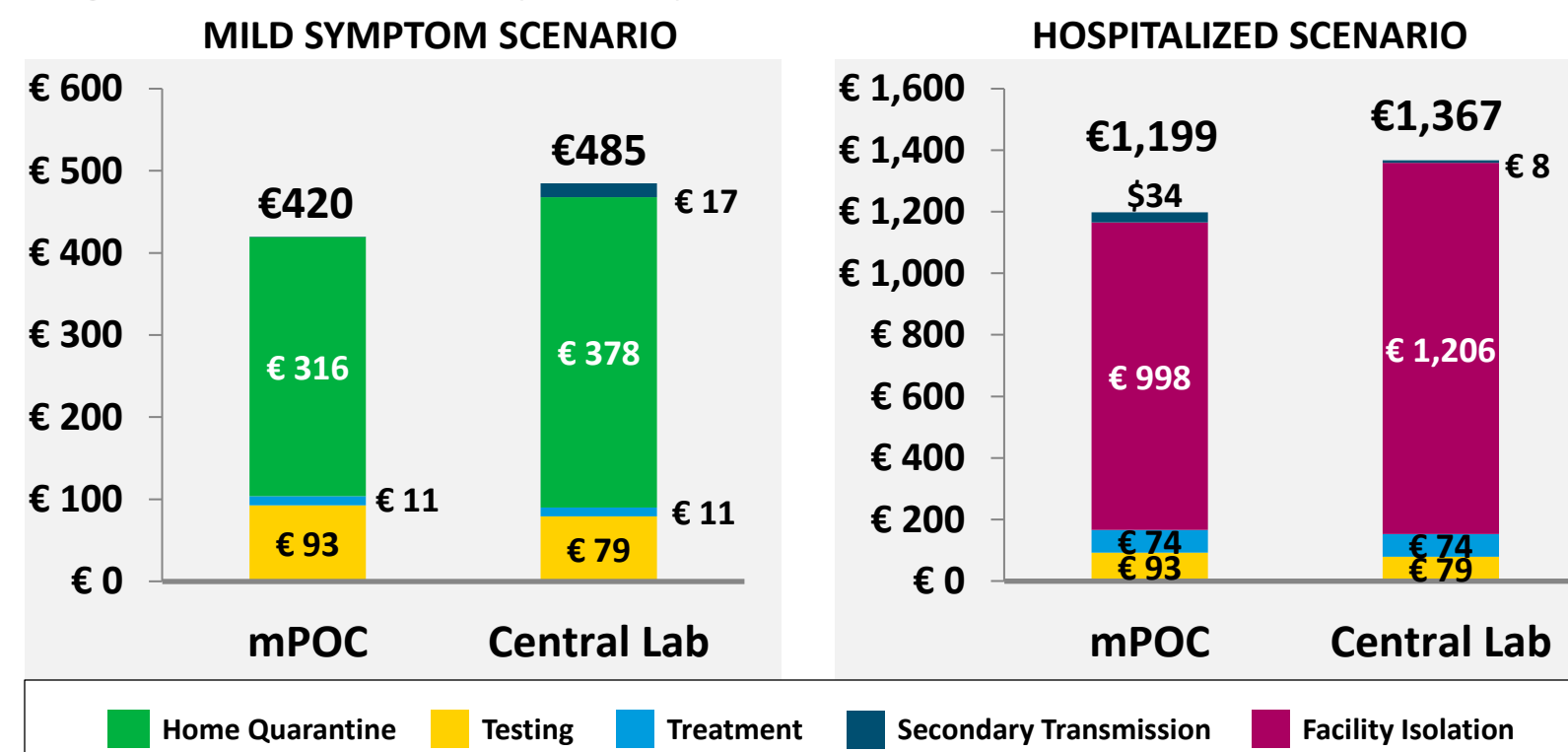
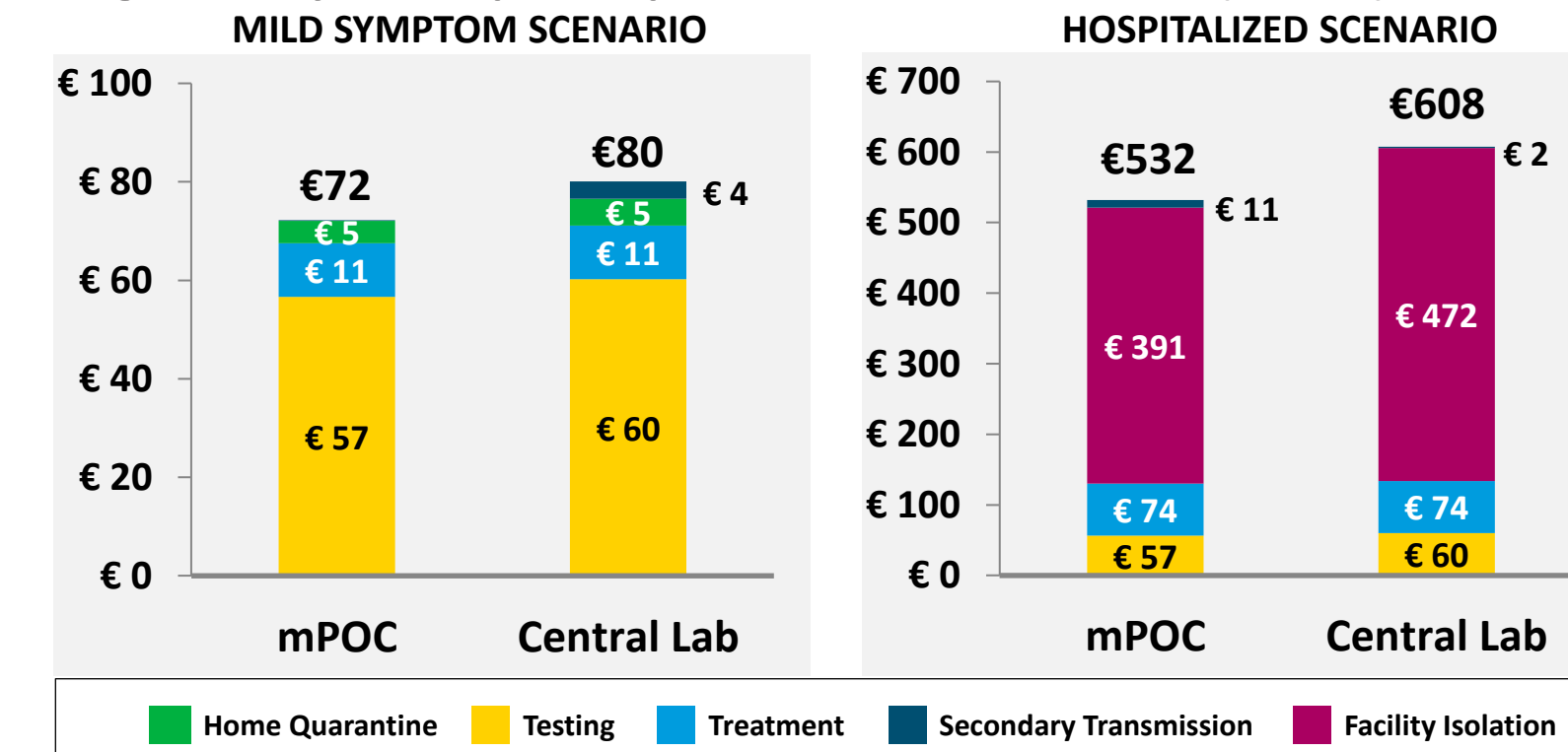


Figure 7. Payer Cost per Suspected COVID-19/Flu Case (France)



SENSITIVITY ANALYSIS

Mild Symptom scenario results were most sensitive to time to central lab results and percent of patients quarantining while waiting for results (Figure 9). Hospitalized Scenario results were most sensitive to time to central lab results, probability of testing positive for COVID-19, and hospital isolation costs (Figure 10).

Figure 9. Sensitivity Analysis, Mild Symptom Scenario, Germany

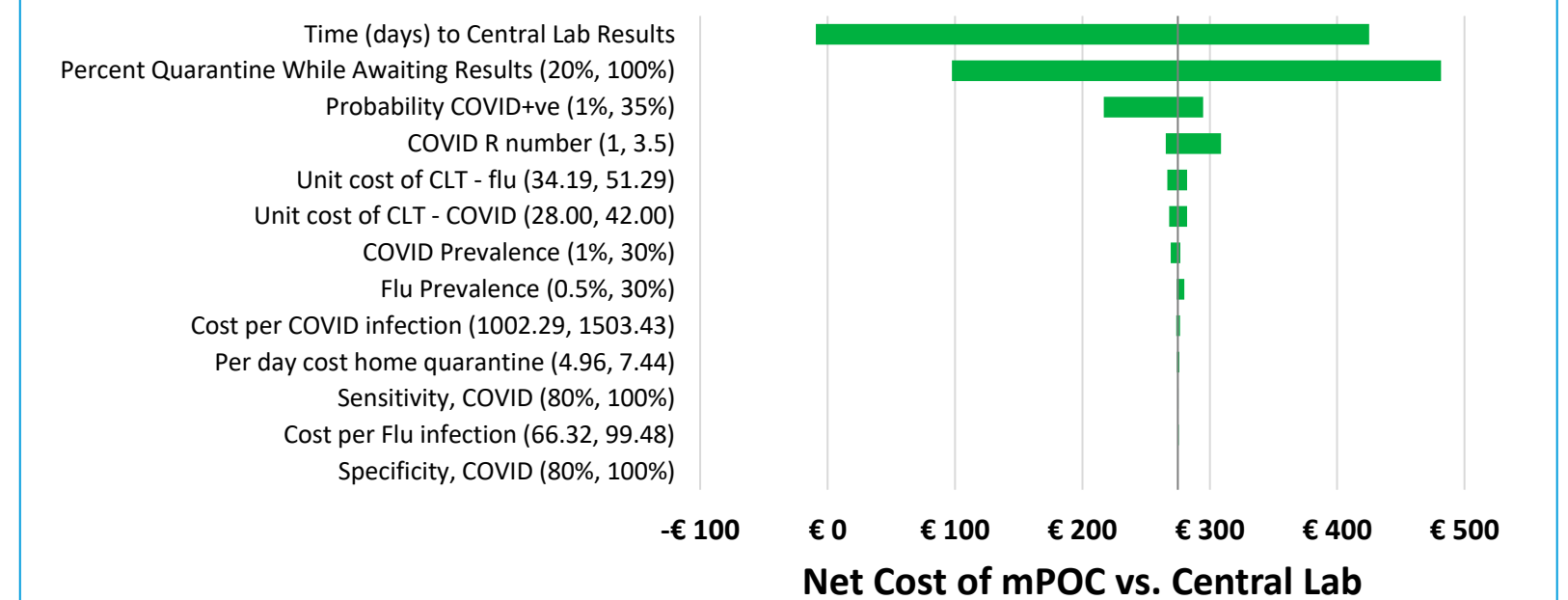
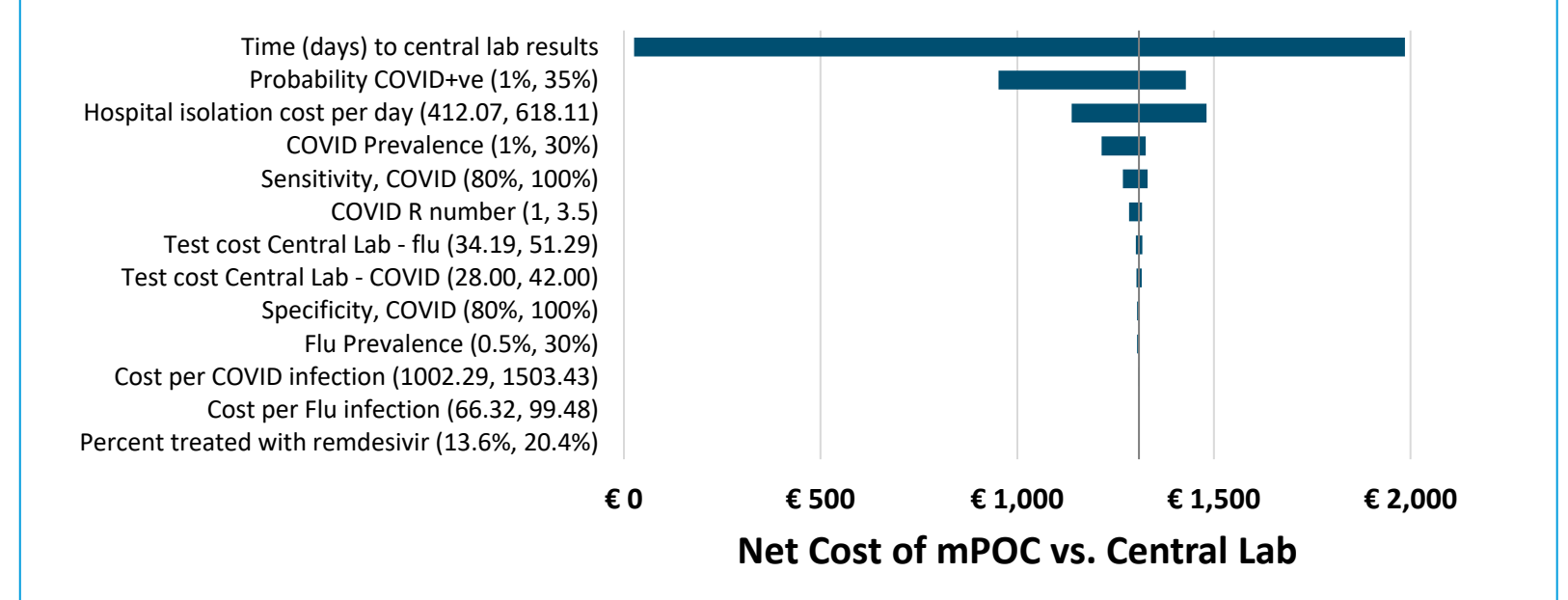


Figure 10. Sensitivity Analysis, Hospitalized Scenario, Germany



CONCLUSIONS

This study demonstrates a sequential mPOC approach for testing for COVID-19 and influenza may be cost-saving compared to central lab PCR testing.

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