

# Sustainable Hospitals: a green strategy for improving competitiveness in healthcare services

## Hospital Sostenible: Una Estrategia Verde para Mejorar la Competitividad en Servicios de Salud

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**Abstract**— The experience of applying the cleaner production concept to healthcare service providers in Boyacá is presented in this paper. The methodology revolves around innovation and technological progress towards adopting cleaner production strategies. The focus is systematic continuous improvement founded on three main components: group-training activities, individualized technical assistance and bestowing “SUSTAINABLE HOSPITAL” certification on the entity. Four complementary components strengthen the process: the exchange of successful best practices, technical environmental consulting services, home-based management activities, and a virtual network called HSOS. The dynamic generated over the course of five iterations of this one-of-a-kind program in Colombia has strengthened quality service provision while minimizing the impacts on human health and the environment. Finally, the conditions unique to the regional context are highlighted, along with the results that have been achieved.

**Key Words**— Green Hospital Program, healthcare services, cleaner production, quality, environment

**Resumen**— En este documento se presenta la experiencia de aplicación del concepto de producción más limpia en entidades que prestan servicios de salud en el departamento de Boyacá. La metodología aplicada se centra en innovación y desarrollo tecnológico, hacia la adopción de estrategias de producción más limpia dentro del esquema sistemático de mejora continua, contempla tres componentes fundamentales: capacitación colectiva, asistencia técnica individual y la entrega del reconocimiento “HOSPITAL SOSTENIBLE” y además integra cuatro elementos complementarios que la fortalecen: el intercambio de experiencias exitosas, el consultorio técnico

ambiental, las actividades de gestión en casa y la red virtual HSOS. La dinámica generada, única en su género en Colombia, a través de ya cinco versiones del programa Hospital Sostenible, ha llevado al fortalecimiento de la prestación de servicios de calidad y a la minimización de impactos sobre a la salud humana y el medio ambiente. Finalmente, se resaltan las condiciones particulares de la experiencia en el contexto regional y los resultados alcanzados.

**Palabras clave:** programa Hospital Verde, servicios de salud, producción más limpia, mejora, calidad y medio ambiente.

### I. INTRODUCTION

The group of consultants involved in the experience documented below are inspired by the Sustainable Development model and took the definition posited in the Brundtland Report of 1987 to heart for the Green Hospital program: "Sustainable Development is that which meets the needs of the present without compromising the ability of future generations to meet their own needs" [1].

This model, which has inspired the behavior of individuals, institutions and nations over the last number of years, has motivated the health and sanitation sectors to also concern themselves with finding a balance amongst the economic aspects of their activity, the care objectives (of social value), and pollution prevention.

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A regional example of a cleaner production program in the health sector is one currently known as the SUSTAINABLE HOSPITAL program. This program has been in operation in the Department of Santander since 2003 and in the Department of Boyacá since 2008 [2]. The environmental variable is included in healthcare service provision using a sector-wide methodology. Sector-wide methodologies for clean production are tailored to each sector, as opposed to multi-sector methodologies that have a more generalized application [3].

In the year 2002, the Corporación Autónoma Regional para la Defensa de la Meseta de Bucaramanga (Regional Autonomous Corporation for the Protection of the Bucaramanga Plateau) –CDMB– appointed the consultants connected with the Cleaner Production for Santander Node, now known as Corporación ECOEFICIENCIA, to carry out a project known as “Integrated solid hospital waste management”. The object was to comply with Decree 2676 2000, and the resulting reduction in water, electricity and natural gas consumption, as well as the proper management of hospital solid waste, showed the status of health entities within the jurisdiction of the CDMB with respect to the management of special waste and resource consumption [4].

The above-mentioned results showed the wide gap between Colombian health entities and global indicators for water and energy consumption, and solid waste generation. A wide gap also exists when compared to the individual environmental management experiences in countries such as El Salvador, Paraguay, Costa Rica, Nicaragua, Spain, Bolivia and Denmark [5], all of which are reference points for any health institution seeking direction for including environmental variables in their management processes.

Likewise, at a national level, isolated projects where the clean production principle has been applied were developed at the Clínica del Caribe, el Hospital Juan de Acosta, Clínica Universitaria Bolivariana, Clínica San Juan de Dios en el municipio de la Ceja [2]. However, these projects have generated short-term economic and environmental benefits that cannot be guaranteed in a structured way for each entity over the long-term.

Based on the above findings, the need to include the concept of clean production for the health sector was introduced with the idea of consolidating autonomous and sustainable environmental management over time. This is how Corporación ECOEFICIENCIA, with the help of the Regional Autonomous Corporation for the Protection of the Bucaramanga Plateau and the University of Santander, started the first phase of the program “Green Hospital” in 2003, now known as Sustainable Hospital [6]. The goal was to identify cleaner production opportunities and implement them in health sector entities so that immediate economic and environmental gains could be generated.

With the goal of continuing to promote this dynamic and motivate healthcare service providers across the country to adopt the cleaner production concept in their service provision, the Regional Autonomous Corporation of Boyacá, in

partnership with the Regional Autonomous Corporation of Chivor and the Health Secretariat of Boyacá, started the first version of Green Hospital in the Department in 2008. The following health enterprises joined at that point in time: E.S.E. Hospital Regional de Duitama, E.S.E. Hospital San Antonio de Soatá, E.S.E. Hospital San Vicente de Ramiriquí, Hospital Regional II Nivel de Atención Valle de Tenza E.S.E. Sede Garagoa, Hospital Regional de Sogamoso E.S.E, E.S.E. Hospital San Francisco de Villa de Leyva, E.S.E. Hospital San Vicente de Paul de Paipa, E.S.E. Centro de Salud de Ventaquemada, E.S.E Hospital San Rafael de Tunja, E.S.E Centro de Salud Manuel Alberto Fonseca Sandoval de Sotaquirá [7]. Sustainable Hospital Boyacá continues to operate today, and in the sixth iteration reports the participation of 45 entities belonging to the public network of the Department.

This program contributes greatly to environmental management by improving and streamlining processes for the participating health enterprises. This is achieved by acquiring environmental knowledge with the help of technical experts, and couching it within a systematic and continuous clean production structure, as well as applying production alternatives inside each organization. This dynamic favors the preservation, saving and efficient use of resources such as water, inputs, and energy, and promotes solid waste management and the control of chemical product use, emissions and spills, among other things [4].

## II. METHODOLOGY

The Sustainable Hospital program involves the work of a multidisciplinary team [8] whose members join forces and expertise for the purpose of establishing a framework for ongoing and systematic improvement. The team is made up of representatives from the regional environmental and sanitation authorities, the professional technical team from Corporación Ecoeficiencia and the environmental and sanitation committees of the participating entities. The object of the exercise is to identify opportunities for cleaner production and implement them in a way that generates immediate economic and environmental gains and contributes towards complying with applicable environmental legislation [4]. The functionality of the Sustainable Hospital program is characterized by the simplicity of the requirements and ease of operation.

Group training is complemented by individualized technical assistance tailored to each health enterprise in order to identify cleaner production alternatives and corroborate the progress made at a particular site.

Participating entities are stimulated to independently continue with their environmental management by awarding them with the SUSTAINABLE HOSPITAL certification as a way of extolling the excellent environmental indicators and economic benefits reached after following the methodology.

A detailed description of the methodology stages follows.

### A. Training

The SUSTAINABLE HOSPITAL is aimed at the representatives of health enterprises. Through the use of group-training workshops, participants receive practical training, internalize key clean production concepts, clear up doubts and identify common barriers to the inclusion of environmental variables in service provision. These meetings, which are lead by the technical team of the corporations appointed for this task, also create debate and information and experience exchange amongst participants and the technical team (in the case of Boyacá this was Ecoeficiencia).

### III. TECHNICAL ASSISTANCE

Individualized technical assistance for each health enterprise is carried out in parallel with the training workshops so that cleaner production alternatives can be implemented. Personalized assistance is provided by way of technical visits characterized firstly by identifying alternatives during tours of the premises, interviews with staff who provide care, and reviewing current practices. Secondly, by checking whether the applicable environmental and sanitation regulations are being complied with. A technical, economic and environmental analysis of the identified alternatives is carried out [9] in order to ascertain their feasibility and structure a specific environmental action plan for each organization. Lastly, once the enterprise has taken ownership of the concept of economic savings associated with environmental benefits, they generate new cleaner production initiatives that can be applied more easily and spontaneously in their own contexts and then shared with other health institutions.

The success of bringing the alternatives identified to fruition depends upon the leadership and commitment of the environmental and sanitation committees of each entity. It is for this reason that considerable variation can be observed in the achieved results amongst the group of beneficiaries.

Systematic follow-up of the program is also necessary in order to consolidate the learning process through technical assistance with emphasis in analyzing group and individual progress during the technical visits. In this way, detecting deviations from the plan and applying timely solutions is made possible.

### IV. SUSTAINABLE HOSPITAL RECOGNITION

Taking into account the effort made by diverse health enterprises to improve their environmental performance, the methodology provides for awarding a SUSTAINABLE HOSPITAL accreditation. This is considered to be a stimulus for autonomous environmental management on the part of the health sector so that continuous improvement in environmental management becomes the norm and other entities start to include the environment as a variable in their service provision.

Four criteria are used to evaluate whether a SUSTAINABLE HOSPITAL accreditation can be awarded: MANAGEMENT, IMPLEMENTATION, RESULTS and CONTINUOUS

IMPROVEMENT. Each criterion has its own variables that are graded until a maximum mark of 1000 is reached.

The enterprises that opt for this certification must comply with environmental and sanitation regulations in their entirety and be authorized to operate by the relevant authority.

The evaluation is objective and independent which guarantees a serious and transparent process, beginning with an environmental performance report followed by the deliberation of a panel of judges using the scores assigned to each entity, then the information is analyzed and lastly, the entities with the highest scores in each awarded category are named.

By way of signed minutes, the panel of judges makes official the names of the winners. These are kept secret until the day of the SUSTAINABLE HOSPITAL award ceremony.

This certification, the first of its kind in Colombia, is awarded by the Ministry of Social Protection for Boyacá, Regional Autonomous Corporation of Boyacá –CORPOBOYACA, The Regional Autonomous Corporation of Chivor –CORPOCHIVOR and the Health Secretariat of Boyacá [7].

It is both an honor for the winning institutions to receive the SUSTAINABLE HOSPITAL award and it is a commitment that serves as an example to other intuitions in the sector. As a result, it is expected that subsequent actions will be consistent with this distinction. With the award comes the obligation to be promoters of sustainable development in the sector and the country, and to publish their experiences and results.

The SUSTAINABLE HOSPITAL award has two categories:

**OUTSTANDING SUSTAINABLE HOSPITAL.** This category rewards the entity's commitment to independent environmental management, which enables it to guarantee ongoing environmentally friendly improvement, complete compliance with environmental legislation, and economic benefits that ensure the presence of the environmental variable over time. The winning organization becomes an example to follow in the health sector since it has an environmental management model that generates a respectable reputation for safety, integrity and trustworthiness in the eyes of the community.

The SUSTAINABLE HOSPITAL category serves as a stimulus towards scaling up taking ownership of the environmental management process within the organization, and in so doing systematically consolidating the inclusion of the environmental facet healthcare service provision.

### V. RESULTS

Over the five different versions of the program, 2,204 cleaner production options have been applied on the following work fronts: rational and efficient use of water and energy, and solid

waste and chemical product management. The results attained by the participating entities during the five versions allowed for reducing water consumption by 203,398 cubic meters, the equivalent amount used by 45,188 people over an entire month. Energy use was reduced by 2,322,882 kWh/year, a large enough amount to supply 21,117 homes for one month and a reduction in natural gas consumption equal to 340,395 cubic meters which could meet the needs of 17,020 households over a month. Given the reduction in electricity and natural gas use, 1591.5 tons less of carbon dioxide was generated [7].

Harmful solid waste was reduced by 230.6 tons. Solid waste that was reincorporated into the production cycle equaled 1054.3 tons with the concomitant reduction in consumption, and this without taking into account that 285.8 tons less solid waste was generated in the first place [7].

The economic benefits accrued due to the above-mentioned results over the five versions of the program in Boyacá are calculated at \$3,059,805,375 COP [7].

A consolidated group of participating entities now exists which shows enthusiasm and dynamism after verifying that cleaner production has improved their environmental performance at the same time as generating important economic gains that make them more competitive each day.

## VI. CONCLUSIONS

The alliance with environmental and sanitation authorities in this process is very important since it allows for uniting internal and external criteria related to the management of solid waste and chemicals, among other things. Achieving responsible and frugal resource management leads to benefits for organizations and their clients and avoids the duplication of information and efforts. Likewise, this alliance facilitates the verification of legal compliance and strengthens the relationship between authorities and organizations because the policing image of the authorities is replaced with one of supporting responsible management and working together.

The SUSTAINABLE HOSPITAL program contributes greatly to environmental management by improving and streamlining processes for the participating health enterprises. This is achieved by acquiring environmental knowledge with the help of technical experts, and couching it within a systematic and continuous clean production structure, as well as by applying production alternatives inside each organization. This dynamic favors the preservation, saving and efficient use of resources such as water, inputs, and energy, and promotes solid waste management and the control of chemical product use, emissions and spills, among other things [4].

The results achieved during the five iterations of this program have motivated the environmental and sanitation authorities of Boyacá to keep this continuous improvement initiative going. They hope to include all of the organizations that make up the public health care network in Boyacá so that the accrual of environmental and economic benefits can demonstrate that

including the environmental variable in healthcare service provision is sustainable over the long-term and also contributes to sustainable development in general.

Articulating environmental authorities with sanitation authorities in the Department of Boyacá within the SUSTAINABLE HOSPITAL initiative is a key factor in supporting the continuous improvement of the quality of healthcare service provision and accreditation. This is especially true when talking about the efficient use and safe management of solid waste and chemical substances, which have direct repercussions for productivity and improved use of available resources with knock-on benefits for clients.

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