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Bioethics in Obstetrics

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1. Introduction

Obstetrics has been defined as the branch of medicine concerned with child birth. This simplistic definition may not entirely represent the plethora of events, many challenging, others contentious that are usually associated with the developmental processes that culminate in the birth of the child. They can therefore be only but a few aspect of clinical practice that are likely to elicit as much bioethical considerations as obstetrics practice. Bioethical questions arise in virtually all aspects of pregnancy and child birth starting from ethical issues involved in genetics and embryo research through the process of assisted reproduction, surrogacy, abortion, the process of normal and abnormal pregnancies, safe motherhood and neonatal care. Cook et al have observed the emerging significant of bio-ethics over the last half a century, at both professional and scholarly levels, and have further highlighted the input of multiple discipline - biology, philosophy, healthcare service, medicine, law, nursing and religious studies in the structuring of modern bioethics. This perhaps has been most profoundly expressed in obstetrics care, and indeed reproductive health as a whole. The medical profession in several cultures has an inherent responsibility to conduct its activities guided by the highest ethical standard. Reproductive healthcare practitioners in particular inevitably face ethical and bioethical challenges, some of which constitute a conflict between the old and new, requiring resolution, for example, the process of super-ovulation with higher multiple pregnancies, associated with assisted reproduction may require the ethically-questionable process of selective reduction foeticide in order to ensure the survival of one or two foetuses and facilitate the success of the procedure. Health professionals looking after woman are more compelled to observe strict ethical principles because they work in areas of women's body that are private and of particular psycho-sexual sensitivity (Ezeani, 2003). The decision to oblige to treatment request, obstetrics care inclusive requires that the reproductive healthcare practitioner appraises and appreciates his or her personal ethical stand-point which is then related to his duty to address the well being of his patients and also the overall character and conscience of the community. The need to include bioethics in the training curriculum of residents in obstetrics and gynaecology has become compelling and over the past two decades been increasingly highlighted (Elkins et al, 1986; Royal College of Physicians and Surgeons of Canada, 1997). As clearly stated by Mckneally and Singer (2001) "Enhancing Clinicians" knowledge and skills in resolving ethical quandaries can increase their ability to deal with issues that cause moral distress

and thus enable better team and institutional performance in caring for patients. The Royal College of Physicians and Surgeons of Canada had since the late 1990 insisted that the teaching of bioethics be made a requirement for accreditation of any residency training programme. In furtherance to this, Council on Resident Education in Obstetrics and Gynaecology stated the objectives that residents must demonstrate an understanding of basic ethical concepts and their application to the issues and decisions based in the practice of obstetrics and gynaecology (Royal College of Physicians and Surgeons of Canada, 1997).

This chapter defines bioethics together with a brief account of its historical origin particularly in relation to the development of principles of modern bioethics. It also describes the fundamentals of bioethics – notably bioethical orientation, principles and analytical levels. It further highlights research ethics and reviews key obstetrics issues requiring bio-ethical consideration.

2. Fundamentals of bioethics

The word ethics is derived from the Greek word “ethos” which means customs and habits. Medical ethics has been defined as the principles or norms that regulate the conduct of the relationships between medical practitioners and other groups with whom they come in contact in the course of their practice (COMMAT, 1997). These groups include professional colleagues, other health professionals, the patient, the government and other custodians of healthcare.

Ethical codes are set of principles or rough guides to practice, usually developed following serious breach of ethical standards (Uzodike, 1998). For example, the Nuremberg code of 1947 and Helsinki Declaration of 1964 are guidelines developed on human research, following inhuman experimentation conducted on human subjects (CIOMS, 1993). The Hippocratic Oath of 4th century B.C. in its modified form, sworn to by newly qualified medical doctors, constitutes a component of the ethical codes of most countries of the world.

Bioethics in a narrow sense is a subdivision of ethics that regulates the relationship between the healthcare provider and the beneficiary of healthcare. In a broader sense however, it is regarded as a multidisciplinary field of inquiry, which addresses ethical issues in clinical practice and healthcare, biomedical research involving humans and animals, health policy and the environment (Cook et al, 2003; Adinma and Adinma, 2009). Bioethics has its roots from the value system developed by ancient Philosophers – Socrates, Aristotle and Plato. The term bioethics was coined by van Rensselaer Potter, an American biochemist at the University of Wisconsin in the 1960's. Although the first institutional use of the word was in 1971 by Kennedy, Institute of Ethics, Georgetown University – Washington DC (Cook et al, 2003). Modern Bioethics is believed to have evolved in the 1960's as a response to various challenges and controversies encumbering health technological development at the time (Callahan, 1997; Rothmans, 1991; Jonsen, 1998). Although Warren Reich opined that the evolution of bioethics in the western countries was a reaction to the tendency of religions to approach developments in medicine through their parochial theological doctrines and perspective.

3. Bioethical orientations

The thinking and end result of bioethical considerations are directed along various set-lines, constituting different bioethical orientations. The ancient Greek value system and philosophy considered to be the origin of bioethics together with the input of various religions notably Christianity and Islam over the years represent the historical orientation of bioethics.

Duty based or deontological bioethical orientation is related to natural laws and reason, distinguishing vice from virtue as an indivisible accompaniment of any action or intention. The Catholic Church is a well known proponent of duty based bioethics and this is evident from the church's stand for instance against the use of condom for prevention of pregnancy or sexually transmitted infection or against artificial forms of contraception, while supporting natural family planning. St. Thomas Aquinas in the 13th century incorporated some natural laws developed and proposed by Aristotle into the doctrine of the Roman Catholic Church. Duty based bioethical orientation is believed to be absolutist and often unbending to the relativity and diversity that characterize ethical considerations. This may have serious implications to reproductive health in general, often replete with bioethical challenges.

Utilitarian or consequentialist bioethical orientation recognizes man's moral responsibility for his or her bioethical choices. Whatever promotes the well-being or happiness of man is considered to be good while whatever causes harm or unhappiness to man is bad. It recognizes man as an important end in himself rather than being a means to an end of whatever form. For example, a woman with an unwanted pregnancy, desirous of termination of the pregnancy should be assisted with safe and unencumbered induced abortion since this may promote her psychological and social well being.

Feminist bioethical orientation basically aims at incorporating women's social experiences, thinking and behavior into the value system of healthcare and clinical practice. It is also known as ethics of care or connectedness, and constitutes a reaction to the exclusion of women from historical sources of moral authority such as the clergy, top echelons of the military or legislature and other similar position exclusively "restricted" on the basis of sex or gender.

Apart from these bioethical orientations considered to be key towards effective bioethical considerations, there are a few others that have become recognized which include the following:

Virtue – tenets to which biomedical institutions and practitioners should adhere to, such as kindness, trustworthiness, discernment, and integrity, all of which conform to the ethical ideals of Hippocrates.

Communitarianism – bioethical orientation that advances and promotes the good of the community.

Casuistry - proponents of this orientation subscribe to the resolution of issues on the basis of their merit rather than on a resort to universal rules.

4. Principles of bioethics

The development of the principles of modern bioethics is inextricably linked to the contents of the Belmont Report (The Belmont Report, 1978). The Tuskegee Alabama public health service funded syphilis research over the 40 year period, 1932 – 1972, involved inhuman experimentation on 400 indigent black American males (James, 1993). The termination of this research led to American congressional passage of the National Research Act in 1974 and the establishment of the United State's National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research which in 1979 published its findings and recommendations known as the Belmont Report. The Belmont Report provided an analytical frame work to guide the resolution of ethical problems arising from research involving human subjects. Three basic ethical principles contained in the Belmont Report viz: Respect for persons, Beneficence, and Justice, essentially constituted the foundation for the development of the key principle of modern bioethical analysis. Implicit in the principle of beneficence (do good) is non – maleficence (do no harm) which has become recognized as a distinct key principle. These four key principles of bioethical analysis constitute a consensus resolution of different bioethical orientations notably from the works of two American bioethicists - Tom Beauchamp and James Childress and the British expert - Raanan Gillon (Beauchamp and Childress, 2001; Gillon, 1994). In addition to these four key principles, three others have been recognized in modern bioethical analysis – veracity, fidelity and scientific validity.

The principle of respect for person occurs at two levels. The first level refers to autonomy of capable persons which upholds patient's right to voluntary informed consent, and choice based on comprehension of available options, for example, patients right to family size determination. The second level is the protection of persons incapable of autonomy. Three groups of persons are notable in this regard - the unconscious, the mentally sub-normal and the child – all of who require the protection of their autonomy. For example, the decision on the treatment of an unconscious pregnant woman, or the genital mutilation of an infant. This protection requires either the presence of a living will especially in the case of the unconscious patient or the obtaining of consent from the surrogate or where not feasible a clergyman, or the ethical committee of a health institution or as a last resort, the law court. Medical paternalism refers to the overriding of autonomy. Strong paternalism is the overriding of the autonomy of a capable person, and is not ethically permissible. While weak paternalism is the overriding of the autonomy of an incapable person which is permissible if performed for the overall well-being of the person. The principles of Beneficence refer to the ethical responsibility to do and maximize good. It emphasizes what is best to the patient with respect to preventive and curative healthcare. The principles of non-maleficence refers to the ethical duty of the health practitioners to do no harm or cause pain to the patient as in the giving and suturing of episiotomy without local anesthesia in a parturient woman. The principles of Justice refer to the ethical responsibility to uphold fairness and equity in medicare. It refers to the equitable distribution of potential benefits and risks. The ethical principles of veracity enjoins health practitioners to tell the truth - explaining the potential benefits and risks alike involved in whatever treatment being giving to, and procedure being carried out on the patient. The principles of fidelity refers to the ethical responsibility of the health practitioners to carry out whatever promises made to a patient in relation to activities for which he or she has been employed. For example, a

pregnant woman used for the purpose of a clinical examination for professional medical students' exams may have been promised free further antenatal care and delivery. The ethical principle of scientific validity enjoins the medical practitioners to ensure professional competence and scientific soundness in the conduct of medicare or research on patient.

5. Analytical levels of bioethics

There are four analytical levels to which bioethical principles are applicable. Each of these has its specific orientation and may or may not be related to the others. Microethical analytical level applies to relationship between individuals and in this case the health care provider and the patient, while the medical practitioner has an ethical obligation to give his patient enough and correct information on all available options to make an informed decision and consent, the patient is obligated to respect his or her medical practitioner's right to conscientious objection to any treatment being requested of him. For example, a medical practitioner's conscientious objection to induced abortion should be respected just as much as the medical practitioner is obligated to refer such patient to where competent treatment can be accessed. Macroethical level of bioethical analysis refers to the relationship between groups or communities – between members of the group of communities themselves, or between them and members of another group or community, for example, the ethical commitment to the provision of healthcare between an urban and rural population, or between different socio-economic classes of people within a group or community. Mesoethical analytical level otherwise known as ethics of intergenerational justice refers to discordance in resource allocation between groups by health managers at both public and private levels. Mesoethics falls between microethical and macroethical levels and implicates the ethical principles of beneficence and distributive justice, for instance contrasting high budgetary allocation to Senators to receive free medicare abroad even for trivial illness treatable locally, to the very low budget allocated to maternal health service delivery, in a developing country with unacceptably high maternal mortality. Megaethical level of bioethical analysis applies to issues operating beyond national boundaries, for example ethical issues related to the treatment of HIV/AIDS with Anti Retroviral Drugs where in the past the drugs are produced at reasonable cost in developed countries and exported to developing countries with a high burden of HIV disease and sold at prohibitive prices. Similar concerns are also manifest in reproductive health issues, and the effect of environmental pollution or degradation.

6. Research ethical review

Ethical considerations are perhaps more profoundly manifest in research than in most other aspect of medicine. Medical research especially those involved with human embryo and stem cell often bring to bear the demands and challenges posed by different bioethical orientations. Deontological bioethicists for their firm adherence to an orientation of natural laws and reasons are unlikely for instance to condone research targeted at exposing life threatening foetal abnormalities that would ordinarily require termination, in a pregnant subject. In the same vein, consequentialist and feminist bioethicists will employ macroethical reasoning to justify the conduct of research on a few human embryo and stem cells for the purpose of obtaining information that will lead to the development of therapy that will benefit many more sick patient (Stephens and Brynner, 2001). Ethical conflicts arise

as to the propriety of employing human subject to carry out scientific studies to reveal vital information that will contribute to the successful management of a vast number of patients as was the case with the Tuskegee Syphilis Research which not only unveiled the long term manifestations of syphilis but also heralded the genesis of the developmental framework for the principles of modern bioethics from the Belmont Report. However it has been established that the well-being of human subject should be given priority consideration to the interest of science and the society (WMA, 2000).

It became necessary at a point to develop an acceptable course in bio-medical research involving not only humans but also animals and the environment. Two landmark guidelines emerged over the years concerning the conduct of research on human subjects – the Nuremberg Code of Ethics developed in 1947 following the trial of 23 German Physicians and Administrators for inhuman experimentations on human subjects during the 2nd world war and the Helsinki Declaration of the 18th General Assembly of the World Medical Association which developed recommendations and later ethical principles for medical research involving human subjects (WMA, 2008).

Helsinki consists of 35 principles, the first 30 of which relate to medical research, while the last 5 concern clinical practice. Between 1964 and 2008 Helsinki has been revised 9 times, the 9th of which was at the 59th General Assembly of the World Medical Association in Seoul South Korea in 2008. Helsinki Declaration recognizes the safety, autonomy, confidentiality, and the dignity of human subject in research. It also recognizes that potential benefits that should accrue to research subjects, and that research should be discontinued if the risk outweighs its benefits. Helsinki Declaration further requires that the protocol of the subject under study be submitted in advance to a Research Ethics Committee that is independent of the investigator or sponsor of the study, for scrutiny, consideration, comments, and ultimate approval or rejection (WMA, 2008). Ethical committee members are multidisciplinary and include not only medical professionals but also a lawyer, a clergy, an ethicists and other notable member of the community all of whom should be familiar with scientific basis of proposals together with the laws and regulations of the country in which the research experiment is performed.

7. Obstetrics issues eliciting ethical attention

The provision of ethical care that respects the sexual and reproductive rights of women is considered fundamental and therefore implicit on professionalism in healthcare of women. The International Federation of Gynaecology and Obstetrics (FIGO) has over the years provided leadership role and direction towards the structuring and promotion of professional ethical standards in women's health and indeed reproductive healthcare as a whole through its committee for the Study of Ethical Aspects of Human Reproduction and Women's Health (FIGO, 2006).

In 2001, FIGO through its Sexual and Reproductive Right Committee carried out a Women's Sexual and Reproductive Right Project, undertaken in six countries:- Nigeria, Ethiopia, India, Pakistan, Sudan and Mexico. This project essentially consisted of advocacy and sensitization of obstetrics and gynaecology professionals on areas of women's sexual and reproductive right infringement and the need to uphold, protect and promote these rights; the development of a human right based code of ethics to guide health professionals caring for

women, and also incorporate same into the curriculum of medical education; and advocacy into two key areas of sexual and reproductive right failings of women in each country. The project was conducted in each of the countries by a multidisciplinary steering committee under the auspices of the national FIGO – member society. Ethical guideline developed by each of the participating countries were eventually employed in the development of FIGO professional and ethical responsibility guideline concerning sexual and reproductive rights, at the XVII FIGO World Congress in Santiago Chile in 2006 (Adinma, 2003; FIGO, 2004). These professional ethical guidelines are contained in three basic groupings.

- a. **Professional Competence** – which enjoins the health professional to uphold the highest standard of professional practice in the care of his patient, avoid inappropriate relationship with patients or his family members, carry out prompt referral of patients when the expertise to care is lacking or in situation of conscientious objection to care of the patient. The health professional is also obligated to avoid ethical and human right violation in the care of their patient, develop appropriate interpersonal relationship with their patients and others while upholding the highest standard of integrity with colleagues and patients. They should also continuously update their professional knowledge through continuing medical education.
- b. **Women's Autonomy and Confidentiality** - which obligates health professionals to inform and educate their patient to facilitate informed consent, ensure their right to privacy and confidentiality and avoid all forms of discrimination. The health professionals will also have an obligation to guide adolescents towards making ethics based reproductive health decisions.
- c. **Responsibility to the Community** - which obligates health professionals to advocate for the right of their community members to information, education and means to make appropriate sexual and reproductive rights decision, advocate for the provision of resources and care that will enable women benefit from scientific progress and also promote reproductive health education of community members that will enable them participate in dialogue on health policy decisions concerning them. They should also discourage the patronage of quacks by community members, encourage traditional healers to refer patient, and show compassion to patients with medical emergencies especially with respect to payment of deposit and during industrial actions (FIGO, 2006; Adinma, 2003; FIGO, 2004).

8. Obstetrics care

An unbalance relationship exists between the medical practitioner and his female patient borne out of differences between them in social, cultural and economic circumstances together with inequality in knowledge of medicine. The woman seeking health care is therefore posited on a pedestal of vulnerability. The medical practitioner should address this vulnerability by giving clear information on every available treatment option that will enable the patient decide on her appropriate treatment choice. The woman's autonomy is thereby respected. This situation is no less appropriate to the obstetrics patient than is considered to other patient and this respect for her right to informed decision and consent should be sustained throughout the duration of her pregnancy. Every obstetrics patient has the right to the highest standard of obstetrics care and benefit of scientific progress and should under no circumstances be allowed to go through unnecessary or avoidable pain

during the course of the pregnancy. This represents professional commitment to the ethical principles of beneficence, justice and non-maleficence. For example, the giving of episiotomy to a parturient woman to prevent a third degree laceration of the perineum upholds the ethical principles of beneficence, but when the episiotomy is given without prior administration of anesthetic agent, or is repaired without any, or is left un-repaired, this will amount to violation of ethical principles of non – maleficence.

The ethical principles of justice also enjoins that all women should be treated equally and without discrimination in healthcare delivery to them.

9. Genetics, oocyte and embryo research

9.1 Human gene alteration

The application of the knowledge of science to human reproduction falls within the purview of obstetrics and therefore obstetrics and gynaecological professionals should be mindful of the ethical implications of genetic studies, engineering and the application of genetics in disease management.

Gene therapy refers to the alteration of human DNA particularly for the purpose of alleviating disease burden in individual. There are three categories of alteration of human gene viz.

- Genetic alteration of Somatic Cells to treat diseases – which raises ethical issues similar to that in experimental, therapeutic and human research, and therefore requires ethical review, informed consent, and the protection of confidentiality of the subject; If gene therapy studies are successful it is ethically permissible to apply such treatment to the foetus in-utero provided that the safety of the foetus is guaranteed and the autonomy of the woman is respected.
- Germ line genetic alteration - involves the changing of the gamete of the individual which is consequently passed on to subsequent generations. There are presently no safe and reliable means of genetically altering germ cells – sperm, egg or zygotes derived from them, therefore any research proposal targeted at germ cell alteration is ethically not permissible.
- Non – therapeutic genetic alteration (genetic enhancement) - involves insertion of a gene with the aim of improving the genetic makeup of a normal healthy gene. For example, the enhancement of colour, height or beauty. This technology has social implications concerning the weight between its potential risks and benefits to individual subjects. It therefore raises serious ethical questions that prohibit research into its application on human subject.

10. Cloning of human

This involves the asexual reproduction of mammals by the technique of Somatic Cell Nuclear Transfer (SCNT). The birth of the first cloned mammal, sheep Dolly in 1997 using this technique represented a land mark development that unequivocally showed the possibility of replicating this asexual reproduction in man. Somatic cell nuclear transfer technology has however been shown to be associated with a high miscarriage rate and an overall low success rate. It is also fraught with high rate of complications such as the large

offspring syndrome and immune system failure. It is generally believed to be unsafe and therefore ethically not permissible for use in human reproduction. However, subject to strict observation of ethical guideline, research on human embryo stem cells from Somatic Cell Nuclear Transfer to produce various cell lines for the purpose of treatment of diseases is permissible.

11. Human embryo and gamete research, sale and donation

Apart from the human embryo, stem cells can be obtained from cord blood, the foetus or adults. It can also be obtained from supernumerary embryos at the blastocyst state, in IVF cycles and embryos created de novo from donated gametes. Stem cell studies may be useful in the treatment of many diseases and also in the improvement of the management of infertility. Ethical questions arise in the use of human embryos produced solely for the purpose of research. This can be permitted only if it is not possible to obtain the information sort for, from research on existing supernumerary embryos. Gametes collection for research must be preceded by specific informed consent. Supernumerary embryos from IVF programmes can be used for research only following the consent of the recipients of the resulting embryo. Women particularly the more vulnerable should not be coerced or induced to donate oocyte or embryo for research. A research ethical review is necessary prior to the employment of human embryo for the purpose of research. Donations of gametes and embryos for the purpose of pregnancy and child birth should be on humanitarian basis rather than on commercial consideration, although reasonable compensation for legitimate expenses is allowable. On no account should genetic materials be sold as a profit making venture (Int. J. Gynecol. Obstet, 1994). The donation of genetic materials - egg, sperm or pre - implantation embryo has been used for the treatment of infertility, ovarian failure, severe rhesus iso-immunization, achievement of post menopausal fertility, habitual abortion etc. Such a donation and accompanying child created from it not only have profound ethical implications but are also associated with legal, cultural, moral and religious questions. The child, the recipient couple and the donor all have interest that need to be taking into consideration as well as protected. Different countries have cultural or legal provisions that determine qualification for donation of genetic materials as well as regulate the relationship between the social and the biological parents, the fate of the genetic material (whether for banking or disposal), the protection of the child's interest, and in particular the record keeping rules. The donation of genetic material should be accompanied with informed and written consent of the donor, the recipient and recipient's lawyer. It must be ensured that genetic material donors are normal, healthy and without diseases such as genetic disorders and sexually transmitted infection. Donors of genetic materials should be anonymous and confidentiality should be maintained except when permission for disclosure has been granted. Members of the recipient team should not be donors, nor should genetic materials be obtained from dead persons unless a written consent had been given prior to death. Genetic materials should not be donated for the purpose of extending natural reproductive life span. Donation from one donor should be limited to avoid the danger of consanguinity or incest in the future.

12. Pregnancy and delivery

12.1 Directed gamete donation for assisted reproduction

Rehmann-Sutter and Wienroth (2009) have identified the influence of reproductive technologies on perceptions and practices related to reproduction and beyond this, even to the cultural and societal imperatives that enable the understanding of the family and in particular motherhood, offspring and other issues related to them.

Ethical considerations arise from gamete donations from known donors as much as is the case with anonymous gamete donation already addressed. The availability of advanced micro-manipulative assisted reproductive technology prohibits the need for request on sperm donations, although such request may still occur for artificial insemination using donor semen (AID). Requests for directed oocyte donation however are common, usually in the treatment of ovarian failure. Directed gamete donations usually take into account various desirable characteristics, of the donor which may include the health status, character, social and cultural background and of course genetic makeup. The confidentiality issues raised in directed donation are more profound in that the identity of all the players, the health professionals, the donor and the recipient is known. Directed donations therefore require confidentiality that is determined by legal, professional ethical standard as well the relationship and understanding of the involved parties. Directed donation requires that the interest of the potential child and the other involved parties, the donor, the recipient and the health professionals be protected with respect to disclosure of identity, written informed consent of the donor and also recognition that the donor is not driven by pressure, coercion or financial consideration in making the decision to donate gamete. The disclosure to the children from directed gamete donation of their genetic origin may serve the purpose of averting consanguinity, or incest, amongst these offspring in the future.

13. Surrogacy

Surrogacy implies the commissioning of a woman to carry a pregnancy whether or not on a commercial basis. It poses ethical challenges having been regarded occasionally the using of one person as a means to the ends of another (Warnock, 1987). Ethics demand that the autonomy of the surrogate mother should be respected and that surrogacy should not be commercialized. Ethical approval is required and the legal requirements for surrogacy in the concerned country should be complied with and duly explained to the concerned parties prior to the surrogate arrangement by the health professional.

14. Multifoetal gestation (multiple pregnancy)

Assisted reproduction requiring the use of ovulation inducing drugs and the need for multiple embryo transfer has been the main factor responsible for the increasing incidence of multiple pregnancies the world over. Multiple pregnancy has grave implications not only for the mother and the foetuses but also for the family, the community, the healthcare provider and the overall health services particularly in respect of the demands of expert on neonatal care, couples seeking for infertility treatment especially by assisted reproductive technology should therefore be adequately informed as to the possibility, and risks that may

be associated with multiple pregnancy, particularly of the higher order variety. Obstetrics and gynaecological professionals involved in assisted reproduction should therefore aim at achieving singleton pregnancies and furthermore clearly inform their client and other interest group such as the press that multiple pregnancies arising from assisted reproduction constitute a complication rather than a fit. Where multiple pregnancies especially of the higher order variety occur, it is ethically preferred to reduce the number of foetuses than leave them alone, since this will increase the chances of survival and success of the assisted reproduction.

15. Termination of pregnancy

Termination of pregnancy can occur for variety of reasons. When pregnancy termination occurs before the age of viability of the foetus, it is regarded as abortion. Abortion can occur as a natural process in which case it is regarded as spontaneous abortion or otherwise as a forced procedure regarded as induced abortion. Induced abortion is usually performed for unwanted pregnancy. When performed in countries where the law permits, it is regarded as legal abortion, while it is illegal or criminal if carried out where the law does not permit abortion. In some countries abortion law is restrictive, abortion being allowed under certain circumstances such as for the purpose of saving the life of the mother. In countries where the law does not permit abortion or where the law is restrictive, unsafe abortion is usually of high incidence. Virtually all forms of abortion, but in particular induced abortion are fraught with ethical challenges. A woman with an unwanted pregnancy particularly for strong reasons will go to any length to seek for the termination of such pregnancy – even at the risk of losing her life.

The ethical question is, should her autonomy not be respected by obliging her with a safe termination of the unwanted pregnancy?

A further question that often arises and is capable of throwing the health practitioners into serious ethical dilemma concerns the identity of the foetus that the pregnant woman seeks to abort. Does the foetus not constitute a being albeit incapable of autonomy and therefore vulnerable, whose autonomy needs to be protected, or should the fate of the foetus be allowed to be solely dependent on the decisions of the mother? These ethical questions are applicable to several issues in obstetrics that may constitute danger to the foetus or the mother or both.

16. Prenatal diagnosis and termination of pregnancy following the procedure

Prenatal diagnosis is becoming an increasingly important component of obstetrics care, to identify in -utero, diseases of the foetus and their severity, that may require genetic engineering, future life style adjustment or termination of pregnancy. Prenatal diagnostic procedure requires prior counseling and informed consent of the woman. The woman is also required to state in advance any information that she would not want to be given following the procedure for example the sex of the foetus.

Prenatal diagnosis provides information as to foetal diseases that may permit termination of pregnancy in countries where the law permits. The ethical challenges raised however is related to how one determines the degree of the severity of the disease or abnormality and

to what extent this will influence the quality of life of the infant following delivery to justify the termination of the pregnancy.

The decision to terminate a pregnancy following the discovery of foetal abnormality from prenatal diagnosis, is entirely that of the couple and on no account should the couple be coerced into choosing any of the available care option, in fact where abnormality discovered is treatable or compatible with life, termination of pregnancy is discouraged.

17. Interventions for foetal well-being including court-order obstetrical interventions

The majority of pregnant women act in a manner that protects the interest of their foetus. There are few occasions however where the habits or practices of a mother may impair the well-being of her foetus, for example, cigarette smoking, alcohol intake and the use of hard drugs. A mother may also refuse the advice of the health practitioner to carry out procedures such as cesarean section for foetal indication. The healthcare practitioner and indeed the medical team have a responsibility to empathically counsel and fully inform the patient, excising utmost patience in doing so, of the benefits or repercussions of the medical advice. Most of the time, the woman accepts to co-operate if she is adequately informed. Situations however may arise where the pregnant woman emphatically objects to the proposed obstetrics intervention to the extent that judicial mandate is sought for by the hospital authorities. Court order cesarean section, the most common of these interventions has been reviewed by Walden (2007). A 1987 New England Journal of Medicine report indicated that among 21 cases of cesarean sections for which court orders were sought, 86% were obtained; in addition a survey of heads of maternal-foetal medicine departments, revealed that 46% of the respondents supported court ordered cesarean section (Veronika et al, 1987). A more recent study of attendees at the annual meetings of the American College of Obstetricians and Gynecologists and the American Health Lawyers Association found that as high as 51% indicated the likelihood of their supporting forced cesarean section (Samuels et al 2007). The issue of court order (forced cesarean section) and what should constitute the health professionals' approach to it has been summarized in a 2004 American College of Obstetrics and Gynecology (ACOG) guidelines which states as follows:- "if an obstetrician disagrees with a patient's choice and is unable to arrange transfer of care, they must, continue to care for the pregnant woman and not intervene against the patient's wishes, regardless of the consequences." The guideline also states that the use of judicial authority to implement treatment regimens to protect the fetus violates the pregnant woman's autonomy and should be avoided. It further states, "Even in the presence of a court order authorizing intervention, the use of physical force against a resistant, competent woman is not justified. The use of force will substantially increase the risk to the woman, thereby diminishing the ethical justification for such therapy (ACOG, 2007). The position contained in the ACOG guideline concerning court order cesarean section is in tandem with the premise on which the first appellate court vacation of a court order cesarean section was made in 1990. Angela Carder a terminally ill cancer patient at 26 weeks pregnancy had a forced judicial mandate cesarean section at George Washington University Hospital in 1987 – against her wish and that of her doctor and relations. Angela and her child died shortly after the surgery and it was argued that the surgical procedure had accelerated the death.

Angela Carder's family and Reproductive Freedom Project (RFP) supported by several other bodies and human rights organizations filed an appeal at the D.C. court of Appeal for the vacation of the court order for that cesarean section and the legal precedents it had set, which was ultimately granted (ACLU, 1997). On no account therefore should a woman be forced or coerced into carrying out a procedure that she is unwilling to accept since this will amount to a violation of her autonomy. It is inappropriate to resort to judicial intervention when a woman has made an informed refusal of a medical or surgical procedure since this is considered to constitute an overriding of her autonomy (strong paternalism). The situation is noteworthy, different when the woman's competence to make decision is impaired as in the unconscious mother or in the mentally sub-normal.

The consent of a surrogate – the woman's spouse or any other member of her family is usually enlisted. It is important however to note that in general the mother should be of prime consideration and therefore decision on her well-being takes precedence over that of the foetus.

18. Interventions for severe congenital malformation of the foetus

A woman carrying a severely malformed foetus has the ethical right of having the pregnancy terminated. In situations where termination of pregnancy is not considered as a management option, for example for legal, religious or other personal reasons, prenatal diagnostic procedures for severe foetal congenital malformations should be preceded by counseling of the woman on the possible findings and ascertaining from her the extent of the findings to be disclosed to her. Pregnancy termination on the basis of the sex of the foetus is un-ethical. In multiple pregnancies involving normal and malformed fetuses prime consideration should be given to survival of the normal fetuses provided the mother's life is not at risk. Where the couple disagrees on the management option in severe foetal malformations, the view of the woman should take precedence over that of spouse. The medical team has the ethical responsibility to encourage the parents, in the case of severe foetal malformation, to seek a second opinion, should they not be satisfied with the medical advice given to them. The decision on the termination of pregnancy for congenital malformation should be made by the parents free from coercion, financial inducement or demographic considerations whether from government or other bodies. Medical practitioner should seek appropriate consent to confirm and appropriately document the nature and extent of foetal malformation following termination and furthermore appropriately inform and counsel parents.

19. Caesarean section for non-medical reason

Worldwide there has been an increasing incidence in the rate of caesarean section attributable to medical, legal, financial, social and psychological factors. Oftentimes physicians are confronted with request for caesarean section for personal reasons such as the convenience of the patient. Caesarean deliveries are associated with higher risks than vaginal deliveries. Furthermore complications, costs and duration of hospital stay are more following caesarean deliveries compared to vaginal deliveries. It is ethically wrong for medical practitioners to perform caesarean section for indications that are not medical. The health practitioners are therefore obligated to inform adequately and counsel woman against requests for caesarean section for non-medical reasons.

20. Management of pregnancy related to sudden unexpected maternal death

When a pregnant woman is certified dead or is in the danger of imminent death from circulatory or respiratory failure, the life of the foetus is severely endangered and urgent intervention becomes necessary. It is important to maintain the circulation and respiration of the woman while waiting for an urgent decision on the foetus. Pertinent issues requiring considerations includes, the viability, and probable health status of the foetus, any wishes expressed by the mother as well as any views expressed by her family members especially her partner. The management options include immediate caesarean delivery if the foetus is alive and matured, co-ordinating efforts to maintain the vital functions of the woman to allow the preterm foetus to mature provided that the informed consent of the woman's partner or family has been obtained, and the deceased had not wished otherwise, and outright discontinuation of support for the respiratory and circulatory function of the woman if the foetus is dead or the two former conditions are not wished by the involved parties. If support for the vital organs of the woman cannot be maintained immediate caesarean section is recommended.

21. HIV infection in pregnancy

HIV infection is a global pandemic. 2008 estimate has it that approximately 33.4 million people worldwide are living with HIV including 2.1 million children under 15 years of age (UNAIDS, 2009; WHO, 2009). HIV prevalence rate ranges from as low as less than 0.1% in countries such as Bangladesh, Croatia, and Egypt to as high as 24.8%, and 25.9% in Botswana and Swaziland respectively (UNAIDS, 2010). HIV infection has profound psychological and social implications to the victim, her partner, family, the health worker, and the society at large. Vertical transmission of the infection during pregnancy and breast feeding is the most common source of infant and childhood infection. The disease which runs a chronic course has varying degrees of morbidity and is characterized by social stigmatization of the patient, with discrimination in the work place and societal activities. HIV disease has ethical challenges. The respect for the privacy and confidentiality of the HIV infected person conflict with the need to protect the partner, the health workers and other members of the public that may be placed at risk by virtue of their contact with the infected person. Ethical concerns on the privacy and confidentiality of the infected HIV patient however should be weighed against the need to prevent the disease from getting to epidemic proportions through providing information to the public on the morbidity and mortality statistics of the disease, mandatory screening for antenatal patient, and disclosure of HIV status of patients to partner, health workers and other vulnerable persons. The responsibility of the physician therefore includes the provision of individual counseling, care and treatment for the HIV infected persons and advocacy to the public towards the protection of the patient from stigma and discrimination. The ethical responsibility of the physician to protect persons at risk of being infected by an HIV patient requires proper counseling of the patient together with enough information to enlist the consent for testing, and disclosure to such persons. For example, the partner and the health worker, where informed consent for disclosure is not obtained in spite of adequate counseling of the patient, and the risk of transmission of the disease is high, the physician can after due consultation with relevant bodies such as, the institution's ethical committee, decide to override the patient's autonomy of confidentiality.

Vertical transmission of HIV to an infant is averted when breast feeding is avoided. In societies where affordable alternative infant feeding methods are available it is unethical to allow an HIV positive mother to breast feed her infant. In low socio- economically developed societies where infant feeding formula may not be affordable or may be prepared under unhygienic condition with risk of infection to the infant, or in societies with strong cultural ties to breast feeding, it is ethically justified to allow breast feeding provided the countries' protocol for the reduction of the infectivity of the breast milk and increasing its safety to the infant is adhered to. Gamete donation for Assisted Reproduction requires informed consent and screening for HIV. Only donors with sero-negative HIV status are allowed to donate gamete.

22. Safe motherhood

World health organization (WHO) has estimated in a 2007 report that 536, 000 maternal deaths occur annually the world over from causes related to pregnancy and childbirth (WHO, 2007). As high as 99% of these deaths occur in developing countries (WHO, 2001). Maternal and Perinatal mortality statistics are the most important measure of safe motherhood, and their reduction has been recognized in the 5th and 4th component respectively, of the United Nations Millennium Development Goals (UNDP, 2003; UNO, 2003).

Maternal mortality can occur from direct medical causes – obstetrics haemorrhage, sepsis, complications of unsafe abortion, hypertensive disorders in pregnancy and obstructed labour; from indirect medical causes – factors pre –existing or co –existing with pregnancy e.g cardiac diseases and gender based violence; and from non –medical factors – underlying social-cultural, legal, religious, and economic factors, reproductive health factors, health systems and health services factors and delays to access to emergency obstetrics care (Fatusi and Ijadunola, 2003; WHO, 1994; Maine and Wray, 1984).

Most causes of maternal deaths are preventable, such deaths therefore represents a violation of ethical principles and human right of the woman – a situation more marked in the developing countries, lack of access to family planning, abortion services, good antenatal care, delivery by skilled birth attendant, emergency obstetrics care, good neonatal care and postnatal services – all constitute a violation of woman's ethical principles of respect for persons, beneficence, non – maleficence, and justice which may occur both at microethical or macroethical level. Physicians have an ethical responsibility to protect the sexual and reproductive rights of women in order to promote their rights to life, information and education, to decide on whether and when to get married and found a family, to healthcare and protection, to benefit of scientific progress and to be free from ill treatment and torture.

Physicians also have an important role to play in publicity and campaign towards the development of policies and programs that will strengthen the health systems and health service to promote safe motherhood and reduce maternal mortality to the barest minimum.

Governments should work in partnership with non – governmental organizations and communities to provide good roads, acceptable and affordable maternal health services with good health facilities equipped and manned by skilled birth attendants adequately trained on emergency obstetrics care.

23. Cord-blood collection and new born care

Umbilical cord blood is a rich source of haemopoietic stem cells that is used in the treatment of diseases such as leukemia. It can therefore be collected, pooled and stored in core blood bank to be dispensed when required, usually on commercial bases. Maternal consent to the collection of umbilical cord-blood is ethically required. Early clamping of the umbilical cord has been shown to be capable of reducing the new born circulating blood volume by 30% and tripping the newborn into circulatory disturbance. Enlisting maternal consent to cord blood collection should therefore be preceded by the assurance of the mother that the umbilical cord will not be clamped early, to prevent hazard to her new born.

Resuscitation and care of the new born requires that the physician considers the welfare of the individual new born within the context of the ethical principle of respect for persons albeit incapable of autonomy, who should therefore be protected. The parents who constitutes the rightful surrogate of the child should be adequately informed as to the diagnosis and prognosis of the child's condition, for example, the severely preterm infant to enable them make appropriate decision and consent to the treatment of the child.

Gender, religious, ethnic and financial considerations should not influence decisions on the treatment of the new born. The physicians counseling and advice to the parents on treatment decision for the newborn should be based on accurate knowledge of the facts and statistics on the prognosis following the treatment of the condition, and in most circumstances, after due consultations with other members of the health team including a senior obstetrician and gynaecologist. Where there is disagreement between the physician and the parents independent adjudication may be sought for and where necessary, the view of the health facility's ethical committee. Following the death of the infant, permission should be sought from the parents for the conduct of a post mortem examination on the deceased new born, to confirm the definitive cause of death and provide more information for further counseling of the parents particularly for future births.

24. Conclusion

Contemporary global health care has over the years increasingly recognized the need to uphold and promote the sexual and reproductive rights of individuals, especially women, which has been perceived to be an important prerequisite to national development (Adinma and Adinma, 2009; Adinma and Adinma, 2011). It has therefore become absolutely compelling that health professionals caring for women imbibe and observe strict ethical principles in all aspect of reproductive health care of women. In particular, obstetrics care, on account of its exclusiveness for women and the wide range of physical, psychological and social issues, sometimes cross-cutting, that may be associated with the process, from conception to parturition, requires that the health professional be vast with various ethical and human rights challenges associated with every step in obstetrics care.

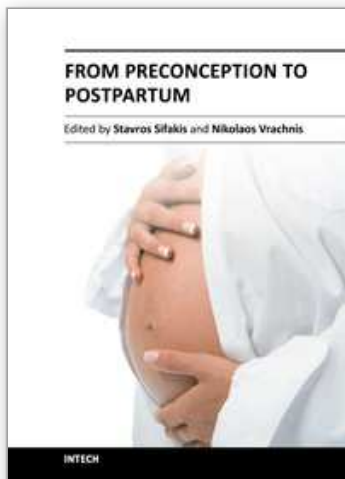
In countries not already doing so every effort should be made towards including, or broadening the scope, of bioethics in the curriculum of studies of health professionals caring for women, both at under-graduate and post-graduate levels. Furthermore it is necessary to develop human rights based bioethical codes that will guide such health professionals in their day to day obstetrics practice and ensure that the ethical codes are appropriately disseminated

for application by health professionals already in obstetrics practice. These health professionals will also benefit from periodic workshops and seminars on bioethics as part of their continuing medical education. Health professionals also have an obligation to guide governments and policy makers towards the development of human rights and ethics – friendly policies and programmes that will invariably promote obstetrics care and overall safe motherhood.

25. References

- American College of Obstetricians and Gynecologists. Cesarean delivery on maternal request. ACOG Committee Opinion No. 394. *Obstet Gynecol* 2007; 110:1501–1504.
- Adinma JIB, Adinma ED. Ethical Considerations in Women's Sexual and Reproductive Healthcare: *Nigerian Journal of Clinical Practice*. 2009; 12(1):92-98.
- Adinma JIB, Adinma ED: Impact of Reproductive Health on Socio-economic Development: A Case Study of Nigeria. *African Journal of Reproductive health* 2011; 15(1): 7
- Adinma JIB. International Federation of Gynaecology and Obstetrics / Society of Gynaecology and Obstetrics of Nigeria (FIGO/SOGON) Human Rights Code of Ethics on Women's Sexual and Reproductive Healthcare for health professionals in Nigeria. FIGO/SOGON Women's Sexual and Reproductive Rights Project (WOSRRIP) 2003.
- American Civil Liberty Union (ACLU) Coercive and Punitive Governmental Responses to Women's Conduct during Pregnancy September 30, 1997.
<http://www.aclu.org/reproductive-freedom>.
- Beauchamp TL, Childress JF. *Principles of Biomedical Ethics*. Oxford University Press. New York. 2001.
- Callahan D. The Social Sciences and the task of bioethics. *Daedalus*. 1999; 128: 275–294.
- Commonwealth Medical Association Trust (COMMAT). Consultation on Medical Ethics and Women's Health, including Sexual and Reproductive Health, as a Human Right. NY, USA, 23–26 January 1997.
- Cook RJ, Dickens B, Fathala MF. *Reproductive Health and Human Rights*. Oxford University Press, 2003.
- Council for International Organizations of Medical Sciences (CIOMS). International ethical guidelines for biomedical research involving human subjects. Prepared by CIOMS in collaboration with WHO, Geneva, 1993.
- Donation of genetic material for human reproduction, *Int. J. Gynecol. Obstet*, 1994, 44:185.
- Elkins TE, Strong C, Dilts PV Jr. Teaching of Bioethics within a Residency Program in Obstetrics and Gynecology. *Obstet Gynecol*. 1986 Mar; 67 (3):339-43. Website: <http://www.ncbi.nlm.nih.gov/pubmed/3945445>
- Ethical Issues in Obstetrics and Gynecology by the FIGO Committee for the Study of Ethical Aspects of Human Reproduction and Women's Health. November 2006.
- Ezeani CO. Evolving a human rights based code of ethics for medical practitioners caring for women in Nigeria. *Trop J Obst Gynae* 2002; 19 (Suppl.1): S 26–28.
- Fatusi AO, Ijadunola KT. (2003) National study on Emergency obstetrics care facilities in Nigeria, UNFPA/FMOH Abuja.
- FIGO Professional and Ethical Responsibilities Concerning Sexual and Reproductive Rights. Dec. 2004. www.figo.org/Codeofethics
- Gillon R (Ed). *Principles of health care ethics*. John Wiley and Sons. Chichester. 1994.
- James HJ, *Bad Blood: The Tuskegee Syphilis Experiment* (New York: Free Press, 1993); Carol A. Heintzelman, "The Tuskegee Syphilis Study and its Implications for the 21st Century" at <http://www.socialworker.com/Tuskegee.htm>.
- Jonsen A. *The birth of Bioethics*. Oxford University Press. New York. 1998.

- Maine D, Wray J (1984) Effects of family planning on maternal and child health. *CONTEMPORARY OBS/GYN* 1984 O mar. 23(3): 122 – 36.
- McKneally MF, Singer PA. Bioethics for clinicians: 25. Teaching bioethics in the clinical setting. *CMAJ* 2001; 164: 1163-1167.
- Warnock M (1987). The new Ethical Problems in Infertility. In: *Progress in Obstetrics and Gynaecology*, edited by Studd J., vol. 6., chapter 13, pp 243 – 251. Edinburgh, Churchill Livingstone.
- Rehmann-Sutter C, Wienroth M: Ethical Considerations on new Developments in Reproductive Medicine. *Ther Umsch*, 2009 Dec, 66 (12): 807 – 11.
- Rothmans D. Stranger at the bedside: A history of how Law and Bioethics transformed medical decision making. Basic Books, New York, 1991.
- Royal College of Physicians and Surgeons of Canada. General Standards of accreditation. Ottawa: Royal College of Physicians and Surgeons of Canada, 1997. Standard B.V:3:
- Samuels TA, Minkoff H, Feldman J, Awonuga A, Wilson TE. "Obstetricians, health attorneys, and court-ordered cesarean sections." *Womens Health Issues*. 2007 Mar-Apr;17(2): 107-14.
- Shuster E: Fifty Years Later: The Significance of the Nuremberg Code. *NEJM* 337.
- Stephens T, Brynner R. *Dark Remedy* (Cambridge, Mass: Perseus Publishing, 2001), on the rehabilitation and therapeutic benefits of Thalidomide.
- The National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. The Belmont Report: Ethical Principles and Guidelines for the Protection of Human Subjects of Research. DHEW Publication No. (OS) 78-0012. Washington, 1978, p. 2.
- UNAIDS Global updates of HIV/AIDS. 2009
- UNAIDS, Report on the Global AIDS Epidemic, 2010. http://www.unaids.org/Global_Report/Global_report.Htm
- UNDP. Human DEVELOPMENT Report 2003, MDGs: A compact among nations to end human poverty.
- United Nations Millennium Declaration 2000. A/RES/SS/2 18 September, New York. <http://www.un.org/millennium/Declaration/are5552e.pdf>. march 2003
- Uzodike VO. Ethical codes and statements. In: Uzodike VO, ed. *Medical Ethics: Its foundation, philosophy and practice* (with special reference to Nigeria and developing countries). Computer Edge Publishers, Enugu, Nigeria, 1998: 21.
- Veronika E.B. Kolder, Janet Gallagher, and Michael T. Parsons. "Court-Ordered Obstetrical Interventions." *NEJM* 316.19 (May 7, 1987): 1192-1196.
- Walden R. What Do Obstetricians and Lawyers Think About Forced C-Sections? April 7, 2007. <http://womenshealthnews.wordpress.com/2007/04/07/>.
- World Health Organization (WHO): maternal mortality in 2005: estimates developed by WHO, UNICEF, UNFPA, and the World Bank Geneva, WHO, 2007
- World Health Organization, United Nations Children's Fund, and United Nations Population Fund. Maternal mortality in 1995. Estimates Development by WHO, UNICEF and UNFPA. Geneva 2001. World Health Organization (WHO/RHR/01.9)
- World Health organization, United Nations children's fund, UNAIDS (2009) Towards universal access. Scaling up priority HIV/AIDS interventions in the health sector, progress report 2009 Geneva, world Health Organization.
- World Health organization. Mother Baby package: implementing safe Motherhood in countries. WHO/FHE/USM/19.11. World Health Organization, 1994.
- World Medical Association, Declaration of Helsinki, as amended Oct. 2000, Article 5 (see Pt. III, Ch. 2)
- World Medical Association, Declaration of Helsinki, as amended Oct. 2008, Article 5.



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Obstetrics is evolving rapidly and finds itself today at the forefront of numerous developments. Providing selected updates on contemporary issues of basic research and clinical practice, as well as dealing with preconception, pregnancy, labor and postpartum, the present book guides the reader through the tough and complex decisions in the clinical management. Furthermore, it deepens the scientific understanding in the pathogenetic mechanisms implicated in pregnancy and motivates further research by providing evidence of the current knowledge and future perspectives in this field. Written by an international panel of distinguished authors who have produced stimulating articles, the multidisciplinary readers will find this book a valuable tool in the understanding of the maternal, placental and fetal interactions which are crucial for a successful pregnancy outcome.

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