

POINT-OF-IMPACT TESTING IN THE EMERGENCY DEPARTMENT: DIAGNOSTIC FOR RESPIRATORY VIRAL INFECTIONS

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Background and objective

Molecular diagnostics for infectious diseases is increasingly important in a clinical setting for both disease management and infection control. New highly sensitive and specific tests become readily available due to the shifting trend from single to multiplex testing, as well as from centralized to decentralized Point-Of-Impact (POI) testing.

With a critical window of opportunity for innovations within a hospital setting, we aimed to assess the value of POI testing for respiratory viral diagnostics at the emergency department, by implementing an adequate diagnostic policy. This will affect the laboratory hands-on time and the total turnaround time which is related to adequate therapy, infection control measures and cost redundancy.

Methods

For the improved hospital broad diagnostic policy, the emergency department (ED), the department of medical microbiology and several clinical wards were actively involved. The BioFire respiratory panel (bioMerieux) was implemented and we extended our service from 08h to 22h, 7 days a week during the respiratory season from early December 2014 to early April 2015.

We created an improved diagnostic policy and measured the (clinical) benefits and costs during this respiratory season. Since the sensitivity of commercial assays approach the quality of laboratory developed tests, we introduced the €hr concept (comparable with kWh), to represent the value of POI testing in patient care.

Results

Improved diagnostic policy

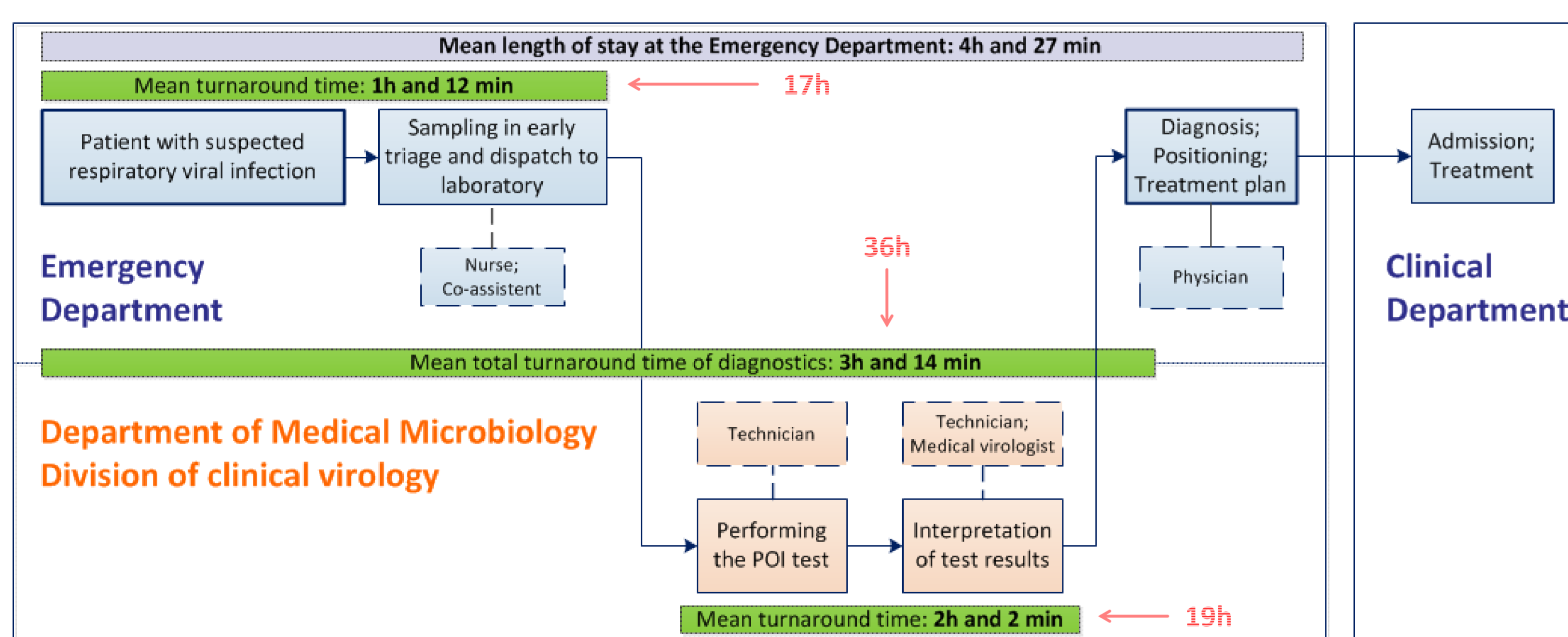


Fig. 1. Routing in the improved diagnostic policy

Diagnostic stewardship

Active involvement of multi disciplinary stakeholders improved open discussion and has shown to be important for creating hospital-broad awareness and support. Successful management of infectious diseases not only involves Antimicrobial Stewardship (ASP), but also an Infection prevention and control Stewardship Program (ISP) and a Diagnostic Stewardship Program (DSP).

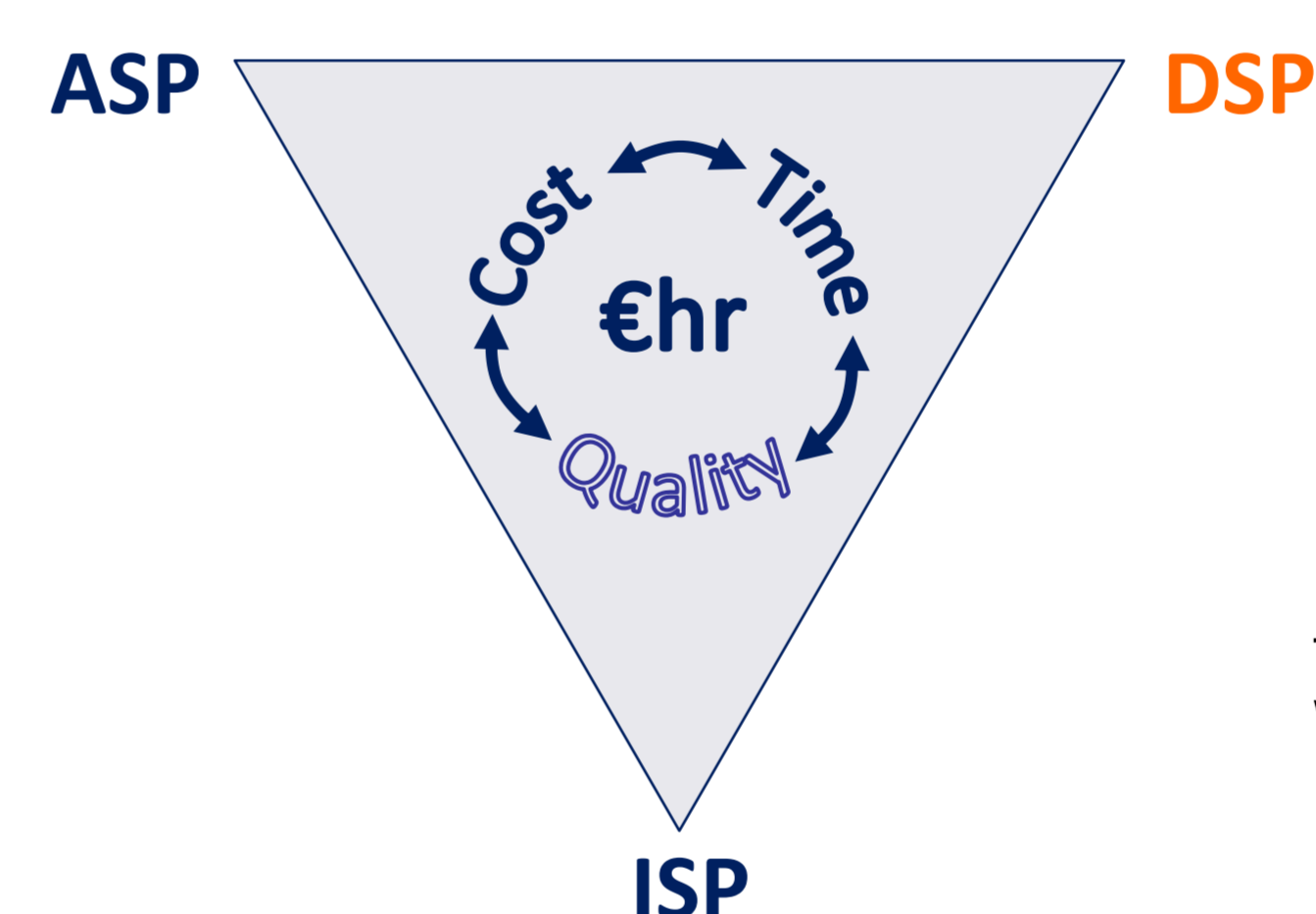


Fig. 2) Optimal diagnostic policy includes three parameters: quality, time and cost. When quality equals one, time (hr) and cost (€) are merged: the €hr concept.

Valuing POI testing, the €hr concept

641 diagnostic requests from the ED during the respiratory season, of which 492 included complete sets of data.

- 436/492 (89%) test results were available before dismissal of patient at the ED
- 330/492 (67%) patients were admitted to a clinical department
- 199/330 (60%) were tested negative;
- 51/330 (15%) Influenza A [Mostly H3]; 20/330 (6%) Coronavirus;
- 18/330 Rhinovirus, 17/330 hMPV and 16/330 RSV; each 5%.

Table 1 Characteristics for the €hour concept: implementing the POI test versus using the PCR

	Test	Costs (€)	Mean turnaround time (hr)	POI value (€hr)	€hr Ratio
Clinical Virology	PCR	€ 39.970,00 (1)	19	759.430,00	4,5
	FilmArray	€ 82.705,05 (2)	2,03	168.166,94	1
Emergency Department AND Clinical Virology	PCR	€ 39.970,00 (1)	36	1.438.920,00	5,4
	FilmArray	€ 82.705,05 (2)	3,23	267.413,00	1

- 1) 492 PCR * €70 and 79 influenza A subtyping * €70 **€ 39,970**
2) 492 FilmArray * €150 and €8905 extra labour **€ 82,705**

Cost benefits with POI testing

The total turnaround time decreased significantly to a mean of 3 hours and 14 minutes. These rapid answers contributed to:

- ✓ Improved (preliminary) diagnosis € ..
- ✓ More adequate therapy € ..
- ✓ Improved patient outcome € ..
- ✓ Keep control of prescribing antibiotics € ..
- ✓ Improved bed management € ..

- ✓ 181 isolations avoided € 154,806
- ✓ reducing nosocomial infections € 37,024

Increase of costs at the division of clinical virology due to:

- ✓ Extended service (Labour costs) € 8,905
- ✓ Increased costs for POI testing € 33,830

Financial benefit € 149,096

Conclusions

Diagnostic stewardship stimulates a **co-creative approach** that resulted in a new **hospital broad diagnostic policy**, which includes an **optimal implementation of POI testing** for the detection of respiratory viral infections.

Valuing POI testing for respiratory viral infections with respect to patient safety, therapy, and infection control, is reflected by combining time and cost in the **€hr concept**.

The hospital broad **financial benefits** were estimated to be at least **€150,000**.

That makes the implementation of POI testing in the respiratory season to be very **cost-effective**.



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