BUDGET IMPACT ANALYSIS OF IMPLEMENTING A CLOSED-SYSTEM TRANSFER DEVICE DURING CHEMOTHERAPY ADMINISTRATION IN A FRENCH HOSPITAL

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Background

Contamination of nurses exposed to cytotoxic medications is a growing issue due to the increase use of injectable chemotherapy. Associated adverse events can impair work performance and become an economic concern for the hospital. Recommendations were published for the purpose of reducing the occupational exposure to these carcinogenic, mutagenic and reprotoxic (CMR) agents.

Closed-system transfer device (CSTD) are known to reduce cytotoxic contamination during chemotherapy preparation phase. To our knowledge, no economic evaluation assessing the effect of using a CSTD during chemotherapy administration was made.

Objective

The objective of the analysis is to assess by a budget impact analysis the potential economic impact of introducing a CSTD during chemotherapy administration on a hospital budget. The model has been developed internationally.

Methods

Budget impact model structure:

- A "face-to-face" schema
- Comparators of CSTD were standard luer lock (LL) and needleless connector (NLC)
- Target population is the nursing staff administrating chemotherapy
- Population-based approach
- Open multicohort model with incident cohort and prevalent cohort
- Time horizon of 5 years with annual cycle

Model construction steps:

Three literature review were made

1. Cytotoxic contamination rates for exposed personnel and reduced cytotoxic contamination rates when using a CSTD or a NLC
2. Adverse events frequency associated with cytotoxic contamination
3. Loss of productivity associated with adverse events

Cost perspective:

Health care facility perspective was adopted in order to evaluate the financial consequences for the establishment through the valuation of the productivity losses due to adverse events caused by the contamination, which were direct costs for the establishment :

- Absenteeism during sick leave
- Presenteeism for the reduction of performance during work due to adverse events

Economic theory for cost valuation:

Short-term and long-term adverse events were reported. Two economic methods were used to value the loss of productivity.

1. The Human Capital Methods, which values any hour lost with the gross hourly salary;
2. The Friction Cost Methods, which values a friction period relative to the time necessary to the replacement and the training of a new replacing nurse with the gross salary associated.

The Friction Cost Methods was used in case of long-term adverse events with long sick leaves.

Base case : Public hospital with a medium chemotherapy activity (40 000 annual chemotherapy sessions with 50 nurses involved) using LL or NLC.

Sensitivity analyses : Deterministic

Scenario analyses : Public hospital with a low (10 000 annual chemotherapy with 20 nurses) and a high (70 000 annual chemotherapy with 85 nurses) activity hospital.

Results

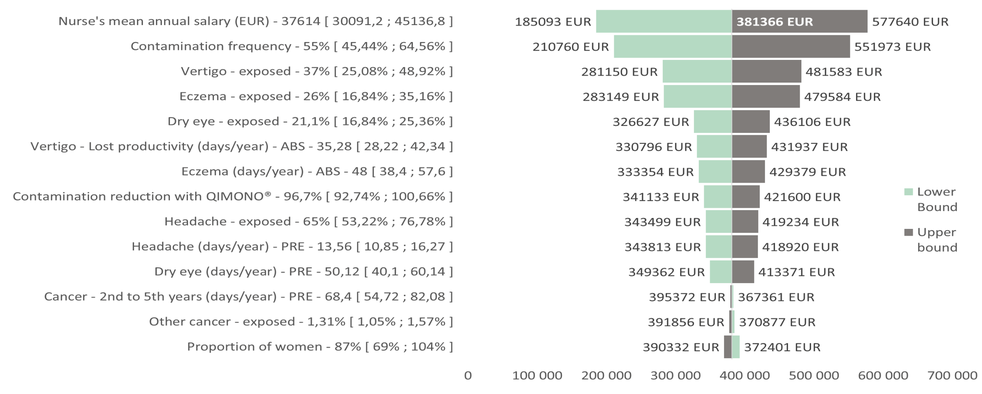
CSTD versus LL:

- A medium chemotherapy activity hospital would save 181 954€ due to lost productivity the first year : 61% of which was du to absenteeism and 39% to presenteeism of nurses
- The establishment would invest 120 000€ in the device each year.
- The health care facility would save 61 954€ the first year. It would result in a return on investment of 52%: for each euro invested in the CSTD the hospital benefits rose to 0.52€.
- Over 5 year, a medium activity hospital saved 381 366€ by adopting CSTD, resulting in a return on investment of 64%

CSTD versus NLC:

- A medium chemotherapy activity hospital would save 160 504€ with 61% due to absenteeism.
- The establishment would invest 102 000€ in the device.
- Resulting in saving 58 504€ the first year.
- Over 5 years, a hospital saved 355 673€ by adopting CSTD, resulting in a return on investment of 70%.

Base case results	Year 1	Year 2	Year 3	Year 4	Year 5	5-year period
vs. LL						
Costs associated with lost productivity (€)	181 954	188 798	195 966	203 441	211 207	981 366
Absenteeism (€)	111 476	111 592	111 705	111 812	111 913	558 495
Presenteeism (€)	70 482	77 206	84 261	91 629	99 294	422 872
Investment costs (€)	-120 000	-120 000	-120 000	-120 000	-120 000	-600 000
Budget impact (€)	61 954	68 798	75 966	83 441	91 207	381 366
Return on investment (%)	52	57	63	70	76	64
vs. NLC						
Costs associated with lost productivity (€)	160 504	166 540	172 864	179 458	186 307	865 673
Absenteeism (€)	98 331	98 437	98 536	98 630	98 719	492 654
Presenteeism (€)	62 173	68 104	74 327	80 827	87 588	373 019
Investment costs (€)	-102 000	-102 000	-102 000	-102 000	-102 000	-510 000
Budget impact (€)	58 504	64 540	70 864	77 458	84 307	355 673
Return on investment (%)	58	63	69	76	83	70



Deterministic sensitivity analyses:

- In each case, the hospital made benefits from adopting the device versus LL.
- When switching with the lower and upper limits of the nurse mean salary, the hospital saved 185 093€ and 577 640€, respectively.

Scenario analyses:

- In all scenario (high activity and low activity), the health care facility would save money by adopting CSTD.
- Benefits increased each year and are larger when the hospital currently used a LL then a NLC.

Conclusion

In addition to a better nurses' health care, implementation of the CSTD during chemotherapy administration would save money to an hospital. Other consideration such as human error couldn't be included in the model but would consistently be reduced by decreasing adverse events occurrences.

References

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