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Cryptococcal meningitis (CM) is a major cause of death among HIV-infected individuals. It causes an estimated 957,900 cases and 624,700 deaths worldwide annually, the vast majority of them in sub-Saharan Africa. In Cape Town, CM is now the most common cause of adult meningitis (63% of all microbiologically confirmed cases), and acute outcomes are poor. Even with optimal treatment in study settings, 10-week mortality rates are between 24% and 37%. In 2009, in a routine care setting at an urban hospital in Johannesburg, 67% of patients had died or were lost to follow-up at 3 months (N Govender et al., unpublished data). Unfortunately almost half of South African patients still receive sub-optimal initial treatment with oral fluconazole rather than intravenous amphotericin B. Clearly, given the substantial mortality and morbidity associated with CM, preventive interventions should be prioritised.

As CM primarily affects patients with CD4+ T-cell counts ≤100 cells/µl, the incidence should fall during scale-up of antiretroviral therapy (ART) programmes, as in the high-income countries. However, despite recent progress in expanding access to ART in South Africa, the median CD4+ T-cell count of patients initiating ART remains low, and a high risk of new AIDS events and mortality persists during the first months of ART. Numbers of CM cases in Cape Town remained constant between 2003 and 2008 despite a large increase in ART coverage, and national surveillance shows slight increases in the incidence of reported CM cases year on year.

With expanding ART access, an increasing proportion of CM diagnoses occur among patients already receiving ART – 20% in a cohort of CM patients from Cape Town. Most of these patients had recently initiated ART (median duration 41 days), and their in-hospital mortality was high (29%). CM is therefore a leading contributor to the high early mortality in African ART programmes. It accounts for up to 20% of all deaths, many of which are thought to be due to ’unmasking’ cryptococcal disease among patients who had sub-clinical disease when starting ART.

To date, preventive strategies have consisted of routine fluconazole primary prophylaxis for all patients with low CD4+ T-cell counts. Although this approach reduces the incidence of CM, concerns exist: fluconazole resistance may develop with widespread use; it is not cost-effective; it is teratogenic; and fluconazole has potential interactions with both ART and tuberculosis (TB) medication. These issues have led to very limited uptake of fluconazole primary prophylaxis in HIV treatment programmes.

Fortunately, research has demonstrated that nearly all patients at risk of developing CM during ART could be identified on entry into ART programmes by screening for sub-clinical infection using cheap (ZAR38.95), simple and highly sensitive cryptococcal antigen (CRAG) blood tests. In 707 patients initiating ART in Cape Town, stored serum samples from 13% of patients with CD4+ T-cell counts ≤100 cells/µl tested positive for CRAG in a retrospective analysis. The majority of these patients had previously tested HIV-positive (both those on ART and the 73% who were known to be HIV-positive but not on ART) had been screened, and effective interventions given, up to 78% of cases of CM could have been prevented.

Cape Town data also show that 73% of ART-naïve patients presenting with CM have already been diagnosed with HIV, a median of 4 months before CM, but developed disease before starting ART. CRAG screening could also identify these patients, allowing for pre-emptive therapy and fast-tracking for rapid ART initiation – an issue of particular priority given the exceptionally high mortality of South African patients in this pre-treatment period. If all patients who had previously tested HIV-positive (both those on ART and the 73% who were known to be HIV-positive but not on ART) had been screened, and effective interventions given, up to 78% of cases of CM could have been prevented.

CRAG screening directed at newly diagnosed HIV-positive patients with CD4+ T-cell counts ≤100 cells/µl is likely to detect most cases. At a programmatic level, plasma from ethylenediaminetetra-acetic acid (EDTA) samples sent for CD4 count testing could...
automatically be tested for CRAG at the laboratory if the CD4+ T-cell count was ≤100 cells/µl for the first time in that individual, and in the future, development of point-of-care CRAG tests could allow testing at the clinic level, greatly simplifying the process.

The optimal treatment of asymptomatic CRAG-positive patients has not been studied. Natural history data from Cape Town suggest that ART alone is sufficient to clear asymptomatic antigenemia in around 50% of cases. However, the remaining 50% are at very high risk of developing symptomatic CM and death, so proactive management is needed. One approach would be to perform lumbar punctures for examination of cerebrospinal fluid on all antigenaemic patients identified.

Deaths during or after a surgical procedure may be considered medico-legal and subjected to medico-legal autopsy and inquest. We define death in medical terms and discuss the implications of the provisions of the Amended Health Professions Act of 1974 and the Drug Registration Act of 1963. In July 2008, a revised version of this statutory obligation to report unnatural death related to anaesthesia was provided for in the Health Professions Amendment Act. We examine the scope and significance of this amendment, and consider its implications for health care providers.

Introduction
Patients who undergo anaesthesia and medical procedures may die as a result thereof. South African law requires any death considered unnatural to be reported for medico-legal investigation. Unnatural death related to anaesthesia, and also in a totally compromised state where their lives are subject to the conduct of the health practitioners, constitutes a contributory cause, shall not be deemed to be a death from natural causes as contemplated in the Inquests Act of 1959, or the Births, Marriages and Deaths Registration Act of 1989, or any other similar legislation. The amendment provides that ‘death of a person undergoing, or of which the drug-induced state of deep unconsciousness and loss of voluntary faculties places patients in a position of vulnerability to hazards of the anaesthesia, and also in a totally compromised state where their lives are subject to the conduct of the health practitioners involved. The expectation of death following procedures performed under anaesthesia varies widely, from 1 in 133 patients in Togo to 1 in 185 000 in the UK, raising concern about anaesthesia and peri-operative safety in developing countries. The peri-operative death rate from inpatient surgery in industrialised countries is between 0.4% and 0.8%, and at least half of all surgical complications may be prevention of high-dose fluconazole for HIV-associated cryptococcal meningitis in southwestern Uganda. Clin Infect Dis 2008;47(12):1556-1561.


**MEDICINE AND THE LAW**

The amended legislation on procedure-related deaths – an advance in patient care?

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Deaths during or after a surgical procedure may be considered medico-legal and subjected to medico-legal autopsy and inquest. We define death in medical terms and discuss the implications of the provisions of the Amended Health Professions Act of 1974 and its recent amendment. Problems with the old and new definitions of such deaths and whether the amendment provides additional patient protection for the patient are considered. We challenge the South African law-makers to review the all-inclusive terminology in relation to such deaths.

**Introduction**

Patients who undergo anaesthesia and medical procedures may die as a result thereof. South African law requires any death considered unnatural to be reported for medico-legal investigation. Unnatural death related to anaesthesia, and also in a totally compromised state where their lives are subject to the conduct of the health practitioners involved. The expectation of death following procedures performed under anaesthesia varies widely, from 1 in 133 patients in Togo to 1 in 185 000 in the UK, raising concern about anaesthesia and peri-operative safety in developing countries. The peri-operative death rate from inpatient surgery in industrialised countries is between 0.4% and 0.8%, and at least half of all surgical complications may be avoided. However, deaths caused by the anaesthetic procedure alone account for fewer deaths compared with the surgical procedure itself, with mortality associated with general anaesthesia alone ranging from 0.02% to 0.06% reported as a global figure.

**Issues pertinent to South Africa**

The amendment in South African law appears to be related to the requirement for health professionals to recognise the need for greater protection for the vulnerable patient under their authority and care. The wider-ranging provision in section 48 of the Health Professions Amendment Act permits legal inquiry into deaths which may have evaded investigation under the repealed section 56 of the Health Professions Act.