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Supplemental file 1: economic evaluation

Methods

Economic evaluation was performed from the hospital perspective. Medical costs were calculated by multiplying the volumes of health care use with the corresponding unit prices. In particular, we were interested in the impact on process outcomes of diagnostic tests and antibiotic prescription as these procedures were supposedly susceptible to implementation of the clinical decision model. We used real unit prices when available; otherwise charges were used as a proxy for real costs. In-hospital medical costs included costs per patient hour for each caregiver, initiated diagnostics and treatment, length of stay at the ED, hospitalization and revisits. Volumes of diagnostics and treatment were measured according the computer-based hospital information system. Effects of the clinical decision model were differences in the number of false positive and false negative rates. When the clinical decision model resulted in improved patient outcomes with reduced medical costs, complete cost-effectiveness analyses would not be necessary. If the clinical decision model resulted in similar patient outcomes a cost-minimization study was required. Finally, if patient outcomes were worse but with reduced costs, a complete cost-effectiveness analysis was necessary. A sensitivity analysis was performed for differences in the prevalence of SBI where our actual prevalence was increased and decreased with 20%. In addition, we tested the assumption that chest-radiography was no longer routinely

applied in children suspected for a lower respiratory tract infection, as recently recommended in guidelines of the British Thoracic Society.⁴³ Finally, cost differences of 20% variation in costs of diagnostic tests and treatment/ follow-up were calculated. Differences in future health effects were not included and discounting was not applied because of the limited time horizon.

Results

A cost-minimization study was performed because no differences in patient outcomes were observed. Development and implementation of the clinical decision model were estimated to cost €7000 (**table 1**), which was 6% of the total costs in the intervention group. The costs of an ED visit for a febrile child was on average €475 in the usual care group and €525 in the intervention group, excluding development and implementation costs of the clinical decision model. Costs of chest-radiographies amounted for 3 to 5% of the total average costs and for 9 to 14% of the total diagnostic costs for febrile children in both study groups. **Table 2** presents the results of the sensitivity analysis compared to the base-case analysis (**table 1**) with an average healthcare cost-difference per febrile child of €50. All assumptions tested in the sensitivity analysis, excluded development and implementation costs of the clinical decision model and resulted in no or only small relative cost-differences. In detail a 20% increase or decrease in the prevalence of SBI resulted in a difference of the total average costs per patient of €41 to €60, respectively. Under the assumption that no more chest-radiographies were performed for the diagnosis of pneumonia we could save €43 per febrile patient. If all costs for diagnostics were over- or underestimated by 20%, the difference in total average costs per patient as the relative cost difference did not change (€52 - €50). Finally, 20% over- or underestimation of the costs of treatment and follow-up resulted in a difference in total average costs per patient of €60 to €42, respectively (**table 2**).

Table 1 Average health care costs (Euros) per patients for intervention and usual care

Cost category	<u>Intervention (n=219)</u>			<u>Usual care (n=220)</u>	
	Cost price	Volume	Costs	Volume	Costs
<i>Clinical decision model</i>					
Development (hours)	36	144	5,184	-	-
<i>Implementation</i>					
Researcher (hours)	54	4	216	-	-
Nurses* (number*hours)	40	20*2	1,600	-	-
<i>CRP testing device</i>					
Depreciation (years)	138	2	276	-	-
Maintenance (years)	246	2	492	-	-
<i>ED visit</i>					
Physician [^] (hrs*number)	0.25*68	219	3,723	220	3,740
Nurses (hours*number)	0.33*40	219	2,891	220	2,904
Hospital costs	114	219	24,966	220	25,080
<i>Diagnostics</i>					
Urine dipstick	3	156	468	133	399
CRP rapid testing	5	219	1095	220	1100
Hematology [#]	6	31	186	48	288
Blood culture	24	10	240	16	384
Urine culture	3	18	54	17	51
Other cultures [~]	19	20	380	25	475
X-thorax	129	42	5,418	28	3612
Bladdercatheterization					
Material	58	7	406	8	464
Time physician	60	0.25*7	105	0.25*8	120
<i>Medication</i>					
Antibiotics at ED (iv)	7	9	56	14	98
Antibiotics at discharge (oral)	2	69	138	78	156
<i>Follow-up / hospital stay</i>					

Length of stay in hospital (days*number)	575	3.5*26	52,325	3.5*23	46,288
Outpatient clinic	129	22	2,838	27	3,483
Telephonic follow-up	20	47	940	33	660

Costs of diagnoses/ adverse events

Revisit ED	144	47	6,768	45	6,480
Readmission length of stay (days*number)	575	3*7	12,075	3*5	8,625

<i>Total costs</i>			<i>122,840</i>		<i>104,407</i>
<i>Total costs per patient</i>			<i>561</i>		<i>475</i>

Costs without development and implementation of clinical decision model

<i>Total costs</i>			<i>115,072</i>		<i>104,407</i>
<i>Total costs per patient</i>			<i>525</i>		<i>475</i>

* including nurses training in CRP bedside testing/ device

^ 80% resident (60) en 20% physician (100)

including hemoglobin, leukocytes count, platelets count and differential count

~ including feces culture, nasal swab, throat culture and cerebrospinal fluid (CSF) culture

Table 2 Sensitivity analyses: total average healthcare costs per febrile child

	Intervention (n=219)	Usual care (n=220)	Cost- difference	Relative cost- difference
Base-case analysis	525	475	50	10%
SBI prevalence +20%	538	497	41	8%
SBI prevalence -20%	513	453	60	12%
No chest-radiographies	501	458	43	9%
Costs of diagnostics +20%	533	481	52	10%
Costs of diagnostics -20%	518	468	50	10%
Costs of therapeutics/ follow-up +20%	594	534	60	10%
Costs of therapeutics/ follow-up -20%	457	415	42	9%

SBI: serious bacterial infections