SGN-SSN
Schweizerische Gesellschaft für Nephrologie
Société Suisse de Néphrologie
Società Svizzera di Nefrologia
Swiss Society of Nephrology

General actions for a sustainable future of Nephrology

Action 1: Organize the effort and aim to change the mindset

We suggest that every Nephrology unit should have a dedicated team (or in smaller centers) a person responsible for questions about sustainability. In larger centers it is helpful to have an interdisciplinary working group. In hospitals, the efforts should be in coordination with existing working groups for sustainability. At least nurses and doctors should come together to discuss ways of improvement. For the efforts to be effective we would suggest implying a continuous improvement system. To get started, smaller changes are more likely to be adhered to. These steps should be regularly reviewed in scheduled meetings.

Action 2: Status quo and where to go

Gather information about current practices, collect and review ideas for a more sustainable practice. Many ideas of smaller or even bigger improvements develop during a busy daily routine. Even so, these ideas pop-up during work, and are sometimes discussed with colleagues, unfortunately these are very regularly lost as fast as they appeared. Find an easy way to collect these ideas for review. Digital solutions could be a “sustainability Chat site” or a central document where suggestions can be dropped and the person with the idea could be contacted later for details. Everybody in the working process should be able to provide ideas. The ideas should be reviewed and then discussed during the regular meetings, in order to transform them in action points with responsibilities and timelines.

Action 3: Medical Review

The medical review should be performed independently from ecological ideas. The suggested review will optimize the patient's treatment and improve the sustainability of nephrology. A systematic pre-dialysis information will help to choose the best treatment option (in-center HD, home HD, PD). This may increase the rate of home dialysis (thus diminishing traveling to the center) and assure the best treatment method according to the needs of each patient.
Dialysis should be started when uremic symptoms warrant it (life threatening laboratory results should be avoided). Starting dialysis early according to renal function does not provide a proven benefit for the patient. Incremental dialysis could be considered in patients with sufficient residual kidney function.

Action 4: Waste handling and reduction

Review the “Waste Process” in your center. Strictly separate non-hazardous from hazardous (potentially infected) waste. The definition of hazardous waste might differ locally. The volume of hazardous waste is very important as it is expensive to discard and commonly additional plastic containers are necessary for the transport. Decrease the weight of hazardous waste by correctly purging the lines and the filter after use. Consideration should be given to the correct channel for special waste from care activities, e.g. in needle boxes ONLY sharps should be collected.

Steps to reduce the non-hazardous waste:

- Reduce single use plastic/cardboard cups (use glass)
- Omit plastic cups to provide drugs given in the center (e.g. use the blister)
- Use washable dishcloth for all the cleaning to reduce the use of wipes
- Start-up machines right on time (this reduces the amount of electricity, dialysate and waste water)

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Action 5: Recycling and waste recovery
The materials to be recovered vary a lot at different sites. We suggest to make a plan which materials can be recycled; usually paper (careful with patient information), cardboard, PET bottles, glass, metals and electric devices can be recycled and therefore should be separated from the rest of the waste. Plastic covers can increasingly be recycled therefore these should also be collected separately. Review the unpacking of materials in your center to help separate materials.

Steps to increase recycling:
- Evacuate and recycle PET (Where is the PET recycling box?)
- Sorting of paper (develop a process for paper with patient information)
- Cardboard (collection at the site of unpacking?)
- Collect non contaminated plastic waste (when there is a recycle plan available)

Action 6: Energy consumption
We suggest to review the energy consumption in the center. If possible, natural resources of energy should be used (e.g. solar panels on new buildings).
A major part of the energy consumption is consumed by heating up the water/dialysate to the temperature used in the machine.

Potential steps towards energy conservation:
- Switching off the machine when not in use to reduce energy and water consumption.
- Be vigilant on the light in the common rooms and corridors. Lower the light intensity whenever possible.
- Switch off the light whenever possible in smaller rooms (e.g. in Toilets, archives, material rooms etc).
- Reduce dialysate temperature (e.g. 36°Celsius are generally feasible, many centers use 35.5°Celsius).
- Adjust dialysate flow when possible. If a blood flow > 300 ml/min is provided, flows higher than the blood flow have not proven superior to a 1:1 flow (but more information is needed). In this case of uncertainty recheck dialysis quality.
- Use the heat-energy before it goes to waste. Some machines are equipped with heat exchangers. Speak to your provider!
- If possible, use a more efficient technology than an electrical heater to heat the fluid. For example, the use of heat exchangers at a larger scale.
- For ambulatory consultations of non-dialysis CKD patients or PD patients, avoiding transport to the center results in important reduction in energy use (fossil fuel burning). Online outpatient clinics can have a major impact.

Action 7: Water consumption
We suggest to perform a review of the water system. Modern reverse osmosis systems reduce the amount of water needed significantly. Performance of the system should be analyzed and optimized by an expert. The number of thermal disinfections should be reviewed. Weekly thermal disinfections are suitable for most systems. Reuse of water (including rejected water of reverse osmosis) according to hygienic and legal standards whenever it is possible should

be discussed. Several steps which reduce water consumptions are also mentioned under point 6.
In addition:

- Review indications and obtained substitution volumes of HDF. Consider to use "Auto Sub" function, if your machines provide this function. In case of substitution volumes < 23L/session, consider switching to HD or HDx (additional data is necessary).
- Use ecoflow/standby function before the patient is connected to the machine
- Choose the optimal volume for bicarbonate "bottles" for each patient, depending on the duration of the dialysis, HD vs HDF, dialysate flow.
- Avoid unnecessary disinfection, and discuss with suppliers the maximum time a machine can remain without disinfection (generally 72h). Many machines are disinfected every day and are not used..
- Prescribe bag sparing/optimizing peritoneal dialysis regimes.

Action 8: Human resources
We live in times of decreasing human resources. The workforce is shrinking due to lower birthrates and higher dropout rates for nurses. Patients are older, multimorbid and need more support. This results in working conditions that are at times not sustainable.
Furthermore, the working conditions are under financial pressure.
Therefore to help provide sustainable working conditions we suggest to:

- Listen to needs of the team members
- Empower team members to design processes (bottom up)
- Support continuous improvement processes (see lean management)
- Invest resources in better working conditions

Action 9: Sustainable leadership
We suggest that sustainability should not be viewed as an add on to regular business, but should be part of the leadership of the unit. Developing sustainability into long-term profits is necessary. The efforts need to become financially lucrative as costs for energy, water and waste will be reduced. A stable team due to a sustainable human resource management is the basis for a successful business.

Action 10: Spread the information
Work cannot be separated from the private sector when it comes to sustainability. To leverage the efforts, the private sector needs to be involved. Small changes by us all in the private sector will add exponentially to the efforts to reduce CO2 emissions.
Reduce private CO2 Emissions:

- Private transport to work (Carpooling for employees and patients? Train? Bicycle?)
- Consider online attendance in international meetings
- Traffic and traveling (rethink flying)
- Consumption of meat (reduce by 50%), consume local things according to the season
- Avoid ordering in foreign countries (see the full costs, not only the price for item)
- Invest in sustainable resources

Action 11: Dialysate flow rate:

The dialysate flow rate is pivotal for the water and energy used during a dialysis session. The rate should be adjusted according to the dialysis form (HD versus HDF). For HD the dialysate flow (QD) to blood flow (QB) should be 1:2 to 1 (QD about 500, depending on QB).
HDF (hemodiafiltration) should be used when the blood flow is generally ≥ 350 ml/min. In HDF, a dialysate of 600 ml/min can be used. These adjustments require a specific analysis of each machine to ensure compliance with current standards and are filter dependent. Therefore, measure Kt/V a month after adjustment to ensure dialysis quality.

Action 12: Machine activation
Machine activation should be aligned with patient arrival in sequence to avoid unnecessary use of energy and dialysate. This would allow machines to remain off until they are needed. We suggest using automatic energy-saving standby mode and reduced Flow (e.g. Eco Flow Mode) during the preparation phase if not in immediately used. Flow should not be switched off for prolonged waiting time as there is a risk of a risk of bicarbonate failure (flocculation / Ausflocken).
For backup machines not in use, it is crucial to establish a disinfection protocol that takes these Stops into account. These machines may remain off but should be powered on for disinfection every 72 hours, in line with supplier guidelines to maintain the microbiological quality of the system.

Action 13: Water preparation and heat cycles

Have the water supply being evaluated by the supplier. For water treatment, the number of heat cycles and the heat time must be analyzed in correlation with the so-called A0 factor, which is a key measure to ensure effective disinfection.

By optimizing the A0 value, we can:

- Reduce energy requirements for water treatment
- Reduce water quantities
- Ensure microbiological disinfection that meets standards

Each supplier must validate the numbers and optimize the applicable A0 value for their system, enabling precise calculations of contact time and the dynamization of the water loop.

For all suggestions of our group dialysis quality and patients' safety are priority issues. Interact with you provider and sent questions to the Sustainability or the Dialysis working group.

This list of suggestions is based on the opinions of the members of the Working Group for Sustainable Nephrology of the Swiss Society of Nephrology. Suggestions for improvement are welcome (please sent them to office@swissnephrology.ch ("Sustainable Nephrology).

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