

Machine perfusion cost-effectiveness versus cold storage has been demonstrated; limiting use to marginal donor kidneys unjustified

doi:10.1111/j.1432-2277.2010.01164.x

In their review of machine perfusion (MP) versus cold storage (CS), Yuan *et al.* [1] recommend that pulsatile perfusion should be currently focused on marginal donor organs. They further conclude that ‘costs have recently increased when utilizing MP and previous studies on economics and organ preservation may need to be revisited prior to expanding the utilization of MP to all organs.’

We take exception to the recommendation of Yuan *et al.*, and provide convincing evidence relative to their conclusion.

As suggested by Yuan *et al.*, as well as others, we modeled the cost-effectiveness of MP versus CS based on the clinical outcomes reported in the Machine Preservation Trial (the only published prospective randomized clinical trial comparing CS versus MP), incorporating recent price increases for MP in the United States [1–4].

We found that at 1-year post-transplant, MP is a more cost-effective option than CS for organ preservation in transplants involving either standard criteria donor (SCD) (\$92 561 vs. \$104 118) or extended criteria donor (ECD) (\$106 012 vs. \$114 530) kidneys (see Table 1) [4]. Moreover, the cost-effectiveness ratios for transplants involving machine-perfused ECD kidneys (\$106 012) are similar to those for transplants using cold-stored SCD kidneys (\$104 118). We concluded that MP is preferable to CS for organ preservation in both SCD and ECD donor kidney transplants. Not only is it more cost-effective, but from all relevant perspectives, it adds substantial value.

Therefore, based on our results, as well as those of numerous other studies, it is reasonable to conclude that MP cost-effectively delivers significant clinical benefits across all donor kidney types [2,4–7]. Furthermore, in this regard, we would like to point out that the term cost-effective has a variety of often confusing usages [8]. In our opinion, even if it were at an added cost, the benefits of MP are sufficiently convincing to be ruled cost-effective.

Susan S. Garfield¹ and Roger W. Evans²
¹ Bridgehead International,
 Wayland, MA, USA
² TransplantProfessionals.com, LLC,
 Rochester, MN, USA

References

1. Yuan X, Theruvath AJ, Ge X, *et al.* Machine perfusion or cold storage in organ transplantation: indication, mechanisms, and future perspectives. *Transpl Int* 2010; **23**: 561.
2. Buchanan PM, Lentine KL, Burroughs TE, *et al.* Association of lower costs of pulsatile machine perfusion in renal transplantation from expanded criteria donors. *Am J Transplant* 2008; **8**: 2391.
3. Moers C, Smits JM, Maahuis M-HJ, *et al.* Machine perfusion or cold storage in deceased-donor kidney transplantation. *N Engl J Med* 2009; **360**: 7.

Table 1. Summary of cost-effectiveness results: cost/payment, utility/effectiveness, and overall cost-effectiveness ratios.

Donor type	Storage method					
	Cold storage			Machine perfusion		
	Cost or payment (\$)	Utility or effectiveness	C/E ratio (\$)	Cost or payment (\$)	Utility or effectiveness	C/E ratio (\$)
Extended criteria donor	95 676	0.84	114 530	91 871	0.87	106 012
Standard criteria donor	92 035	0.88	104 118	87 254	0.94	92 561

C/E ratio, cost-effectiveness ratio.

Source: See Ref. 4.

4. Garfield SS, Poret AW, Evans RW. The cost-effectiveness of organ preservation methods in renal transplantation: US projections based on the Machine Preservation Trial. *Transplant Proc* 2009; **41**: 3531.
5. Light JA, Gage F, Kowalski AE, *et al*. Immediate function and cost comparison between static and pulsatile perfusion in kidney recipients. *Clin Transplant* 1996; **10**: 233.
6. Wight J, Chilcott J, Holmes M, *et al*. The clinical and cost-effectiveness of pulsatile machine perfusion versus cold storage of kidneys for transplantation retrieved from heart-beating and non-heart-beating donors. *Health Technol Assess* 2003; **7**: 1.
7. Groen H, Moers C, Smits JM, *et al*. Long-term cost-effectiveness of hypothermic versus cold storage in kidney transplantation. *Am J Transplant* 2009; **9**(Suppl. 2): 227.
8. Doubilet P, Weinstein MC, McNeil BJ. Use and misuse of the term “cost effective” in medicine. *N Engl J Med* 1986; **314**: 253.