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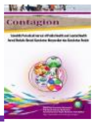

Ethical Issues in Neuroscience and Neuropsychiatric: A Review of Major Issues

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Abstract

Adherence to ethical principles is essential nowadays in neuroscience and neuropsychiatric research. observance of ethical principles is essential in the case of neurology and neuroscience research, as it is in all the other medical and surgical fields. as neuroscience research advances, researchers, clinicians, and other stakeholders will face a host of ethical challenges. Ethical problems of neuroscience-based diagnosis and interventions. This section concerns problems resulting from neuroimaging, pharmacological brain enhancement, and new technical interventions in the brain. The research is based on a literature review, so data will be collected from literary sources such as scientific journals, books, and articles in January 2023 relating to the research topic. The literature search process must be systematically documented, including keywords, databases used, and search dates. Data analysis will be carried out by reading and understanding the content of the literature, identifying ethical problems encountered in the field of neuroscience and neuropsychiatry, and analyzing different perspectives in addressing these ethical problems. In this article, we also review the major ethical issues raised by advances in neuropsychiatric genetics. Advances in neuroscience raise ethical, social, and legal issues about the human person and the brain. The potential benefits of applying neuroimaging, psychopharmacology, and neurotechnology to support mentally ill and healthy persons have to be carefully weighed against their potential harm. Questions concerning underlying concepts of humans should be actively dealt with by interdisciplinary and public debate. t is therefore essential to develop bioethics and encourage discoveries in neuroscience to firmly respect the ethical principles available at the time of their publication.

Keyword: Ethical Issues, Neuroscience, Neuropsychiatric

INTRODUCTION

President Obama announced his vision to advance neuroscience research on April 2, 2013. Through the Brain Research through Advancing Innovative Neurotechnologies® (BRAIN) Initiative, the president committed $100 million to neuroscience-related research efforts at the National Institutes of Health, the Defense Advanced Research Projects Agency, the Food and Drug Administration, the National Science Foundation, and the Intelligence Advanced Research Projects Activity. To maintain the “highest ethical standards,” the president charged the Presidential Commission for the Study of Bioethical Issues (Bioethics Commission) with “exploring the ethical, legal, and societal implications raised by this research initiative” (Paradise, 2013) ;(EISEMAN, 2003). Given the nature of the research that the BRAIN Initiative could fund, addressing and emphasizing the ethical issues surrounding neuroscience research was and still is a critical component of the initiative (Borah et al., 2016) ;(Amadio et al., 2018). Adherence to ethical principles is essential nowadays in neurology and neuroscience research.

Although there are certain generally valid ethical principles for all medical domains, stated and regularly updated in works such as the Declaration of Helsinki or Beauchamp and Childress's book "Principles of Biomedical Ethics", the complexity of neurology leads to particular ethical issues that both the clinician and the researcher may face (Israel, 2014). Observance of ethical principles is essential in the case of neurology and neuroscience research, as it is in all the other medical and surgical fields (Nakagawa et al., 2011). The central dogma of medical ethics refers to the following five essential principles: justice, benevolence, non-harm, maintaining the professional patient-doctor relationship, and respect for autonomy (Rossi et al., 2009). As neuroscience research advances, researchers, clinicians, and other stakeholders will face a host of ethical challenges (Nestor et al., 2016). get used to routine health checks and physical activity before starting work (Widitia et al., 2020).

Advances in neuropsychiatric genetics hold great promise for better prevention, diagnosis, and treatment. Patients should be helped to understand the often limited predictive power of current knowledge, the potential psychological impact, risks of stigma and discrimination, and possible implications for family members. The implications of the genetic findings for families raise the question of whether doctors must inform family members about the implications for their health. Finally, participation in research in neuropsychiatric genetics raises a variety of ethical issues, including the issue of debate over the extent to which results should be returned to individual subjects. As the science of genetics becomes more widely applied.

METHODS

The research is based on a literature review, so data will be collected from literary sources such as scientific journals, books, and articles in January 2023 relating to the research topic. The selection of literature sources must meet certain inclusion criteria, such as publication date, relevance, and quality of research. The literature search process must be systematically documented, including keywords, databases used, and search dates.

The selection and screening process was carried out independently by three researchers. Any uncertainty is resolved by means of deliberation. English articles are translated using Google Translate as well as reviewed who have a good knowledge of the language. The selection is determined as follows:

1. After the data is collected, the researcher will conduct a selection and assessment of the literature relevant to the research topic.
2. A literature assessment is carried out using certain exclusion criteria, such as the quality of the research and relevance to the research topic.
3. The process of literature selection and assessment must be well documented, including the reasons for the exclusion of certain literature sources.

Data Analysis:

1. After the literature is selected, the researcher will analyze the data found.
2. Data analysis will be carried out by reading and understanding the content of the literature, identifying ethical problems encountered in the field of neuroscience and neuropsychiatry, and analyzing different perspectives in addressing these ethical problems.
3. The process of data analysis must be systematically and documented.

RESULTS

Ethical problems of neuroscience-based diagnosis and interventions. This section concerns problems resulting from neuroimaging, pharmacological brain enhancement, and new technical interventions in the brain. In this article, we also review the major ethical issues raised by advances in neuropsychiatric genetics. It should be recognized that this discussion of ethics reflects current thinking about how genetic information should be used. But we are still early in the evolution of this promising technology and it will be many years before its full impact is felt and understood by society. Only then will it be possible to determine how genetic science should best be used to benefit society, and to fully understand the ethical implications of that use. As experience is gained in the real world, ethical principles will emerge to guide the use of genetic information in ways that balance the interests of individuals and society.

Table 1. Four fundamental values in bioethics and their application to dementia care

Ethical Value	Definition	Application To Dementia Care
Autonomy	Right to self-determination	The clinician needs to evaluate the patient’s capacity, inform the individual and family caregiver of the results of the assessment, and determine jointly the right balance between safety and well-being, the patient’s capability for independent decision-making and actions, and when and how to involve the family caregiver.
Beneficence	Making decisions and taking action in the best interest of the patient	The clinician needs to reach out to the family caregiver to assess his or her health and well-being and capacity to provide ongoing care, as this is in the best interest of the patient with dementia.

Nonmaleficence	Pursuing actions that minimize harm	The clinician needs to reach out to the family caregiver and provide education, support, referrals, and resources to minimize harm to the caregiver and patient
Truth-telling	Communicating openly and honestly	The clinician needs to inform the patient of the importance of involving her care partner in decision-making and is obligated to share the truth about the capacity of the patient and avoid deception

The table above shows the 4 fundamental pillars of bioethics in dementia care. With technology such as brain enhancement, it is hoped that it will be easier and more optimal for clinicians to carry out these 4 fundamental pillars.

Drugs that are being sought for the eradication of traumatic memories that are typical for post-traumatic stress disorder (PTSD) will be available to anyone wishing to avoid recalling an unpleasant event.

Ethical problems of brain enhancement include the growing options for brain enhancement raise ethical concerns that are partly comparable to other nonmedical drug applications; however, it also has a far-reaching impact on how we understand ourselves and the behavior of our lives.

DISCUSSION

1. Neuroimaging

With the growing sophistication of neuroimaging techniques, they may be used to infer not only people's actual mental states but also their unconscious attitudes and predispositions to a particular kind of behavior. Though opening up the most interesting prospects for research and diagnosis, the possibility of a "transparent brain" raises several critical issues. Neuroimaging is bound to momentary states, and inferences on personality, propensities, and actual dangerousness are hardly warranted. Another ethical issue concerns the increasing use of neuroimaging to predict later-onset psychiatric disorders. Thus, functional magnetic resonance imaging (fMRI) scans of adolescents considered at high risk of schizophrenia showed structural and functional abnormalities in certain areas. Early pharmacological intervention might prevent or delay the onset of psychosis.

Brain processes are intimately bound to ourselves and our identity. Our sense of privacy may be threatened by technologies that can reveal the neural correlates of our innermost thoughts and unconscious attitudes. In the future, however, it might be possible to more reliably 'read' personality features, psychiatric history, truthfulness, and hidden deviations from a brain scan. This could be exploited for such purposes as screening job applicants, assessing insurance risks, detecting a vulnerability to mental illness, determining who qualifies for disability benefits, and so on. For this reason, ‘cognitive liberty’ has already been postulated as every person’s fundamental right to autonomy over his or her brain states.

2. Brain Enhancement

The development of new psychotropic agents with fewer side effects carries the option of improving the general psychological and cognitive functioning of individuals who are not ill. Mood, memory, attention, alertness, and other cognitive capacities are on the agenda for ‘brain enhancement’ or ‘mind doping’. The product range of pharmaceutical companies increasingly aims at healthy persons willing to increase their well-being and performance through legal drug use.

The last two decades have seen a new wave of drugs that may heighten cognitive ability and alertness. Psychostimulants such as methylphenidate and dextroamphetamine used for treating attention deficit hyperactivity disorder (ADHD) can also enhance attention and other executive functions in healthy people. The excessive administration of methylphenidate for school boys has raised concerns, particularly in the United States. Moreover, up to 16% of American college students take stimulants as regular study aids. This misuse is favored by the fact that ADHD represents the lower tail of a continuum shading into the normal range rather than a qualitatively separate state of cognitive dysfunctions. Similarly, Modafinil reduces daytime sleepiness among shift workers, but in 90% of prescriptions, it is being used to promote alertness in people with regular sleep-wake cycles (Lakhan, 2012).

The search for memory-enhancing drugs is increasing. In recent molecular biology research, there are two ways to improve memory, namely by targeting (a) early acquisition of memory by long-term potentiation and (b) later stages of memory consolidation. Although research is aimed at finding a treatment for dementia, the pharmaceutical company's main target group is individuals aged 40-60 years with mild cognitive impairment caused by the aging process.

3. Neurotechnology

Neurocognitive enhancement involves intervention in a complex system with long-term side effects. Thus, psychostimulants such as methylphenidate can increase short-term working memory capacity at the expense of sufficiently anchored information in meaningful higher-order knowledge. Memory enhancement can eventually impair memory retrieval, as the natural balance between remembering and forgetting can be disrupted by excess memory stored in the brain. Other effects: Competition, and changing individual conditions (Fuchs, 2006).

The growing trend to localize mental disorders in the brain has supported a return to neurosurgery, with ablation or resection being performed primarily in the treatment of obsessive-compulsive disorder and even intractable anxiety. Still, in its early stages, neurostimulation with a brain pacemaker not only helps restore coordinated movement in patients with Parkinson's disease but can also be used to treat epilepsy, OCD disorders, depression, or chronic pain. Both types of intervention can result in personality changes, although in contrast to psychosurgery, deep brain stimulation is reversible. Examples of neurotechnology: are cochlear implants and EEG (Staudt et al., 2019).

Apart from the ethical issues discussed in the brain enhancement section, technical intervention in the brain raises particular concerns about the identity, agency, and inviolability of the person. Changes in behavior and personality have been observed in patients with deep brain stimulation. Research on electronic brain enhancement brings up consequences involving mind control, hybrid brains, and cyborgs.

Techniques for regulating and manipulating brain function are developing rapidly. Caution and control in its application seem to be very necessary. Researchers still don't know exactly how the various brain systems interact, or what certain brain disorders related to psychopathological disorders might predict in the future. Researchers also don't know exactly how this system can affect a person's beliefs, desires, intentions, and emotions that make up the human mind. Psychiatrists can play an important role in identifying the ethical issues raised by advances in neuroscience; because the job of psychiatrists has always been to bridge the gap between the biological and personal levels, in their decisions and their communication with their patients (Decety et al., 2007).

4. Prenatal Genetics

Early studies suggest there is great interest in prenatal testing to detect other neuropsychiatric disorders such as bipolar disorder, schizophrenia, alcoholism, attention deficit disorder, and depression. The high level of interest expressed in prenatal testing may reflect a lack of understanding of the possible value of predictive testing for this condition. For example, genetic tests show a doubling of the lifetime risk for developing schizophrenia. Even if expectant parents vary widely in their consideration of the risk of neuropsychiatric disease in their decision to abort a pregnancy, this level of predictive power is unlikely to provide them with much useful information (O’Connell, 2021).

The Nuffield Council on Bioethics (1998) and other thoughtful commentators (Clark, 1994) have suggested that parents should not be allowed to test their children for unpreventable adult-onset disorders; this decision must be made by children, once they reach adulthood.

Parents should only be allowed to test when effective therapeutic interventions are available during childhood. Well-intentioned parents may seek genetic testing to protect at-risk children from exposure to environmental conditions that may interact with their genetic susceptibility to triggering neuropsychiatric disorders (Hoge, 2012).

5. Child Genetic Testing

More serious ethical issues, however, arise in the context of predictive testing. Parents may seek to have their asymptomatic children tested for susceptibility to disorders that may arise later in life, invoking their right to know their children's vulnerabilities and to make family decisions (Fulda et al., 2006). They may be interested in ensuring that they have several children who are free from the risk of developing certain neuropsychiatric disorders and may seek testing as part of family planning. However, this interest comes at the expense of the child to be tested. The test results will not provide direct benefits to the child and precede the child's choice of whether to be tested at a later date. When a child is identified as vulnerable to future disorders, parents may choose to allocate family resources to education and other opportunities in a way that is detrimental to the child at risk. In addition, parents may seek to protect children at risk and alter their experiences in ways that may affect their development or, perhaps more subtly, their self-image. Finally, test results can lead to discrimination in many of its manifestations (Silumbwe et al., 2018).

6. Pharmacogenomics

Pharmacogenomic profiling refers to the study of genetic influences on drug response, including predisposition to adverse reactions. Polymorphisms can cause variable drug responses by altering the enzymatic metabolism or site of drug action. In many cases, the pharmacogenomic profile poses few ethical concerns. In some cases, however, genetic markers used for drug response profiling will convey other information that may be more problematic. For example, the APOE profile that provides information about the risk of Alzheimer's disease can assist internists in predicting treatment response to lipid-lowering statin drugs (Rollinson et al., 2020). Thus, information that has been generated for pharmacogenomic purposes for the treatment of one condition conveys important risk information which the patient may not want to know for another condition. Today, with the rapid advancement of genetic research, it is almost certain that some genetic information is obtained in a seemingly low-risk context. In the consent process, patients who will undergo genetic testing for any purpose must understand that the results can later be found to have collateral implications (Oates et al., 2018).

7. Doctor's Duty to Patient's Family

Because genetic information may have significant consequences for a patient's relatives, questions have been raised about whether doctors must alert family members when genetic test results indicate they may be at risk. Courts in the United States have addressed this issue in several cases showing what the proper ethical contours of such an assignment might look like. InSafer v. Packages (1996), Ms. Safer sued Dr. Pack, his father's doctor, who had treated him for colon cancer which was ultimately fatal due to familial adenomatous polyposis, which is usually an autosomal dominant disorder. Those with the disorder develop multiple benign polyps at a young age; progression to malignancy is unavoidable unless the colon is removed. Dr. Pack had not informed the family (Mrs. Safer was 10 years old at the time of her father's death) of the underlying condition or its heritability, information the medical community knew at the time. Unaware of the risks, Ms. Safer took no precautions (Lucassen et al., 2018).

At the age of 36, he was diagnosed with familial polyposis and metastatic carcinoma of the colon. The tribunal dismissed his suit, ruling that the absence of a doctor-patient relationship with Dr. Pack hinders recognition of the doctor's obligation to protect him. However, the New Jersey Superior Court overturned a lower court, stating that a doctor has a "duty to warn those known to be at risk of avoidable harm from genetically transmissible conditions." The obligation to warn family members, as articulated in this case, appears to override the patient's interest in confidentiality (Blake, 2012). Florida Supreme Court, date v. Threlkell (1995), articulated a narrower task, one that did not compromise the patient's right to privacy.

As discussed earlier, genetic testing for neuropsychiatric disorders likely involves alleles that result in a slightly increased relative risk (except autosomal dominant syndromes and highly penetrating microdeletions and microduplication syndromes which carry a higher risk, and therefore testing can be performed highly predictively). Psychiatric conditions are generally treatable, although neurodegenerative conditions are not, in both cases preventive measures are not currently available. Thus, at this time, it is usually difficult to justify a family member's warning directly, especially if this would involve a breach of patient confidentiality.

However, it is good practice to inform patients of any increased risk to their family members, as this allows patients to decide whether and how to share information with them. The practice of providing information and placing responsibility in the hands of the patient is supported by the public and genetic counselors and may develop into a standard of care.

CONCLUSIONS

These are just some of the particular situations in neurology and neuroscience research when ethical issues arise, directly concerning the neurologist. Of course, with the new research in the field, and with the emergence of modern treatments, ethical issues will become more and more frequent. It is therefore essential to develop bioethics and encourage discoveries in neuroscience to firmly respect the ethical principles available at the time of their publication.

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