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# The Cost-Effectiveness of Continuous Versus Intermittent Renal Replacement Therapies in Acute Kidney Injury: Perspective of the Social Services for the Elderly in Argentina

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ABSTRACT

**Background:** Acute kidney injury (AKI) is a public health problem that affects millions of hospitalized patients worldwide. In Argentina, evidence suggests that its incidence has risen in recent years. When severe, AKI may require a renal replacement therapy (RRT) where continuous RRT (CRRT) and intermittent RRT (IRRT) are plausible options for patients in the intensive care unit. **Objective:** To evaluate the cost utility of CRRT versus IRRT for the National Institute of Social Services for Retirees and Pensioners, the largest social security health insurance for elders in Argentina. **Methods:** This was a model-based cost-utility analysis. Long-term costs and health outcomes were estimated for a hypothetical cohort with a Markov model. Parameters used were obtained from published literature and validated with local experts. Local costs were estimated and expressed in $AR of 2016. Several sensitivity analyses were run to analyze the impact of uncertainty on results. **Results:** Continuous RRT dominated IRRT by cumulating over the model more quality-adjusted life years and less costs. Total discounted quality-adjusted life years for both cohorts were 1049 and 1034, respectively, and total costs were $95 362 and $103 871. Cost-effectiveness (CE) results reflect these differences in favor of CRRT with a deterministic cost-saving incremental CE ratio and a probability of CRRT being CE of 65.4%, considering a CE threshold of 1 gross domestic product per capita. **Conclusions:** Continuous RRT for patients with AKI eligible for CRRT or IRRT would probably be a cost-effective intervention for the National Institute of Social Services for Retirees and Pensioners' view. Nevertheless, there is considerable uncertainty around results, mainly due to the lack of adequate controlled studies and local data on the prognosis of these patients in Argentina.

*Keywords:* acute kidney injury, renal replacement therapy, health economic evaluation



## Introduction

Acute kidney injury (AKI) is a public health problem that affects millions of hospitalized patients worldwide. It is associated with increased mortality, longer hospital stays, high financial costs, and increased risk of developing chronic diseases.[1–3] Owing to its high incidence, it represents one of the most frequent reasons for consultation in nephrology departments.[4] Estimations of prevalent cases range from 2000 to 15 000 patients per million people per year.[5,6] The multinational AKI-EPI study, which included 1032 intensive care unit (ICU) patients from 97 centers in 33 countries, found that 57.3% of patients suffered AKI during hospitalization, with sepsis and hypovolemia as the most common etiologies.[7]

Acute kidney injury is considered an independent risk factor for mortality.[8,9] Its unadjusted mortality is estimated to be 23.9% in adults and 13.8% in children worldwide, increasing with the severity of AKI.[9,10] Aging is strongly associated with an increased risk and incidence of AKI.[11] Even if patients survive an episode of AKI, few recover their renal function ad integrum. Many patients with AKI, in particular the elderly and those bearing preexisting chronic kidney disease (CKD), will progress to CKD or worsen it.[12] The risk of developing CKD is 28 times higher in those patients with AKI requiring renal replacement therapy (RRT) versus those without AKI,[13] and 2.7% requiring RRT will evolve to terminal CKD in the following 3 years, with dialysis dependence (DD).[14] Acute kidney injury also leads to longer hospital stays, greater risk of

Conflict of interest: Baxter Inc. did not participate in any phase of the study, and all results are responsibility of the signing authors. Mr Garay's affiliation during the entire research was IECS, but in March 2018 the author changed affiliation to Roche Diagnostics.

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2212-1099/$36.00 - see front matter © 2019 ISPOR–The professional society for health economics and outcomes research. Published by Elsevier Inc.
https://doi.org/10.1016/j.vhri.2019.03.008

rehospitalization, poorer quality of life, and significant burden of disease.[15]

In the AKI-EPI study, from all patients with AKI, RRT was needed in 23.5% of the cases.[7] Renal replacement therapy can be provided with an intermittent mode (IRRT) or continuous mode (CRRT). Both techniques are not mutually exclusive but complementary[16]; however, in some specific situations, international guidelines recommend the preferential use of CRRT, including conditions such as hemodynamic instability, cerebral edema, acute brain injury with increased intracranial pressure, and persistent metabolic acidosis.[15] Evidence from randomized controlled trials (RCTs) and meta-analyses have shown no differences in mortality between both modalities,[17–19] but other evidence suggest that CRRT is associated with lower rates of dialysis-dependent CKD compared with IRRT.[13,20]

In Argentina, a local prospective study done in 9 ICUs found a prevalence of AKI in ICU of 52% to 69% according to different sets of definition criteria, with the risk of mortality being 41% to 45%.[21] Most of these patients in Argentina receive medical attention through the National Institute of Social Services for Retirees and Pensioners (PAMI), the largest social security health insurance for elders, whose beneficiaries are mainly retired people, pensioners over 70 years old, and ex-combatants of the Malvinas war. Because of technology availability and coverage policies, CRRT is not commonly a therapy option for PAMI's patients requiring RRT.[22] Because of its potential reduction in dialysis dependency and considering CRRT was shown to be cost-effective in different countries,[23–25] it is a relevant research question if CRRT would be a cost-effective option compared with IRRT for PAMI's views. This study objective, then, is to evaluate the cost utility of CRRT versus IRRT for PAMI.

## Methods

### General Overview

This is a cost utility analysis—many times referred to as cost-effectiveness (CE) analysis in the literature—that compares the costs and health-related quality of life of 2 RRTs for acute patients in the ICU setting, CRRT and IRRT, from the perspective of PAMI, a social health insurance with near 4 million enrollees, mainly senior citizens.[26] Costs and health benefits were estimated with a state transition model and in turn were discounted using a 5% rate based on the Methodological Guidelines for Economic Assessment Studies of Mercosur.[27] The population is a hypothetical cohort of 1000 acute patients who are eligible to receive either therapy. This study followed the Consolidated Health Economic Evaluation Reporting Standards recommendations for reporting economic health assessments.[28] The CE threshold was defined to be 1 gross domestic product (GDP) per capita, estimated for Argentina as $13 467 by The World Bank for 2015.[29]

### State Transition Model and Outcomes Estimations

A state transition or Markov model, adapted from Ethgen et al,[25] was used to estimate long-term costs and health outcomes (see Fig. 1). Patients enter the model with AKI at ICU where they receive 1 of 2 types of renal replacement therapies analyzed (IRRT or CRRT). To capture relevant differences between treatment options, Markov cycles were defined on a daily basis. The main model outcome is chronic DD after discharge from hospital. Patients can die from any cause anytime. The base-case time horizon was defined in 10 years, but longer time horizons were explored using scenario analyses. Incremental cost-effectiveness ratios (ICERs) of CRRT compared with IRRT were calculated as Δcosts /ΔQALYs, that is, the ratio between the difference in cumulative total costs and quality-adjusted life years (QALYs) between strategies. Additionally, net monetary benefit (NMB), estimated as ΔQALYs * λ − Δcosts (cumulative difference of QALYs times the CE threshold minus the total cost difference) and probabilities of CRRT being cost-effective (P[CE]) were calculated.

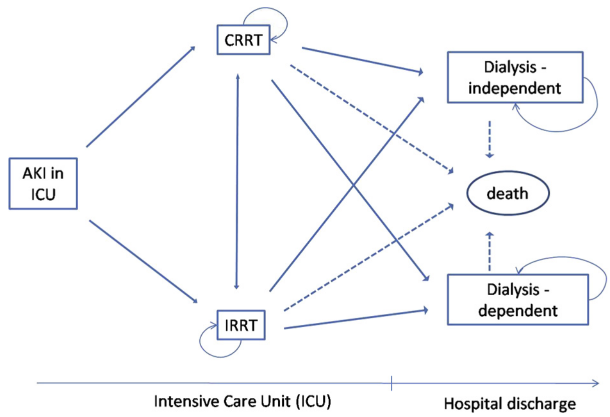


**Figure 1 – Markov Model. Adapted from Ethgen et al.[25] AKI indicates acute kidney injury; ICU, intensive care unit; CRRT, continuous renal replacement therapy; IRRT, intermittent renal replacement therapy.**

### Model Parameters Estimation

Required parameters to run the model are listed in Table 1. We conducted a literature review in PubMed, Cochrane Library, EMBASE, LILACS, the International Society for Pharmacoeconomics and Outcomes Research scientific presentations database, and Google Scholar to identify useful information to estimate them. The search strategies, which are available in the Appendix in Supplemental Materials found at https://doi.org/10.1016/j.vhri.2019.03.008, were adapted to obtain local data related to the epidemiology, resource usage, efficacy, and quality of life of RRT in elderly patients with acute renal failure. Searches were performed from inception until January 12, 2017, without language restrictions. A search for ongoing clinical trials was also conducted on ClinicalTrials.gov and the World Health Organization International Clinical Trials Registry Platform. Additionally, a local panel of 6 nephrology experts estimated missing parameters and validated the estimations for Argentina. Consensus was reached with a Delphi-like panel method.

### Epidemiological and Clinical Parameters

Epidemiological and clinical parameters needed were associated with the population characteristics, clinical outcomes related to ICU stay, survival after ICU discharge, risk of chronic DD, and quality of life (see Table 1). We defined the age at the time of RRT in 65 years because the studies we used to characterize survival rates reported the same.[18,30,31] The average length of stay for this population in ICU was established by our local experts panel in 14.2 (5.00-27.2) days, indistinctly for both types of RRT. This is in line with previous studies.[13,32] To characterize the duration of RRT in the ICU, we used the reference for CRRT reported by Uchino 2005,[33] which corresponds to an observational study that included 1218 patients from 23 countries. Aiming to keep a conservative strategy, we decided to use the same value of 6 days (95% CI: 3-15) for both RRTs. The switch from CRRT to IRRT refers to the percentage of individuals with CRRT as initial therapy in the ICU who

**Table 1 – Parameter used in the base-case model, variability range, probability distributions, and reference. PAMI, Argentina, 2016.**

| Parameters | Base case | Variability range† | Probability distribution‡ | Source |
|---|---|---|---|---|
| ICU stay | | | | |
| ICU stay with RRT (days) | 14.20 | (5.00-27.20) | Gamma (6.29; 2.26) | Delphi panel |
| RRT duration (days)* | 6.00 | (3.00-15.00) | Gamma (3.84; 1.56) | Uchino 2007[32] |
| Switch from CRRT to IRRT (%) | 37.33 | (15.00-47.50) | Beta (12.33; 20.70) | Delphi panel |
| Switch from IRRT to CRRT (%) | 35.00 | (12.50-42.50) | Beta (13.24; 24.60) | Delphi panel |
| Survival (%) | | | | |
| Discharged alive from ICU* | 45.33 | (29.83-55.67) | Beta (25.42; 30.65) | Delphi panel |
| Alive at 60 days of treatment* | 33.50 | (24.00-42.00) | Beta (35.06 ; 69.60) | Delphi panel |
| Alive at 180 days of treatment* | 30.00 | (20.42-40.75) | Beta (23.12; 53.94) | Delphi panel |
| Dialysis dependence at 90 days from RRT | | | | |
| In IRRT (%) | 20.80 | (20.31-21.25) | Beta (5961.58; 22 699.86) | Wald 2014[13] |
| Relative risk (CRRT/IRRT) | 0.68 | (0.38-1.22) | Log-normal (−0,33; 0,30) | Wald 2014[13] y Schneider 2013[18] |
| Health utilities | | | | |
| ICU stay* | −0.34 | (−0.38 to −0.18) | Normal (−0.34; 0.05) | Delphi panel |
| Dialysis independence (DI)* | 0.81 | (0.65-0.90) | Normal (0.81; 0.06) | Delphi panel |
| Dialysis dependence (DD)* | 0.63 | (0.46-0.77) | Normal (0.63; 0.08) | Delphi panel |
| Cost per day ($AR)§ | | | | |
| CRRT | 7779.13 | (6210.29-10 985.18) | Log-normal (8.95; 0.15) | Delphi panel. PAMI[41,42] |
| IRRT | 1952.92 | (1562.34-4300.00) | Log-normal (7.51; 0.41) | PAMI[41,42] |
| DI | 3.42 | (2.74-4.11) | Log-normal (1.23; 0.10) | PAMI[41,42] y otros[22,25,43] |
| DD | 777.06 | (621.65-1087.88) | Log-normal (6.65; 0.15) | PAMI[41,42] |
| ICU hospitalization | 3279.50 | (2623.60-3935.40) | Log-normal (8.09; 0.10) | PAMI[41,42] |
| Others | | | | |
| Discount rate (%) | 5 | (0-10) | - | Mercosur guidelines[27] |
| Cohort (N°) | 1000 | - | - | Assumption |
| CE threshold ($) | 210 212 | - | - | World Bank 2015[29]; ER 2017[49] |

CE indicates cost-effectiveness; CRRT, continuous renal replacement therapy; DD, dialysis dependence; DI, dialysis independence; ER, exchange rate; ICU, intensive unit care; IRRT, intermittent renal replacement therapy; PAMI, National Institute of Social Services for Retirees and Pensioners; RRT, renal replacement therapy.
* Same estimates for CTRR and IRRT.
† See methods for details on range estimations.
‡ Probability distribution parameters were derived from the corresponding variability ranges.
§ Average official exchange rate for 2016 was 14.78 (Banco Central de la República Argentina).

for any reason swapped to IRRT. This was estimated by the local experts panel, which resulted in a similar value of the one reported by Zarbock et al in 2016.[34] We adapted the original model to be able to switch from IRRT to CRRT, for which the experts panel agreed to be 35.0% (95% CI: 13-43).

Evidence suggests that initiation with CRRT or IRRT has no implication for long-term patient survival.[13,16,17,19,35–39] Thus, we assumed no differences in survival between cohorts. This was the same strategy followed by Ethgen et al.[25] We projected survival until day 180 and then obtained a long-term curve using risk estimates from the cohort of De Corte 2016[30] and Schiffl 2012,[31] that were followed for a longer period (7 and 10 years, respectively). Further methodological details on this projection can be found in the Appendix in Supplemental Materials found at https://doi.org/10.1016/j.vhri.2019.03.008. Regarding the chronic DD associated with the type of therapy received in ICU, we used the meta-analyzed estimation of Schneider et al 2013[18] from the group of randomized controlled trials of "satisfactory" quality according to the Jaddad scale: 0.68 (0.38-1.22). Utility estimates for ICU stay, DD, and dialysis independence (DI) were estimated by the panel of experts using vignettes for different health states and the EuroQol EQ-5D-3L questionnaire. Experts were required to complete them as if they were patients. The EQ-5D-3L health states were then valued using Argentinean social weights.[40] Local utility values were estimated as follows: ICU stay −0.34 (−0.38 to −0.18), dialysis unit 0.63 (0.46-0.77), and DI 0.81 (0.65-0.90). See the Appendix in Supplemental Materials found at https://doi.org/10.1016/j.vhri.2019.03.008 for more details.

### Cost Parameters

The model requires estimations of daily local costs per patient of IRRT and CRRT at ICU, and costs per day of DI and DD patients, after discharge. All values are reported in local currency (AR$) of 2016 value. The daily cost of IRRT according to PAMI's public registries is $1952.92.[41,42] Because we did not find costs estimations in Argentina for CRRT, we calculated them based on the cost ratio of CRRT/IRRT observed in international evidence. Three studied were found to be relevant for this exercise, as they reported both costs of CRRT and IRRT.[22,25,43] The average ratio was calculated in 3.6:1 (CRRT 3.6 times IRRT), with a minimum value of 3.2:1[22] and a maximum of 3.8:1.[25] These ratios were then evaluated by the local experts, which in the process of reaching consensus estimated a cost ratio in 4:1 (3.2-5.6). The cost of CRRT was finally estimated by multiplying this ratio with the daily costs of IRRT, which in turn resulted in $7811.68 ($6249.34-$10 936.35). To estimate DD daily costs, we assumed DD to be the treatment of chronic kidney disease with hemodialysis, which is reported by PAMI to cost $1793.22 per session.[41,42] Considering that it is expected that a patient performs 13 hemodialysis sessions per month, the daily cost was calculated as follows: $1793.22 × 13/30 = $777.06.[44–46] The DI costs include medical consultation with specialists and monitoring diagnostic studies such as uremia, serum creatinine, ionogram, and calcemia, among others. The expected resource utilization was estimated from Kidney Disease Improving Global Outcomes Clinical Guidelines for Acute Renal Failure,[15] and were valued using publicly accessible PAMI unit costs.[41,42] The daily cost for DI state was estimated at $5.53.[41,42]

### Sensitivity Analyses

To study the impact of uncertainty on results, we have run several sensitivity analyses (SAs). We used a deterministic SA (DSA) to illustrate the impact of 1-way variations on the base-case NMB (see ranges used in Table 1). Results in this case were summarized in a tornado diagram to visualize which parameters had the greatest individual influence on results. For the probabilistic SA (PSA), CE results were simulated 1000 times to calculate probabilities of CRRT being CE (P[CE]), to graph a scatterplot over the CE plane and to derive a cost-effectiveness acceptability curve. The PSA results were also used to perform a threshold analysis and build a CE price threshold curve to show how changing the costs of both therapies would affect the P(CE). Assumptions of probability distributions and its parameters can be found in Table 1. We additionally analyzed how the following scenarios changed the base-case results: (1) with a lifetime horizon, (2) higher ICU days for CRRT patients, (3) less RRT sessions for CRRT patients, (4) considering the base-case risk ratio (RR) of CRRT/IRRT of Wald 2014[13] instead of the RR meta-analyzed from the RCT of Schneider et al,[18] and (5) considering the global RR of DD meta-analyzed from Schneider et al[18] instead of the RR meta-analyzed from the RCT. A detailed explanation of each scenario is in the Appendix in Supplemental Materials found at https://doi.org/10.1016/j.vhri.2019.03.008.

## Results

### Cost Utility Results

Table 2 shows both discounted and undiscounted base-case results. In both cases, CRRT dominated IRRT by showing more QALYs and less costs in the cumulative count. The discounted QALYs for the cohorts were 1049 in CRRT and 1034 in IRRT, and the total costs were $95 362 and $103 871, respectively. The CE results reflect these differences in favor of CRRT with a negative incremental CE ratio. The NMB resulted in $11 623 and the P(CE) of CRRT considering a CE threshold of 1 GDP per capita for Argentina was 65.4%. Undiscounted results were similar to discounted ones. Continuous RRT compared with IRRT gained more QALYs (1249 vs 1233) with less total costs ($110 561 vs $123 681). As in the discounted scenario, CRRT dominated IRRT. The NMB was estimated at $16 851 and the probability of CRRT being CE lightly increases to 68.5%.

### Sensitivity Analyses Results

Deterministic SA results are summarized in Figure 2, in which the main parameters were ranked according to its force to change the discounted base-case NMB. If the NMB turns negative in DSA, it means CRRT is not CE. This analysis shows that for 2 cases, if the inferior limits were considered instead of their central or base-case values, the resulting NMB would have been negative, making CRRT not CE compared to IRRT. These parameters were 90-day RR for dialysis dependence and the RRT duration in the ICU. All other parameters' uncertainty showed to be less important in this sense, with no ability to change CE results individually.

The PSA in Figure 3 and Appendix Figure A1 in Supplemental Materials found at https://doi.org/10.1016/j.vhri.2019.03.008 resume the PSA. Figure 3 is a scatterplot of 1000 simulated results over the CE plane. The bigger central dot represents the deterministic result, while the smaller points scattered throughout the plane show the possible results, taking into account the assumed variability of each of the parameters (assumed probability distributions, see Table 1). The green line crossing the northeast quadrant represents the CE threshold. All points below this line are CE simulations of CRRT. In total, 65.4% of the simulated results were CE for CRRT. Appendix Figure A1 in Supplemental Materials found at https://doi.org/10.1016/j.vhri.2019.03.008 is the acceptability curve of CRRT according to different CE thresholds. The probability of CRRT being CE

**Table 2 – Results from case base. Accumulated costs per person ($ARS), QALYs accumulated per person, and results of cost-effectiveness. PAMI, Argentina, 2016.**

| | IRRT | CRRT | Difference | ICER | NMB | P(CE) |
|---|---|---|---|---|---|---|
| Without discount | | | | | | |
| Total costs | $123 681 | $110 561 | −$13 120 | - | - | - |
| RRT cost | $10 611 | $25 311 | $14 700 | - | - | - |
| Hospitalizations costs | $25 989 | $25 989 | $0 | - | - | - |
| DI costs | $1444 | $1567 | $123 | - | - | - |
| DD costs | $111 625 | $83 683 | −$27 942 | - | - | - |
| QALYs | 1.232 | 1.249 | 0.018 | - | - | - |
| Results of CE | - | - | - | CRRT dominates | $16 851 | 68.5% |
| With discount (5%) | | | | | | |
| Total costs | $103 871 | $95 362 | −$8510 | - | - | - |
| RRT cost | $10 611 | $25 311 | $14 700 | - | - | - |
| Hospitalizations costs | $25 989 | $25 989 | $0 | - | - | - |
| ID costs | $1205 | $1308 | $103 | - | - | - |
| DD costs | $92 055 | $68 743 | −$23 312 | | | |
| QALYs | 1.034 | 1.049 | 0.015 | - | - | - |
| Results of CE | - | - | - | CRRT dominates | $11 623 | 65.4% |

*Note.* Average official exchange rate for 2016 was 14.78 (Banco Central de la República Argentina).
CE indicates cost-effective; CRRT, continuous renal replace therapy; DD, dialysis dependence; DI, dialysis independence; ICER, incremental cost-effectiveness ratio; IRRT, intermittent renal replacement therapy; NMB, net monetary benefit; PAMI, National Institute of Social Services for Retirees and Pensioners; P(CE), probability of CRRT being CE; RRT, renal replacement therapy; QALYs, quality-adjusted life years.

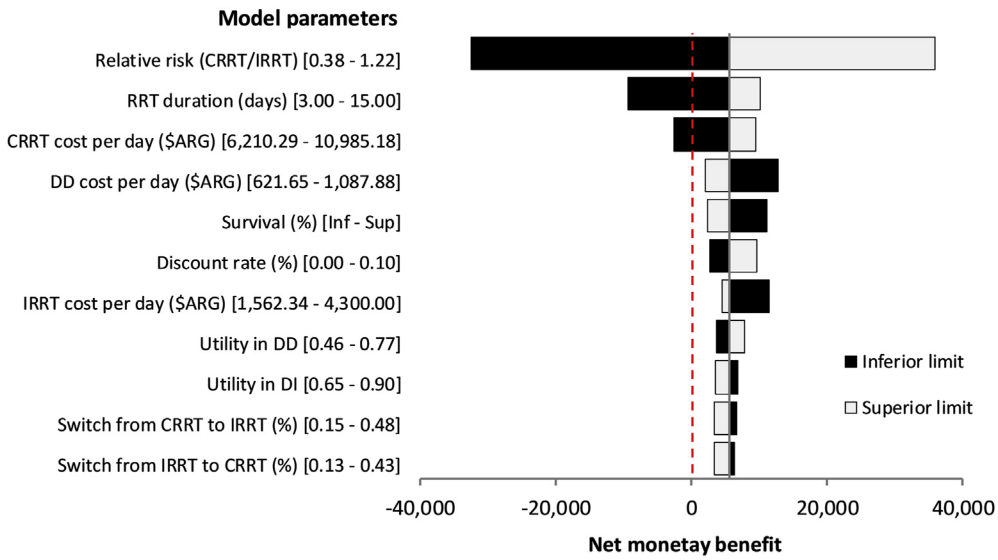


**Figure 2 – Base case tornado graph. A positive net monetary benefit indicates that CRRT is cost-effective compared with IRRT for the CE threshold considered in the study (1 GDPPc). IRRT indicates intermittent renal replacement therapy; CRRT, continuous renal replacement therapy; DI, dialysis independence; DD, dialysis dependence; GDPpc, gross domestic product per capita.**

increases for higher thresholds but no more than 80%. This peculiar form of the curve responds to the characteristics of the uncertainty observed in the scatter plot, where a large number of simulations fall in the fourth or northwest quadrant (less effective and more costly).

The threshold analysis in Figure 4 shows how the probability of CRRT being CE changes for different RRT costs. Because the uncertainty associated with RR is very influential, the variations in the costs of RRT have a slight impact on CRRT probabilities of being CE, and therefore great changes are needed in the costs of RRT to affect the P(CE).

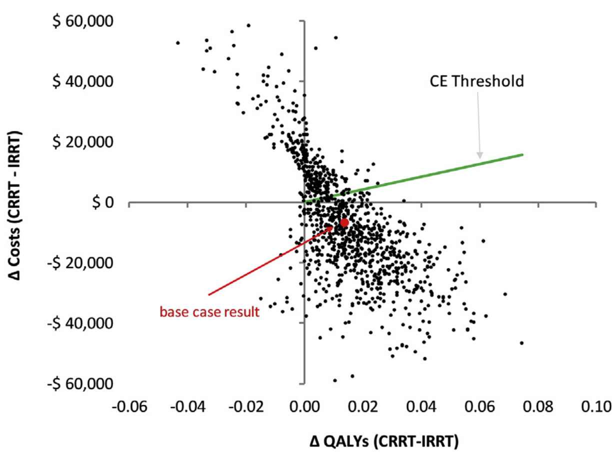


**Figure 3 – Probabilistic sensitivity analysis (PSA). 1,000 simulated results. The cost-effectiveness threshold is 1 GDPpc. The difference in costs and QALYs are expressed per individual. IRRT indicates intermittent renal replacement therapy; CRRT, continuous renal replacement therapy; DI, dialysis independence; DD, dialysis dependence; QALY, quality adjusted life year; CE, cost-effectiveness; GDPpc, gross domestic product per capita.**

The Appendix summarizes results of each of the scenario analyses mentioned before (see Appendix in Supplemental Materials found at https://doi.org/10.1016/j.vhri.2019.03.008). In all cases, CRRT's probability of being cost-effective exceeded 50% when considering a CE threshold of 1 GDP per capita. In general, results were similar to those of the base case. In scenario 5, where an RR of DD at 90 days for CRRT compared with significant IRRT meta-analyzed by Schneider 2013[18] was considered, the probability of CRRT being CE was 94.8%.

## Discussion

This study objective was to analyze the cost utility of CRRT versus IRRT for the perspective of PAMI, the insurance for the elderly in Argentina. We estimated lifetime health outcomes and total direct costs using a state transition model populated with parameters obtained from the literature. A panel of local experts validated the parameters used with a Delphi-like method. Our results suggest that CRRT would probably be cost-effective compared to IRRT. The model showed CRRT dominating IRRT by cumulating more QALYs and less costs for the discounted scenario (1049 vs 1034 and $95 362 vs $103 871) and the undiscounted one (1249 vs 1233 and $110 561 vs $123 681). This result arises primarily as a consequence of the higher probability of patients receiving IRRT being dependent on dialysis at 90 days after receiving RRT, compared with those receiving CRRT. However, uncertainty around this estimate, the most important parameter according to the DSA, is notably high. The tornado diagram suggests that the uncertainty around the main 2 parameters were so high that could change the main conclusions. These parameters are the duration of RRT that was obtained from the consensus of experts and the RR of DD at 90 days from ICU.

The PSA incorporated the uncertainty of all the parameters at the same time. From Figure 3, it is possible to obtain the probability of CRRT being CE compared with IRRT when considering a threshold of CE of 1 GDP per capita. This value was estimated at 65.4%. That is, considering the uncertainty of all the parameters of the model, CRRT is more likely to be CE

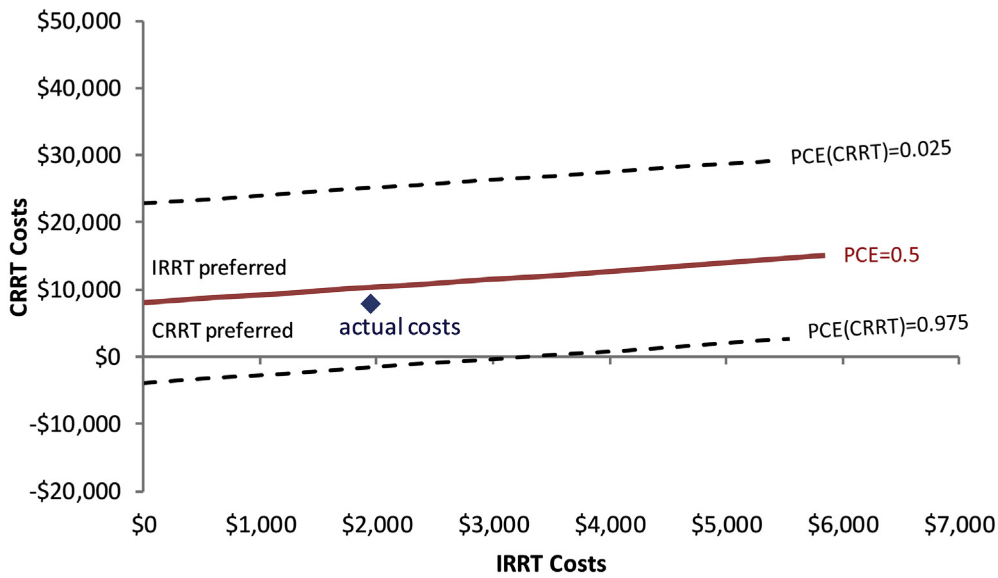


**Figure 4 – Cost-effectiveness price thresholds. Probability of CRRT being cost-effective for different costs of CRRT and IRRT in AR$. IRRT indicates intermittent renal replacement therapy; CRRT, continuous renal replacement therapy; DI, dialysis independence; DD, dialysis dependence; PCE (CRRT), probability that CRRT is cost-effective compared with IRRT.**

compared with IRRT than the reverse. Given the uncertainty that exists over the main parameters of the model, which leads to the cloud of Figure 3 resulting in a large number of points in the fourth quadrant, the CRRT acceptability curve increases as the threshold of CE increases but does not exceed 80% probability.

The CE threshold price curve (Fig 4) also responded to the uncertainty that exists over the main parameters of the study. The central point, reflecting current costs, lay below the line dividing the preference for both therapies (where the probability of being CE equals 50% for both therapies), that is, in the preference zone of CRRT. The analysis suggests that if CRRT prices increase beyond a threshold of approximately $10 000, the preference according to the probability of being CE would change in favor of IRRT.

These results are in line with those previously reported by Ethgen et al[25] for the United States and are against what was reported in 2 economic evaluations also mentioned in their study: Klarenbach et al[47] and De Smedt et al.[48]

This analysis has a series of limitations that should make the reader be cautious about results. Of main importance are the uncertainty associated to the main model parameters, ex-post highlighted by the tornado analysis, specially the 90-day RR of DD and the lack of cost information for CRRT in Argentina. To address them, we aimed to construct as many SAs as we considered relevant for decision makers, and also we aimed to validate the missing information with local experts using Delphi-like panel methods. We believe of special interest are the CE threshold curves regarding the prices of the technologies, from which the probabilities of CRRT being CE can be deduced for a wide range of CRRT and IRRT costs. Another limitation is regarding the definition of the study perspective. The only parameters coming from sources of PAMI are unit costs. All clinical estimates were obtained from non-local studies. As we could not get better information sources to define PAMI's perspective, the Delphi panel was planned to overcome this issue. During the consensus exercise, local experts validated the main assumptions made for PAMI.

## Conclusion

Results suggest that the CRRT strategy in patients with acute AKI, eligible for CRRT or IRRT, is slightly less costly and more beneficial (ie, cost-saving) from the perspective of the national health insurance for the elderly (PAMI) in Argentina, with a probability of being CE of 65.4%. We used the best information to which we had access at the moment, which was in turn validated by local experts. However, there is considerable uncertainty around our results, mainly due to the lack of adequate controlled studies and the lack of local data on the prognosis of these patients in Argentina.

## Acknowledgments

We thank Horacio Trevisani, Ricardo Heguilen, Fernando Lombi, Cecilia Loudet, Ricardo Martínez, and Guillermo Rosa-Diez for their participation on the Delphi panel, and Darío Balán for his valuable comments and work on this manuscript.

This study was funded with an independent grant from Baxter Inc.

## Supplemental Material

Supplementary data associated with this article can be found in the online version at https: https://doi.org/10.1016/j.vhri.2019.03.008.

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