Eco-friendly dialysis with the Systemic Design methodology: an eco-friendly dialysis may start from "the grave"

ECO-FRIENDLY DIALYSIS WITH THE SYSTEMIC DESIGN METHODOLOGY: AN ECO-FRIENDLY DIALYSIS MAY START FOR "THE GRAVE"

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OBJECTIVES:

Chronic Hemodialysis produces about 600,000 tons of plastic wastes per year (1). The Systemic Design is an innovat i v e method to analyse the environmental impact and the improvement strategies needed fora "planet friendly" production hardware and supplies, in ali fields of human life, with an approach that progressively moved from the study of the lifespan of the objects, from "cradle-to-grave", to the continuous start of new cycles "from cradle to cradle" (2). In medicine, attent ion to the environmental impact is still limited, most of the analyses so far performed regard the laspart of the cycle, the "grave of waste produets" (3-4).

Aim of the present study was an analysis of the charcteristics of the disposables employed in chronic hemodialysis, as a tool for identifying strategies to reduce the environmental impact and the discharge costs.

METHODS:

The pathway of the dialysis disposables was followed since their arrival to the hospital. Each step of dialysis was followed and photographed; each item was analyzed as for the type of material, the weight, the volume and the optimization of wastes. (5)

RESULTS:

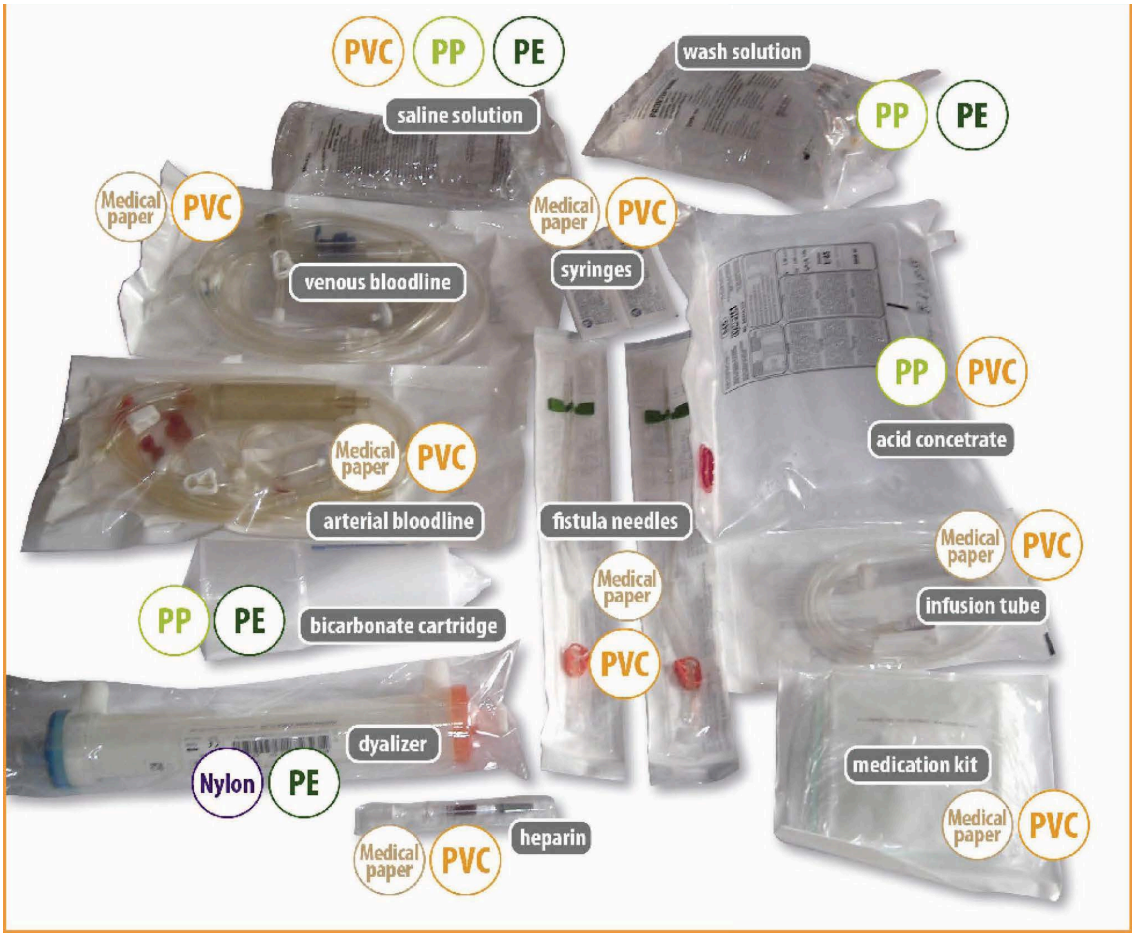
Quantitative analysis.

Each hemodialysis session produced 1.5-2 kg of "contaminated" plastic wastes (i.e. in contact with the patient's blood) that, according to the Italian law, need to be separately discharged, and between 2 and 3 Kg of "non contaminated", mainly plastic wastes (as PP, PE, PVC). As the cost of "contaminated" waste disposal in Italy is 1.8-2 € per Kg, the discharge cost averages 10% of dialysis supplies.

Qualitative analysis

The following potential strategies were identified, staring from the "grave of the waste products"

1. External packaging: large amount ofboxes (non-recycled cardboard), wrapped in plastic. Suggestion: non-disposable coverage, reusable, for delivery. Cardboard boxes should be reused and reusable: the reuse of the same cardboard boxes for dialysis supplies should be considered.
2. Each box contains at least 2 A4 pages of "instructions". Suggestions: use of recycled, non acid paper and ink; reference site for instructions.
3. Packaging. There are two main philosophies of packaging: each element individually and "pre-assembled" packaging, in which a plastic "guide" helps mounting the dialysis machine. The latter are conceptually based upon the principle that time is more costly than wastes. Suggestion: consider compact packaging of single elements. (6-7)
4. Dialysis companies supply pre-assembled "kits" for start and end of the dialysis sessions, which could be at least partly substituted with recycled/recyclable or reusable materials.
5. For disposables contaminated by blood, consider optimal geometry of waste bins: even where wastes are disposed by weight, the volume is crociai in determining transportation fees from hospitals to incinerators (8).
6. Reuse of dialysis filters for a limited time should be weighted against risks of infection, of loss of efficiency and of contamination disinfectants (9-11).



CONCLUSIONS:

The costs, both economical and environmental of dialysis wastes are huge.

The Systemic Design method (12) may be a useful tool for defining single steps of "production" of a dialysis session, suggesting potential strategies. The approach "cradle to cradle" may be a starting point for a criticai analysis, opening to further, more innovative steps, such as the “output>input” approach, learning from nature how to create and renovate “systems”.

REFERENCES:

1. Agar JWM. Personal viewpoint: hemodialysis-water, power, and wastedisposal: rethinking our environmental responsabilities. HemodiallInt 2012; 16: 6-10.
2. McDonough W. Cradle to cradle: remarking the way we make things. New York, USA: North Point Press 2002.
3. James R. Incineration: why this may be the most environmentally sound method of renalhealthcare waste disposal. J Ren Care. 2010 Sep;36(3): 161-9.
4. Connor A, Mortimer F. The green nephrology survey of sustainability in renal units in England, Scotlandand Wales. J Ren Care. 2010 Sep;36(3):153-60.
5. Barbero S, Tamborrini P, Pereno A. Qualitative/quantitative cross analysis to design eco-pack. International Symposium on Sustainable Design –ANAIS. Recife Brazil: Editora Universitaria UFPE 2011. 105-15
6. Barbero S, Tamborrini P. Packaging as a comunicative instrument of and for sustainability. In Bozzola, M.: Sustainability paper packaging for traditional produce. Milano, Italy: Edizioni Dativo 2011.
7. Jedlicka W. Packaging sustainability: tools, systems, and strategies for innovative package design. Hoboken, USA: John Wiley and Sons 2008.
8. Nordin N, Selke S. Social aspect of sustainable packaging. Packaging Technology and Science, 2010; 23 (6): 317-26.
9. Chuang FR, Lee CH, Chang HW, Lee CN, Chen TC, Chuang CH, Chiou TT, Wu CH, Yang CC, Wang IK. A quality and cost-benefit analysis of dialyzer reuse in hemodialysis patients. Ren Fail. 2008;30(5):521-6.
10. Lacson E Jr, Lazarus JM. Dialyzer best practice: single use or reuse? Semin Dial. 2006 Mar-Apr;19(2):120-8.
11. Yan L. Reuse vs. single use: is the tide shifting? Nephrol News Issues. 2007 Dec;21(12):58-62, 64, 74.
12. Bistagnino L. Systemic design: designing the productive and environmental sustainability. Bra, Italy: Slow Food 2011.