Biomedical Waste Disposal and Recycling of Products August 2025





Green ART News Bulletin





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On the Occasion of

World Environment Day 5th June, 2025

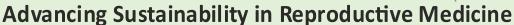
IFS Proudly Launched its Green IVF Centres Initiative



a step towards Promoting Sustainability in Reproductive Healthcare



From the President's Desk.



Dr. Prof.(Col) Pankaj Talwar VSM President, IFS





When we heal the Earth, we heal ourselves **Enhance fertility with Green initiatives!**

In the realm of reproductive health, in vitro fertilization (IVF) has emerged as a beacon of hope for couples facing infertility. However, as the demand for fertility treatments escalates, so also the need to address the environmental impact of these practices. This initiative explores the concept of Green IVF—an innovative approach that prioritizes sustainability without compromising the quality of patient care.

By examining the environmental challenges associated with traditional IVF and presenting actionable solutions, this project aims to inspire a shift toward more ecofriendly reproductive technologies. Traditional IVF practice is largely resourceintensive, that results in a considerable carbon footprint and contributes to environmental degradation. To recognize these grey areas and bring about a paradigm shift in how we introduce green changes in our IVF setup, is of paramount importance.

Green IVF represents a significant evolution in the landscape of reproductive medicine. As we continue to innovate and refine the IVF techniques, the dual goals of enhancing patient outcomes and reducing environmental impact can be achieved; at the same time contributing to lower operational costs, making fertility services more accessible in the long run.

Thus, the Green IVF Initiative aims to catalyze dialogue among healthcare professionals, researchers, and patients, inspiring collaborative efforts to embrace sustainability in IVF practices. By initiating the Green IVF Project in India, Indian Fertility Society (IFS) strives to pave the way for a more responsible, compassionate approach to reproductive health that honors the well-being of future generations.



Green IVF- Sustainable IVF program: A Novel initiative by Indian Fertility Societ

Dr. Prof. Shweta Mittal Gupta Secretary General, IFS

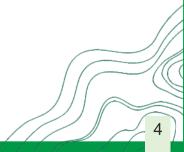


Our environment is the foundation which plays a pivotal role in ensuring our health, economy and well-being. Climate change, resource depletion, and pollution affect every facet of life. There is an urgent need to shift toward sustainable practices which is felt by everyone, including industries like healthcare and assisted reproductive technologies (ART). In a world where IVF and other ART procedures are becoming more common, especially as people turn to these treatments to build families, it is vital that we consider the environmental implications of these technologies. The green world is not just an abstract concept, it's about ensuring a healthy future for all of us, both in terms of the planet's ecosystem and the next generation. There is an urgent need to tie this idea of a "green world" directly to ART and inculcate the habit of sustainable living.

By integrating green technologies and sustainability into ART, we intend not only to minimize harm but also to pave the way for future innovations that will benefit everyone. Countries like India, with growing IVF markets, can pioneer "Made in India" green IVF technologies that can reduce the global carbon footprint. Afterall, green world matters to us all, and by making the IVF process greener, more efficient, and more eco-friendly, we're contributing to a 'healthy' future where both people and the planet can thrive

This innovative step taken by Indian Fertility Society aims at sensitizing ART clinicians, embryologists and stake holders who will collectively work towards the goal of green, sustainable IVF and put India on the global green map.





Pearls of Wisdom



Dr. Sonia Malik Mentor, Green IVF Initiative Chief Clinical Mentor, Nova IVF & Fertility, INDIA



Green Revolution by White Coat, Leading from despair to Hope!

In the 1960's, a global clarion call of 'Green Revolution' was given to increase the agricultural yield in order to meet the increasing food demands of a rapidly rising population. This new mantra indeed proved successful worldwide and also drove India towards becoming a more powerful self-sufficient and economically strong nation. Recently, a new term has started coming up in the field of reproduction — Green IVF! Interestingly, both terms pertain to reproduction: one in the field of plants and the other in animals / humans... dealing with the seed and soil!

The Green Revolution involved the introduction of high-yielding variety (HYV) seeds, advanced irrigation techniques, and chemical fertilizers to boost agricultural productivity Similarly, Green IVF utilizes innovative techniques such as natural cycle IVF, which minimizes hormonal medication and focuses on using advanced imaging and selection technologies for embryo quality assessment. Both movements aim to increase production efficiency. The Green Revolution aimed to alleviate hunger and improve food security whereas Green IVF addresses infertility issues, providing effective sustainable health solutions for couples struggling to conceive.

The biggest challenge with the green revolution has been the change in the genetics and epigenetics profile due to use of insecticides, pesticides and genetically engineered varieties of seeds. Fortunately, in contrast, Green IVF emphasizes a more holistic, innovative and sustainable approach by reducing medication use and environmental impact associated with traditional IVF methods.

I congratulate the present team of IFS led by Col.(Dr) Talwar and ably supported by Dr Shweta Mittal for taking up this very topical subject as the theme of this year. I am sure with the well thought of program, and committed team members, we shall see a change in ART practice in the country very soon.

I wish IFS a thumping success





The IFS Green Brigade



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Green Teams

IFS Green Initiative proposes to touch every aspect of the IVF field so as to improve sustainability in routine ART practice. Accordingly, a task-force of 9 specialized 'Green Teams' has been formed to investigate and evaluate problem areas where green alternatives can be applied. Phase-wise implementation of novel ideas is envisaged, facilitating a dynamic shift to environmentally friendly techniques in the near future.

1.Understanding green sustainable IVF

- 2. Designing sustainable ART clinics
 - 3. Clinician perspective towards reducing carbon footprint
 - 4 .Low cost IVF to reduce environmental load
 - 5. Bio medical waste disposal and recycling of products
 - 6. Embryology initiatives to reduce environmental carbon load
 - 7. Cryobiology and greenhouse emissions
 - 8. Made in India initiative to reduce GHG emissions
- 9. Novel ideas and net zero by 2045



Team 5 Bulletin

Biomedical Waste Disposal and Recycling of Products

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Biomedical Waste Disposal and Recycling of Products

Introduction

The healthcare industry has evolved significantly over the years. However, these advancements have also led to a growing environmental footprint. Assisted Reproductive Technology (ART), especially In Vitro Fertilization (IVF), contributes considerably to greenhouse gas (GHG) emissions through both clinical and laboratory operations. These changes bring with them serious environmental, social, and health consequences.

IVF contributes significantly to the GHG (1) as IVF facilities are:

- □ **Energy-intensive**: Due to air handling systems and equipment that operate 24/7.
- Plastic-reliant: Single-use plastics are heavily used for gamete and embryo culture. These materials and their by-products (e.g., microplastics) are endocrine disruptors and affect fertility.
- □ **Paper-heavy**: Record keeping generates substantial paper waste.
- Gas-dependent: Large amount of gases are required for operation of Incubators and liquid nitrogen (LN2) is necessary for the cryopreservation and cryostorage of gametes and embryos. Transportation of these cylinders and tanks is entirely fossil fuel dependent, creating a significant environmental burden. GHG emissions by Transportation & Incineration causes Global warming, ozone depletion, particulate matter and the potential for eutrophication (accumulation of nutrients in bodies of water), also known as 'midpoint' indicators.
- The **clinical side of IVF** is also carbon foot print heavy generating huge amount of waste in terms of
 - Multi-day monitoring of hormones via
 - Clinical laboratory testing, and
 - Daily injections delegated to the patient under treatment,
 - Use of single-use stainless steel oocyte retrieval needles and embryo transfer cathers
 - Heavy use of disposable personal protective equipment



According to a World Bank report (Kaza et al., 2018), **70% of waste** is either landfilled or dumped in the open, **11% is incinerated**, and **only 19% is recycled**.

IVF Waste is broadly categorized into three categories

1. General Waste

- Consumables: Plastics, disposable gloves
- Packaging waste: Styrofoam, gel/ice packs, cardboard

2. Biological Waste

 Includes follicular fluid, blood, semen, sharps – must be treated before disposal

3. Equipment Waste

Outdated computers and lab equipment

Hence it's important to undertake efforts towards decarbonization and sustainability and reduce the impact of laboratories on environment. The aim should be to reduce waste by 50%.

Need for Change: From "3Rs" to Prevention and Net-Zero

The traditional **Reduce**, **Reuse**, **recycle** approach is no longer enough. We must now **Prevent**, **Reduce**, **Reuse** (**Repurpose**), and **recycle**, aiming for **net-zero GHG emissions** by:

- Diverting waste from landfills to waste-to-energy or recycling facilities
- Bring awareness by imparting Education and bring Behavioral Change in the ART community
- Do online surveys and identify existing good practices and incorporating them as opportunities for improvement.
- Plan for regular laboratory meetings to discuss progress and the education of all staff
- Recognize, Elevate and Reward who play a critical role in building a new culture in the organization
- Discuss Annual sustainability reports and Audits.
- Encourage **regulations**:
 - Top-down regulation -Requires compliance and imposes penalties on companies and clinics that do not comply.



 Bottom-up regulation -Policies that encourage compliance through incentives, rewards and recognition.

The following measures, if taken in terms of waste management, recycling, energy expenditure, water usage, resource management can have significant positive impact on the environment and are summarized below.

Recommended Sustainable Practices

1. Waste Management

Proper waste segregation and management is essential not only for regulatory compliance but also for safeguarding public health and the environment. In India, hospital waste is classified under distinct rules and color-coded systems to streamline safe handling, treatment, and disposal.

Bio-Medical Waste – Color-Coded Segregation (BMWM Rules, 2016) (3)

The Biomedical Waste Management (BMWM) Rules, 2016, mandates that hospitals segregate infectious and hazardous medical waste into specific-colored



containers, each representing a waste type and its treatment pathway Fig.2 Color-Coded Biomedical Waste Segregation (BMWM Rules, India 2016)



Simple action such as replacing deskside waste bins with centralized sorting stations can reduce the volume of waste by 30%, also leading to a significant decrease in the time spent by cleaners removing the waste and markedly increase the recycling rate (400% increase), as reported by Thermo Fisher Scientific (4). This reduces the volume of waste that must either be incinerated or treated chemically to render it non-hazardous, hence reducing emissions of GHG, pollutants such as dioxins, and toxic ash, which are released during this process.

- Seek guidance from local or institutional waste management services
- Follow Circular economy' approaches Give incentives to users who 'return' waste (obsolete electronics) and contribute to the economy.
- Shift from plastic to cloth bags, caps, and gowns.
- Replace shoe caps with laboratory-only shoes
- Reuse packaging Material (icepacks, cardboard, Styrofoam)
- Recycle Medication Packaging and o ☐ ②ce supplies.

2. Packaging

- Use **QR codes** instead of paper instructions.
- Replace Styrofoam with sustainable alternatives like wool packs.
- Clearly label packaging with recyclability instructions.

3. Suppliers and Manufacturers

- Extend product shelf life and prevent expiry-related waste.
- Avoid Excessive Packaging, opt for bulk packaging in lieu of individually wrapped items
- Manage inventory to avoid throwing away unused items
- Consolidate orders, minimize frequency and combine inter-departmental orders
- Choose **sea transport** over air freight for non-cold sensitive items such as instruments whenever possible to keep carbon dioxide emissions and costs down.
- Recycling of packaging materials. Recyclability labels should be mandatory, either 'recycle' or 'do not recycle'.

5. Paper Reduction

- Use double-sided printing and recycled paper.
- Promote e-prescriptions and achieve Digitization of the clinic and laboratory via commercially available software, including an electronic medical record system with a patient portal for communication and consenting.
- Perform regular audits of paper usage.
- Consolidate Paper work
- Use Electronic platform to complete consents
- Perform Audits to monitor paper use

6. Energy Conservation

- Install LED lighting and motion sensors to activate or turn off ceiling light.
- Turn off Computers, Monitors, non-essential equipment when not in use.
- Purchase energy-efficient equipment, by seeing energy rating or efficiency level.

7. Lab Optimization

- Manage cold storage efficiently with autofill LN2 systems.
- Reduce consumables like syringes used per embryo transfer procedure and culture dishes through daily estimates and batching procedures.
- Minimize dish wastage by accurate scheduling and planning.

8. Water Conservation

- Use aerators on taps (50% savings).
- Redirect excess water into other systems (e.g., toilet flushing).

Certifications for IVF Centers

To ensure compliance and continual improvement, IVF labs should pursue:

- □ ISO 14001 Certification
- □ LEED Certification
- Paris Agreement Goals for Carbon Reduction



Summary

Biomedical waste in IVF labs presents a significant environmental challenge. However, with targeted strategies—ranging from waste segregation to digital transformation and energy conservation—ART clinics can drastically reduce their ecological footprint. IVF laboratories must evolve not only as leaders in reproductive medicine but also as champions of **sustainable**, **responsible** healthcare.

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Nursing Empowerment Program (NEP)

Review of Work (ROW)

Quarter- II, III & IV, 2024



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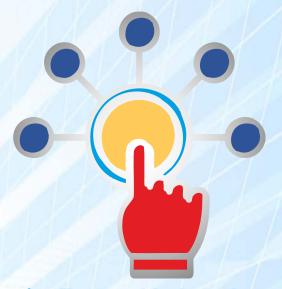
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(CEP) Counsellor Empowerment Program



(IEP) Intelligence Empowerment Program



NEP) Nurses Empowerment Program



(PEP) Patient Empowerment Program



(SEP) Self Empowerment Program



(YEP) Young Empowerment Program



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