Singapore Journal of Legal Studies
[1991] pp. 144 - 157

USE OF ADVANCED TECHNOLOGY - ETHICAL ISSUES*

Modern technology may be used to do good but it can also do harm. Biotechnology perhaps poses the greatest challenge to ethical decision-making as it touches everyone's lives especially in the areas of artificial reproductive technology, gene technology and organ transplantation and erodes traditional ethical conceptions. This overview addresses itself to some of the challenges to ethical decision-making in these and other areas.

I. INTRODUCTION

I hesitated when I was invited to speak at this forum. However, when I realised that a lawyer had been asked by the Medico-Legal Society to speak on the subject of "Ethical Issues in the Use of Advanced Technology", I accepted the invitation as I felt that it was too important a subject to be left in the hands of doctors and scientists. I am further encouraged to speak as a result of what Bertrand Russell has had to say on the subject when he gave his personal view of ethics, "I can only say that while my own views of ethics do not satisfy me, other people's satisfy me still less."[1]

II. NEED FOR TECHNOLOGICAL LITERACY

The ethical issues stemming from a runaway modern technology have been a matter of growing concern beginning in the late seventies in the industralised countries and are only now beginning to filter down to the newly industrialised countries as they begin to absorb the knowledge and technology transfer from the Western multi-nationals, the great universities of the West and their research institutions.

I do not propose to philosophise about how the word "ethics" or "morality" should be used save to say that ethics has been broadly construed and understood as a system of moral principles or values relating to human conduct with respect to the lightness or wrongness of certain actions and to the goodness and badness of the motives or ends of such actions.

---

* This article is substantially based on a presentation at the Medico Legal Seminar, "Law, Medicine and Science in the 1990s - Advances in Technology", held on 3 - 4 November 1990, Singapore. It is published with the kind permission of the organiser, the Medico-Legal Society of Singapore. The 'lecture' style has been retained.

1 *"Reply to My Critics"* in *Handbook of 20th Century Quotations* (Frank and Pepper eds., 1984), p. 115.

Most of the time, however, a morally right or wrong act can be distinguished quite easily. Let me illustrate. Imagine the following conversation.[2] A patient enters a physician's clinic. The physician sees the patient and speaks:

Physician: "Your hand looks in pretty bad shape. Here, let me have a closer look? I think you have got a fracture!"

Patient: "Can you fix it all right? Will it heal properly?"

Physician: "Oh, I think it could be fixed; I'll need an x-ray. I don't see any reason why it couldn't be fixed. But first, tell me what is your work, Mr. ... Mr. ... uh?"

Patient: "You may call me Steinway."

Physician: "Ah, I see the pianist."

Patient: "No sir, he's a distant relative. I'm Bernard Steinway the pickpocket."

Physician: "Oh! Look, I am sorry, I don't do pickpockets' hands here. Nurse, show this man out."

Now, whilst we may admire the physician's personal values that pianists benefit society and pickpockets don't and society's interest may be served best if a pickpocket's hand is not properly treated, all will agree readily that ethically the physician should have set the patient's hand and what he does after it heals should not be the criterion for not attending to him.

But society cannot readily reflect and make ethical decisions concerning vital issues raised by advanced technology in the fields of environment, health, communications and transport on the basis of traditional ethics in every case. The reason is that the development of technology influences traditional ethical conceptions and often gives rise to a wide variety of ethical views as seen in abortions and euthanasia, for instance. The debate is further clouded because any technique in modern technology which may be used to do good can also do harm or worse.

Then there is this further significant handicap: society's lack of understanding of the technical subjects involved. Just as war is too important to be left to the generals, ethical issues cannot be left only in the hands of the experts who are imposing the technology as they

---

2 Gorovitz, *Doctor's Dilemmas* (1982). Extracts published in Kennedy andGrubb, *Medical Law, Text and Materials* (1989), p. 45.

may lack sensitivity or their interests may be too narrow. Perhaps this little story will fortify the point I am trying to make.

A lecturer at a fish research institute was teaching students on the subject of goldfish. He said to them, "I want you to remember when feeding goldfish that male goldfish eat only female worms and the female goldfish eat only male worms."

At question time, a student innocently asked, "Sir, how does the goldfish tell the difference between a male worm and a female worm?", whereupon the lecturer tersely replied, "Look, I am an expert on goldfish, not worms."

As technology in the fields I mentioned earlier, and especially in the life engineering sciences, is reaching out to touch all of human kind, and each individual will be required to give an informed consent to the procedures which will invade his person and shape his destiny and that of his progeny, it is essential that we educate ourselves, assisted perhaps by our health and educational institutions. The choice of diagnosis and treatment in medicine for instance is not a science. A knowledge of scientific methods and procedures will show us that in a certain course of action or treatment there will be certain benefits and risks. The weighing of those benefits and risks will always be made on an individual's cultural scale. Technological literacy should therefore be high on everyone's agenda. We are all going to be involved in the decision-making process.

III. ADVANCED TECHNOLOGIES: AREAS OF ETHICAL CONCERN OF TECHNOLOGY

Advanced technology pervades almost every branch of the sciences. Since 1970, developments in certain areas have raised more public concern than in others as, for example, in biotechnology, high technology medicine, chemical technology and information technology. I propose principally to talk on the ethical implications involving biotechnology but before I do so, I would like to identify very briefly the ethical concerns in the use of each of the other technologies - chemical, information and medicine.

1. *Use of chemical technology*

Chemical technology has threatened our environment. The threats have come from societal groups that control the "risks-benefits" balance, for example, transportation systems, food supply systems and utilities.[3] The ethical issues that have surfaced deal with the balance between technological progress and the environmental problems brought by that progress. Often there is little or no assessment of a risk associated with the particular technological option or the evaluation of the environmental

[3] Caglioti, *The Two Faces of Chemistry* (1983).

damage that may be considered acceptable. The necessary ethical issues were raised across the western world in the seventies and eighties. The nineties has been termed the decade of action to enforce the ethical concerns identified then. This is being done by Governments as they impose greater constraints on industry and make it responsible for toxicity and accumulation of chemical compounds.

Further, Governments are also taking collective action through a United Nations Environment Programme of which the "Toronto Target" currently underway is an example. It is aimed at achieving a greater efficiency in generating and using energy, improving combustion technology and reducing emission of gases which together with chloroflurocarbons, methane and nitrogen oxide are damaging the ozone layer. This layer absorbs the sun's ultra violet radiation thereby protecting life on earth from the harmful effects of that radiation. There is ethical and much practical concern to contain the onset of the much publicised 'Greenhouse effect' to avoid amongst other things over the long term, environmentally induced damage to our DNA (Deoxyribonucleic acid) through mutations.

2. *Use of information technology*

Generally speaking, the ethical concerns in respect of information technology, on the other hand, relate, to the control by the information-rich of the information-poor in a phenomenon which is known as *kulturkampf* (culture struggle). This entails one-way trade of Western ideas or knowledge backed by financial muscle to third world nations. Indeed, Alvin Toffler in his recent book *Powershift* has highlighted the fact that of the three tools of power- violence, wealth and knowledge, knowledge is emerging as the key tool and that the decisive edge will come from the intelligence embedded in the microchips whether it is to wage an armed war or to enhance wealth through a trade war.

More specifically, the proliferating information technology raises ethical issues with regard to the safeguarding of confidentiality. A client needs to feel completely secure that information acquired by his professional consultant from him programmed into a computer will be kept confidential. With computers having networking capability giving rapid access to other users the principle of confidentiality is thought to be in potential jeopardy. Those having the responsibility for the security of the systems against both intrusion and access to such material will no doubt have an ethical if not a legal responsibility that there is no unauthorised access to the information by third parties or that it is not accessed for use for purposes other than that it was obtained for.

3. *Use of high technology medicine*

In high technology medicine, diagnostic methods in medicine have leap-frogged to a state where we have a new medical discipline - "pre-

symptomatic" medicine that spots hidden disorders or potential problems before they become life threatening with the help of instruments and processes, like fluorescent bronchoscopes, that detect cancer six months or a year earlier than a chest x-ray, mammographs, thermographs, the imaging technology of CAT (Computerised Axial Tomography) and PET (Positron Emission Tomography) scans, and MRI (Magnetic Resonance Imaging).

Whilst these technologies will play a welcome role in our health care the higher costs of improved medical care unfortunately will not.

In the United States of America, from where the research and new technology is being transferred, doctors tend to treat then" patients aggressively from birth to death. From bearing in mind all possibilities in examination to prophylactic surgery, American doctors it is said always want to do something so much so that they have come to be known on the Continent as 'Godsakers' - short for "For God's sake do something". This attitude may lie in the belief that American juries are kinder to the sins of commission than of omission — a problem which I believe is not faced in the English common law jurisdiction.

As doctors and hospitals introduce new technologies in Singapore, doctors must not lose sight of the ethical question of the judicious use and at reasonable cost, of the diagnostic aids at their command. 'Over-doctoring' and over-charging' are the twin dangers the public cannot face. Patients are painfully aware that the costs of health care have far outstripped inflation.

4. *Use of biotechnology*

May I now come back to the field of biotechnology, the successor of biomedicine. Loosely defined, biotechnology is a field of applied research where the latest discoveries in molecular biology are used to create marketable products. This is a field which has captured the public's attention most as it has shaken the very foundations of our beliefs, our understanding of life and death and of our capacity to create and prolong life.

The technological explosion is nowhere more evident than in the fields of artificial reproductive technology, gene technology and organ transplantation.

5. *Artificial Reproductive Technology (ART)*

As soon as the first 'test-tube baby', Louise Brown, was born in 1978 in the United Kingdom, doubts emerged over the wisdom of creating life outside the womb and questions began to be asked: Is it moral to grow embryos or pre-embryos as they are termed, in a dish?; Were Scientists playing God? People began to realise that the first test-tube birth could hardly have materialised without a great deal of experimentation

on human embryos, something that was not publicised and the disquiet began to grow as to where the embryos came from and what was the basis for using human embryos for research.

However, twenty years ago, the debate was entirely theoretical. As a result of work involving In-Vitro Fertilisation (IVF) techniques, further, hundreds of laboratories have been implanting embryos resulting in some 20,000 babies being born all over the world.

However, that number does not tell the whole story. For every woman who has undergone IVF treatment or its variant, *i.e.* GIFT,[4] TET/ZIFT[5] or MIST[6] and taken home a baby, between 10 and 15 women have been disappointed. The average success rate is very low; the cost high. Our own statistics in Singapore for 1989 show that for 6 of the 7 centres attached to both public and private hospitals, the combined take home baby rate was about 12%[7] - about the same as the United States of America and Australia as against an overall 4% in the world.

Risk of failure is present at every stage of the treatment. In IVF the successful retrieval rate of a mature ovum is 80% of all attempts, the subsequent in-vitro fertilisation, 15%, the subsequent cell division of the embryo, 80%, and the subsequent implantation only, 12% to 15%. Miscarriage after implantation reduces the successful pregnancy by another third. And the cost of treatment, together with additional costs of investigations and hospital charges, is high.[8] Thus, ethically it is the duty of every centre in Singapore to fully instruct a patient undergoing treatment on the procedures and the likely chances of success. The observance of this requirement is so important that it has in fact been specifically set out in the (Singapore) Ministry of Health's broad *Guidelines for Clinical Applications and Research of IVF and other Reproductive Technologies.*[9] Teoh Eng Soon, a gynaecologist, explains the woman's predicament and the doctor's responsibility as follows:

> There are situations in a woman's life which make her vulnerable; infertility is one of these. Likewise, when one suffers a heart attack or is told that one has cancer, one also becomes vulnerable and may agree to any treatment without thinking too much about it. A doctor dealing with the problem of infertility must not take advantage of this situation.[10]

---

4 Gamete intra-fallopian transfer.

5 Tubal embryo transfer/zygote intra-fallopian transfer.

6 Micro-insemination: sperm transfer.

7 *The Straits Times* (Weekly Overseas Edition), 29 September, 1990.

8 Vivienne Wee and Kanwaljit Soin, "Artificial Reproductive Technology: It's Significance for Women in Singapore" (paper presented at the "Asian Workshop on Technical Change and Women - Towards the 21st Century", held on 5 - 9 February 1990, New Delhi), p.9.

9 2 March 1987. Hereafter referred to as MOH's Guidelines.

10 Teoh Eng Soon, *Infertility: Finding the Right Solution* (1984).

Another related area of professional practice coming in for ethical comment is the acceptance of patients for the IVF or other similar programmes on what is regarded as a somewhat lay diagnosis of 'sub-fertility' which is a catch-all term. It has been reported that patients after being screened and accepted for treatment have often become spontaneously pregnant whilst they were waiting for treatment to commence. In one Sydney hospital 400 women out of the 3,000 accepted and on a 1 - 2 years waiting list conceived spontaneously.[11]

This has been attributed to an inadequate knowledge of fertility patterns and to the scant attention being paid to determining and identifying the causes of sub-fertility and to arresting and controlling it or to researching and applying alternative procedures, considerations which question the ethics of giving ART a medical priority, especially when its cost effectiveness is poor. The recently announced successful application of catheters in a hospital in Chicago clearing blocked fallopian tubes which are responsible for 30% of infertility cases is a case in point.

Apart from the issues concerning professional advice and selection of patients there are a host of other ethical issues that arise outside the normal husband and wife situation. These result from the following technological advances. Women can now use the eggs of other women (donors). Women who cannot carry a pregnancy to term can use the wombs of other women to carry the foetus (surrogacy). Sperms can also be obtained from donors. Eggs, sperm (gamete) and embryos can be frozen for later use or research. Artificial Insemination by Donor (AID) is acceptable in Singapore if performed on a married woman with sperms obtained from the National Sperm Bank. The MOH's *Guidelines* for AID exclude single and unmarried women. The relevant provision states that "AID treatment should be available to all married Singapore citizens and foreigners who need treatment."[12]

However, should a single woman, an unmarried couple, or even a lesbian couple be allowed to benefit from ART through AID? The pros and cons may be worth mentioning. The single woman may feel an equal desire for a child as a married woman and is entitled to the same right. The same argument would apply for the homosexual woman whether living alone or with a partner. The experience of giving birth should not be denied merely because she does not have a husband. Society should not discriminate against the single mothers when it cannot stop them conceiving under normal circumstances and keep the children and stake their future in parenthood.

The arguments the other way have been to some extent aired by the Feversham Committee in the United Kingdom[13] which considered the

---

[11] Wee and Soin, *supra*, note 8, p. 6.
[12] *Supra* note 9, "For AID" para. (i).
[13] Report of the Departmental Committee on Human Artificial Insemination (Cmnd. 1105).

subject of Human Artifical Insemination in 1960. It was not in favour of single women or lesbians receiving AID on the grounds that not only the interests of the procreators but also that of others have to be considered. For instance, the child's interest has to be borne in mind and this must predominate. A child should, as far as possible, have a normal family life. A child without a father suffers a disadvantage just as a single parent child does. In the case of lesbians the psycho-sexual risks to the development of the child were also recognised.

Those views reflected the social mores of the sixties. Thirty years later, mature relations outside marriage between couples and single parent families have become more and more socially acceptable. Logically, there is no reason, therefore, why the MOH's *Guidelines* should not in the future extend AID to a single woman and unmarried couples.[14]

Donor insemination further raises controversy on the issue of anonymity. Should children born through artificial insemination have the right to know who their "real" fathers are or should the donors remain as "phantom fathers"? A pioneering 10-year research project into 57 couples has just been completed in the United Kingdom by Professor Robert Snowden, a leading academic and member of the Government-appointed watchdog body set up to control infertility clinics.[15] The findings will provide a basis for official guidelines to be given to couples when the long-debated Human Fertilization and Embryology Bill[16] becomes law in the United Kingdom. In his findings Professor Snowden has voiced 'openness' and recommended that children born through artificial insemination should have the right to know who their "real" fathers are by having a legal right to consult a register of donors and sperm babies when they reach the age of 18, after counselling.

The parallel is drawn with adopted children who already have the right to be told the names of their natural parents. Indeed, in the United States of America many adopted children do search for their real parents. The traditional arguments against disclosure have been based on legal and emotional complications.

In Singapore under the MOH's *Guidelines* for medical centres, the centres doing AID work must obtain their sperm supplies from the National Sperm Bank which has been mentioned earlier.[17] The MOH's *Guidelines* for the sperm bank require the preservation of anonymity at all times subject to a court order to reveal the identity of the donor.[18]

---

[14] See *supra,* note 12.

[15] *Sunday Times* (London) 23 September, 1990.

[16] Bill 141 (15 May 1990); see also Commons Amendments on the Bill (22 June 1990) enacted as Human Fertilisation and Embryology Act (c.37), (1 November 1990) HMSO.

[17] *Supra,* note 9, "For clinical services", para. (3) and *"Guidelines for the Establishment of a Sperm Bank",* para (d).

[18] *Supra,* note 9, *"Guidelines for the Establishment of a Sperm Bank",* para. (d).

Surrogacy, the renting out of a woman's body to produce a child, is clearly singled out as an unethical practice and is banned by the MOH's *Guidelines* for ART clinics.[19] Apart from the legal questions, the many ethical problems associated with surrogacy include the issue of the morality of the contract itself, the change of the marital status of the parties during or after a baby is born, the dilemma in disclosing the identity of the surrogate mother, and the unanticipated problems such as the birth of a deformed child and the possible refusal of all parties to care for the child. The concept is also open to other abuses.

Aldous Huxley, in his book, *Brave New World*[20] envisioned parentless embryos being exploited under a totalitarian regime reminding us therefore that a genetic link to at least one parent is ethically desirable. In other words, IVF and embryo replacement (ER) are acceptable when either the egg or the sperm is donated but not when both sperm *and* egg are donated. The MOH's *Guidelines* adopt this important ethical principle.[21]

The technology for freezing sperms and fertilised eggs is established but not so for unfertilised eggs because during freezing, ice crystals form inside and outside the egg damaging the delicate genetic material it contains. Technology is, however, currently successfully developing a method of vitrifying human eggs, by solidifying them at a very low temperature without ice forming,[22] thus opening up the possibilities for women to save the eggs for use at a time of their choosing. Although the limits on a woman's child - bearing years are now anyone's guess with four women in the United States of America up to 44 years of age recently reported to have taken home babies after in-vitro fertilisation, the ethical considerations of pregnancy complications in older women should never be forgotten.

6. *Experimentation on embryos*

Experimentation in embryos has raised a profusion of ethical questions. There is even a moral controversy about using the correct description for the entity. Scientists and doctors prefer to use the word 'pre-embryo' for a fertilised egg that is less than 14 days old. Up to that stage they argue that the primitive streak[23] or human characteristics have not developed.

---

19 *Supra*, note 9, "For clinical services", para. 18: "The practice of surrogacy in any form is not permitted".

20 1981.

21 *Supra*, note 9, "For clinical services", para.13.

22 *Sunday Times* (London) 14 October, 1990.

23 Broadly speaking, the early stages of the development of the fertilised egg may be defined in two stages. Some 6 days after fertilisation a cluster of cells begins to attach to the uterine wall forming a flat embryonic plate. About the 14th day if there are no adverse factors there is a crucial change. A groove develops in the embryonic plate into which a third layer of cells migrate. This groove is referred to as the "primitive streak" - the border between molecular matter and a potential human being.

Others think it is a cosmetic trick. "Where does human life begin?" they ask. "Is human life a continuum lacking a clear beginning?" In the meantime, however, the term 'pre-embryo' whilst it does not clarify matters does help to set limits to research.

Scientists in laboratories around the world have many pre-embryos to do their research on because the IVF procedures generate extra-fertilised eggs. Should the clinics or laboratories keep the unused eggs or the pre-embryos which are not used for implantation? How long should the laboratories keep them? What is the morality of using human embryonic or foetal tissue for genetic and medical experimentation? Should scientists be allowed to create more pre-embryos than are intended for implantation? Should they be precluded from researching on pre-embryos taken for IVF procedures and use only those obtained for the purpose of experimentation?

The moral status of the embryos is important in determining the questions. The United Kingdom's Warnock Committee[24] was against the concept of ownership of embryos. Yet it subsequently put forth views on use of spare embryos, their storage and disposal which are in fact quite consistent with ownership. It recommended the use of spare embryos for research but with the consent of the donor. It also recommended the right of an embryo to pass to the surviving spouse in the event of death of one of them.

The MOH's *Guidelines* on research following the Warnock Report of 5 years ago adopted[25] the recommendations mentioned in the Report including one that the human ova fertilised with human sperm should not be cultured in-vitro for more than 14 days or similarly be stored for use in research other than for the purpose of which approval was granted. The debate on the Human Fertilisation and Embryology Bill is not expected to change the 14-day limit on culturing and storing of pre-embryos. The constant fear voiced is the "slippery slope" argument - a descent from basic medical research into the pit of a new eugenics drawing on all the power of a modern biology.

7. *Gene technology*

The ethical issues of genetic engineering (the use of scientific, biological techniques to manipulate or rearrange genetic material to alter hereditary traits) and with all their implications are a ground for much more intensive debate. Apart from such benefits as gaining knowledge in congenital diseases and detecting gene chromosome abnormalities before IVF implantation and the making of entirely new drugs by protein engineering, the long term implications of these sciences are profoundly worrying.

---

[24] Cmnd. 9314 (1984), republished as Mary Warnock, *A Question of Life* (1985).
[25] *Supra*, note 9, "For research", para.8.

Gene therapy for instance is not objectionable if it involves the somatic cells and their repair. But there is a moral difference if it involves the germ line cells, *i.e.* the reproductive cells that belong to lineages that are *potentially immortal, i.e.* extend to several generations.

What would be our attitude to the possibility of human cloning and to genetic production of human and animal hybrids and sex pre-selection of babies? Scientists are currently attempting to transfer genes from humans, chickens, cattle and mice into various species of fish. The characteristics of aquatic species could change substantially. If they escape from holding ponds, ecological disruption could be caused in streams and lakes. It is felt that genetic exchange between distinct species in nature are unethical and undesirable. Evolutionary boundaries should be respected.

The patenting of genetically altered animals and plants which has already been sanctioned by courts in the West could also impact the delicate balance of the environment. The creation of new improved species could lead to the popularisation of that animal resulting in valuable natural gene pools being lost. This will mean an acceleration in our control and transformation of life and of the creative processes to serve purely human ends.

The commercialisation of biology has added another ethical dilemma. In the United States of America, corporations are beginning to file patents to claim exclusive ownership of information contained in the genomes of genetically engineered organisms for purely profit motives.

Use of the knowledge of gene technology has potentially undesirable consequences in the labour-management field as well. A survey disclosed in the United States of America many years ago that some employers had already started to screen employees for certain genetic diseases to reduce the burden of carrying the cost of health care programmes of an employee or have a sick employee at the peak of his career when he matters most to the company. Following from this unhappy practice it is not too difficult to envisage that one day an individual may be denied insurance if he or she carries a bad gene.

8. *Organ transplantation*

The dilemma of organ transplantation and some of the ethical and social problems associated with it from a donor's point of view hitherto may be revealed in the following simple allegorical story[26] represented by the following conversation between a surgeon and a target donor of an organ:

---

[26] Python, *The Meaning ofLife* (1983) quoted in "Medical Technology and the Law" Harv. L.R. 1519 (1990) Vol. 103, 1519.

Surgeon: "Hello, er can we have your liver...?"

Patient: "My what?"

Surgeon: "Your liver ... it's a large glandular organ in your abdomen ... you know it's reddish-brown and it's sort of ..."

Patient: "Yes, I know what it is, but I'm using it!"

The heart of the ethical controversy in organ transplantation is whether or not it is appropriate to modify the treatment of a patient for the sake of some other patient.

But let me explain the definition of death first which is relevant to the issue. In the United States of America, the Uniform Determination of Death Act (UDDA)[27] recognises death on cardiopulmonary *or* neurological grounds.[28] In Singapore, The Human Organ Transplant Act 1987[29] and the Regulations[30] thereunder have for the purpose of the Act adopted the definition of death as "brain death"[31] (neurological) rather than "somatic" death (cardiopulmonary), *i.e.* where the heart stops beating. The rationale for this option is very logical. The heart depends on oxygen for its own tissue on the lungs, which in turn are useless without the heart. Together they supply oxygen to the brain, which is not able to function without the heart or lungs. The lungs are dependent on a functioning *brain-stem* which controls our breathing. The brain stem cannot be substituted. Accordingly, brain death in our legislation is defined as irreversible cessation of all functions of the brain and the criteria for determining it, *i.e.* the clinical signs have been carefully set out. Apart from its logic the main purpose why brain death has been recognised in the West is to establish the scientific basis to disconnect patients from ventilators who can no longer benefit from them when it is clear to clinical observation that the patient is dead. Brain death is not a device for "hurrying death along". The position of the doctor in switching off the ventilator once brain death or brain stem death is diagnosed has been considered as a technical rather than a moral problem. However, the timing of the

---

[27] Recommended by the Presidents' Commission and now the standard model adopted by the various States.

[28] Uniform Determination of Death Act, s.l: "An individual who has sustained either (1) irreversible cessation of circulatory and respiratory functions, or (2) irreversible cessation of all functions of the entire brain, including the brain stem, is dead. A determination of death must be made in accordance with accepted medical standards."

[29] Cap.OlA, 1988 Rev. Ed..

[30] S.187/87, p.998.

[31] "S.3(l) ... a person has died when there has occurred irreversible cessation of all functions of the brain.

(2) The Minister may prescribe the criteria for determining the irreversible cessation of all functions of the brain ... [for conditions and criteria, see Regulations 2 & 3]."

"switch off does raise an ethical issue. An organ taken from a donor whilst his heart is still beating takes better in a transplant than a cadaveric organ. For how long should the corpse be cellularly preserved by the oxygenated blood flow generated by the ventilator while the doctor still maintains an acceptable stand? For how long is it proper to wait for a suitable kidney, liver, or heart transplant recipient? In 1982 a newspaper in the United Kingdom reported the case of a woman who was kept on a ventilator for a week, the sole purpose of which was to bring her foetus to viability (a non-transplant purpose). What needs to be kept in check is the use of this aspect of medical technology lest it be pushed into doubtful morality.

IV. CONCLUSION

In concluding may I say that the human and ethical considerations are more important than any scientific advance, and it is these obligations which should impose limits to science. In the rating table of human values, the striving to retain our moral integrity must always score higher than our quest for knowledge or our scientific achievements.

The need to take moral responsibility for technology's failures by those who promote and administer the technology must also be emphasised.

Do public institutions and governments have an ethical or moral duty to settle actions quickly for compensations of victims injured by advanced technology?

In England a notorious case has been going on for over two years in which almost a thousand haemophiliacs (many of them already dead in the meantime) have sued the Government over their infection with (AIDS) virus from the NHS blood transfusion after being given contaminated Factor 8 blood which contained a polluted blood-clotting agent. Mr. Justice Ognell, a well respected judge, made an unprecedented call in Court, during interlocutory proceedings a few weeks ago, for an end to the Government's legal wrangling and for the victims to be paid. Mr. Justice Ognell said, amongst other things, in a carefully prepared advice:

> The Government which undertakes upon itself the risk of public provider of medical advice and clinical services is in a very different position. It is clearly arguable that its duty to innocent citizens who suffer injuries under the aegis of such treatment has a moral dimension to it which should distinguish its assessment of its position from the criteria to be adopted by other defendants of a corporate character.... The Government owed a moral as well as a legal duty to those in its care. That many victims had already died and many more would be dead before the outcome of a Court case was cardinally important.... The Government owes a duty wider than to its shareholders or insurers. It should also mean that the public may be entitled to expect

> from Government an appraisal of their position, which is not confined solely to legal principles to be found in the law of negligence or problems of proof.... I believe the legal profession has a duty to do its best to see that the legal system does not become a scapegoat in the eyes of the public for what, I fear, may be perceived as the unjust and inhuman denial of any significant measure of compensation to the Plaintiffs.[32]

I will leave you with this final thought. Singapore is committed to technological advancement. Continuously evolving technology, particularly in biotechnology, has raised many ethical problems. Newer ones will continue to emerge. In the early 1980s in the United States of America, a President's Council was appointed to study Ethical Problems in Medicine and Biomedical and Behaviourial Research and, later, a National Commission for the Protection of Human Subjects of Biomedical and Behaviourial Research[33] - a standing body. In Britain there have been *ad hoc* committees from time to time. Although we in Singapore can adopt some of the ideas from the West, do we not need a similar standing National Ethics Committee of our own composed of distinguished persons in the field of medicine, philosophy, law and religion so that we can establish our own values that truly reflect our plural society over the long run?

AMARJIT SINGH*

---

[32] *Sunday Times* (London) 14 October, 1990.
[33] Kennedy and Grubb, *supra*, note 2, p. 84.

* LL.B.(Hons.)(Malaya), Advocate & Solicitor, Supreme Court of Singapore.