



CLINICAL PRACTICE

South African Burn Society burn stabilisation protocol

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Minimal criteria for transfer to a burn centre

(Modified from the Australian and New Zealand Burn Association (ANZBA) protocol)

Burn injury patients who should be referred to a burn unit include the following:

- All burn patients less than 1 year of age
- All burn patients from 1 - 2 years of age with burns > 5% total body surface area (TBSA)
- Patients in any age group with third-degree burns of any size
- Patients older than 2 years with partial-thickness burns greater than 10% TBSA
- Patients with burns of special areas – face, hands, feet, genitalia, perineum or major joints
- Patients with electrical burns, including lightning burns
- Chemical burn patients
- Patients with inhalation injury resulting from fire or scald burns
- Patients with circumferential burns of the limbs or chest
- Burn injury patients with pre-existing medical disorders that could complicate management, prolong recovery or affect mortality
- Any patient with burns and concomitant trauma
- Paediatric burn cases where child abuse is suspected
- Burn patients with treatment requirements exceeding the capabilities of the referring centre
- Septic burn wound cases.

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Treatment protocol

Assess airway/breathing

1. Careful airway assessment must be done where there are flame or scald burns of the face and neck. Intubation is generally only necessary in the case of unconscious patients, hypoxic patients with severe smoke inhalation, or patients with flame or flash burns involving the face and neck. Indications for airway assessment include presence of pharyngeal burns, air hunger, stridor, carbonaceous sputum and hoarseness.
2. All patients with major burns must receive high-flow oxygen for 24 hours.
3. Patients with carbon monoxide poisoning may have the following symptoms: restlessness, headache, nausea, poor co-ordination, memory impairment, disorientation, or coma. Administer 100% oxygen via non-rebreathing face mask. Useful laboratory test: Blood gases including carboxyhaemoglobin level.
4. If breathing seems to be compromised because of tight circumferential trunk burns, consult with the burn centre surgeons immediately.

Circulation

1. Stop any external bleeding.
2. Identify potential sources of internal bleeding.
3. Establish large-bore intravenous (IV) lines and provide resuscitation bolus fluid as required in all compromised patients, using standard ATLS® protocols. Perfusion of potentially viable burn wounds is critical.

Remove any sources of heat

1. Remove any clothing that may be burned, covered with chemicals or that is constricting.
2. Cool any burns less than 3 hours old with cold tap water for at least 30 minutes and then dry the patient.
3. Cover the patient with a clean dry sheet or blanket to prevent hypothermia.
4. Use of Burnshield® is a very effective means of cooling and dressing the injury for the first 24 hours.
5. Rings and constricting garments must be removed.



Estimate the percentage total body surface area (%TBSA) burned (Fig. 1)

Initially, use the Rule of Nines. In the case of all paediatric patients and for a more accurate assessment, use the Berkow diagram or the patient's unstretched open hand representing 1% of TBSA.

Reminder: Accurate estimation of burn size is critical to ongoing fluid replacement and management.

Ongoing losses (once the patient has been stabilised)

1. Patients with < 10% TBSA burns can be resuscitated orally (unless the patient has an electrical injury or associated trauma). This needs ongoing evaluation and the patient may still require an IV line.
2. In the case of patients with burns 10 - 40% TBSA, secure a large-bore IV line; add a second line if transportation will take longer than 45 minutes.
3. Burns > 40% TBSA require 2 large-bore IV lines.
4. If the transfer will take less than 30 minutes from the time of call don't delay transfer for an IV line.

Reminder: IV lines may be placed through the burned area if necessary (suture to secure). Avoid the saphenous vein if at all possible, and avoid cut-downs through unburned skin if possible. An intra-osseous line is an excellent alternative in the hypovolaemic child.

5. Initiate fluids for ongoing resuscitation and fluid losses using the Parkland formula:

$$4 \text{ ml Ringer's lactate} \times (\text{kg of body weight}) \times (\% \text{ burn}) = \text{ml in first 24 hours,}$$

with half of this total given in the first 8 hours post injury.

Children must have their daily maintenance fluids added to the volume of fluids calculated using the Parkland formula (including dextrose).

Example: In the case of a patient weighing 70 kg with a 50% TBSA burn: $(4 \times 70 \times 50) = 14\,000$ ml needed in the first 24 hours. Seven thousand millilitres are needed in the first 8 hours so IVs are initially started at 900 ml/hour.

Reminder: Do not give dextrose solutions (except for maintenance fluids in children) – they may cause an osmotic diuresis and confuse adequacy of resuscitation assessment. Ideally use Ringer's lactate or Plasmalyte B for ongoing fluid losses and a 5% dextrose balanced salt solution for the child's maintenance.

This is only a guide, and ongoing evaluation is essential as patients may need more fluids than calculated.

Assess urine output (this is the best guide to resuscitation)

1. Insert a Foley catheter in patients with burns >15% TBSA. Adequate urine output is 0.5 ml/kg/h in adults and 1.5 ml/kg/h in children.

Reminder: Lasix and other diuretics are never given to improve urine output; fluid rates are adjusted to increase urine output.

2. Observe urine for burgundy colour (seen with massive injuries or electrical burns). There is a high incidence of renal failure associated with these injuries, requiring prompt and aggressive intervention.

Reminder: If the urine is red or brown consult a burn centre.

Insert a nasogastric tube

Insert a nasogastric tube in any patient with burns > 30% TBSA, or any patient who is unresponsive, shocked or with burns > 20% if preparing for air or long-distance transportation.

Decompression incisions (escharotomy)

Assess for circumferential full-thickness burns of the extremities or trunk. Elevate the burned extremities on pillows above the level of the heart. If transfer will be delayed, discuss indications and methods for decompression incisions (escharotomies) with a burn surgeon.

Medication

1. Give tetanus immunisation.
2. After fluid resuscitation has been started, pain medication may be titrated in small intravenous doses (not intramuscular). Blood pressure, pulse, respiratory rate and state of consciousness should be assessed after each increment of IV morphine.

Wound care

1. Debridement and application of topical antimicrobials are usually unnecessary. Transport the patient wrapped in a dry sheet and blanket, keeping the patient warm.
2. Apply a thin layer of silver sulfadiazine to open areas if transportation will be delayed for more than 12 hours.
3. Use of Burnshield® is a very effective means of cooling and dressing the injury in the first 24 hours.

General items

1. A history, including details of the accident and pre-existing diseases/allergies, should be recorded and sent with the patient.
2. Copies of all medical records, including all fluids (calculation of fluids administered) and medications given, urine outputs and vital signs must accompany the patient. These specific

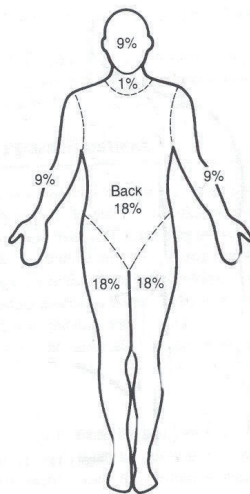
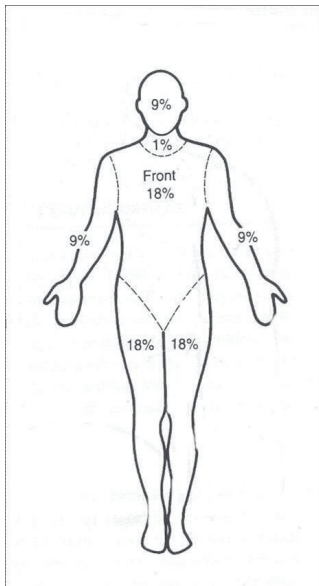


Patient name and date of birth

Date completed

Type of burn

Date and time of burn



Superficial
_____ %

Superficial
(Pink, painful, moist)

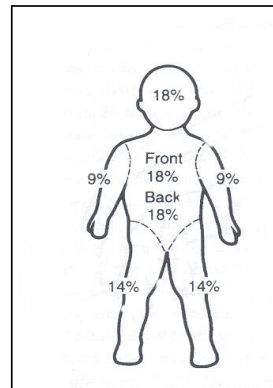
Indeterminate or deep
_____ %

Indeterminate or deep
White, mottled, dark red or black, leathery

Total % burn
_____ %

Paediatric adjustments

- Weight approximated to (8 + age x 2)
- < 1 year – Head and neck are 18% and each leg 14% of BSA
- > 1 year – For each year of life
 - Head decreases by 1% of BSA
 - Leg increases by 0.5% of BSA



Fluids

- Total % burn _____ X weight _____ X 3.5 ml = total fluid in 24 hours _____.
- Total fluid in 24 hours _____ / 2 = volume in first 8 hours since burn _____.
- In children, add maintenance fluid to the above calculated volume _____.

Note:

If urine output is not adequate, increase fluids for the next hour to 150% of calculated volume until urine output is adequate.

Fig. 1. South African Burn Society Burn Assessment Form.



details may be recorded on the back of the burn size assessment sheet.

3. The burn centre will arrange transport if appropriate.
4. In the case of paediatric patients not accompanied by a parent, obtain consent in consultation with your burn centre.

Special considerations with chemical burns (consult burn centre)

1. Remove all clothing.
2. Brush powdered chemicals off the wound, then flush chemical burns for a minimum of 30 minutes using copious volumes of running water. Be careful to protect yourself.

Reminder: Never neutralise an acid with a base or vice versa.

3. Irrigate burned eyes using a gentle stream of saline. Follow with an ophthalmology consultation if transportation is not imminent.
4. Determine what chemical (and what concentration) caused the injury.

Special considerations with electrical injuries (consult burn centre)

1. Differentiate between low-voltage (< 1 000 v) and high-voltage (> 1 000 v) injuries
2. Attach a cardiac monitor; treat life-threatening dysrhythmias as needed.
3. Assess for associated trauma; assess central and peripheral neurological function.
4. Administer Ringer's lactate; titrate fluids to maintain adequate urine output or to flush pigments through the urinary tract (see urine output above).
Useful laboratory test: arterial blood gas levels with acid/base balance.
5. Using pillows, elevate burned extremities above the level of the heart. Monitor distal pulses.

Acknowledgements:

- American Burn Association
- Australian and New Zealand Burn Association

Some early black doctors – a very politically active cohort, 1941 - 1954

Anne Digby

Between 1948 and 1954 increasing government intimidation along with an accompanying intensification of protest politics resulted in older, moderate medical leaders withdrawing from the political frontline. Younger doctors were more radical and their continued political activism led to vigorous repression by the apartheid state, and eventually to scarce medical skills being lost to the people of South Africa.

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Although an occasional individual continued to study in Europe, World War II made this almost insuperably difficult. Those who did so might have started their studies earlier, like James Stewart Sililo, who qualified LRCP and LRCS Edinburgh and Glasgow in 1944, before setting up practice as the first black doctor in Pietermaritzburg. The second black doctor in the town was Mahomed Motala (1921 - 2005.) He was born in Dundee, but matriculated in 1938 at Sastri College before studying medicine in Bombay, and qualifying in 1947. His practice in Pietermaritzburg drew patients from surrounding black townships where he became well known for not charging indigent patients. This awareness of his patients' deprivation led to political activism. Motala revived the branch of the local Natal Indian Congress, and became chairman of the branch, an office he utilised to develop friendly relations with the ANC. In December 1955 the government charged him with treason and he was fortunate that his medical partners kept the practice going for several years until the treason charges were dropped in 1959.



The difficulty of studying abroad was an important lever in giving black students access to clinical medicine training at the University of the Witwatersrand (Wits) in 1941 and the University of Cape Town (UCT) in 1943. South African medical training was cheaper and therefore more accessible to students from a working-class rather than middle-class background, so that the social composition of black doctors widened. About 10 medical students were trained at UCT each year, most of whom were coloured or of mixed ancestry but with a few Indian students in addition. Black students continued to be under-represented so that in 1954 there were only 47 black students out of a total of 271 students at the UCT Medical School. Blacks were not admitted to this school, ostensibly because there were insufficient clinical facilities for their training at Grootte Schuur Hospital.^{1,2}

In 1945 Maramoothoo Samy-Padiachy, Cassim H Saib, and Ralph A A Lawrence were the first black medical students to graduate from Cape Town. Lawrence, born into an Indian family in Durban, became a student at UCT in 1940. A student activist, he was the first black member of the UCT Student Representative Council and the moving spirit behind a Non-European Medical Students Association. This protested to the Cape Hospital Board about a 'lack of continuity in clinical training because of having to attend alternative tutorials if a European patient was being demonstrated'. Lawrence concluded that 'medical training under these circumstances becomes impracticable'. Despite this, black students at UCT had to sign an undertaking agreeing to these exclusions as a condition of their annual medical school registration. After an internship at Somerset Hospital in Cape Town, Lawrence went abroad in 1948, where he married a Welsh woman, and hence



578

Signed and sealed. Among those who signed the Faculty of Health Sciences' new Charter were Prof. Ralph Kirsch (left), and special guest Dr Ralph Lawrence. Dr Lawrence was one of the first three black doctors to graduate from the Faculty in 1947. To mark the occasion, Dr Lawrence was awarded the title Honorary Visiting Professor. The Charter was signed and presented at a special Health Sciences assembly in July 2007 to mark significant milestones in the Faculty's process of renewal and change.

was unable to return to apartheid South Africa. He became a forensic physician and medical consultant in England.³

Another early black medical graduate at UCT was Ralph Hendrickse. He was born in 1926, enrolled at UCT Medical School in 1943 and graduated in 1948. He became an intern at McCord Hospital. During the 6 years that he worked in Durban he organised opposition among the Natal coloured population with regard to the Separate Representation of Voters Bill, and also advocated the extension of voting rights to all South Africans during the early 1950s. Police harassment and intimidation eventually drove him overseas, where he gained an MRCP at Edinburgh. A continued sense of social obligation informed his choice of specialty, and he worked as a paediatrician in Nigeria and Britain.⁴

The number of black medical students at Wits was double that at UCT, and included black (African) students who were not admitted to UCT until the 1980s. The first black male graduates from Wits, Donald Moikangoa and James Njongwe, qualified from medical school in 1946. Although black medical students were outnumbered by Indian, Chinese and coloured students, 25 blacks had qualified as doctors at Wits by 1950. But the context for this advance remained that of an overwhelmingly white university.^{5,6}

The first black female graduate at Wits was Mary Susan Malahele, later Xakana (1916 - 1982), daughter of a Roodeport schoolteacher. After qualifying in 1947 she practised as a GP first in Kliptown and then in Dobsonville, where she also doctored people in Soweto. Known as Dr Mary, she not only served her patients, especially tuberculosis cases, but was also committed to a number of voluntary organisations including the South African National Tuberculosis Association and the Transvaal Young Women's Christian Association (YWCA).⁷ Olivia B Bikitsha and H L Mahabane graduated as doctors in 1949. They married medical practitioners, namely Robert Rose Mahlangeni and Donald Cindi respectively.

A notable female medical graduate of Wits was Margaret Chuene Mncadi. She was born in the eastern Transvaal, and gained a degree at Fort Hare before studying medicine. Mncadi first practised in Benoni, and then took over Wilson Conco's practice in Natal. She was an activist in the women's campaign against the pass laws, and became Vice President of the ANC Women's League in Natal. Mncadi was named in the Treason Trial, although not prosecuted. In 1960 she went into exile in Swaziland.⁸ However, despite female medical graduates like these, the medical school at Wits remained overwhelmingly male, with only 1 in 5 female students by 1959.^{6,9}

Aaron D Lebona (1920 - 2003) was unusual in having first qualified as a medical aide before graduating as a doctor. Born the son of a miner and a domestic worker, he qualified as a medical aide at Fort Hare in 1942. Although this scheme's 5-year training in sanitary and preventive medicine had begun in 1937, it was abandoned in 1943 after training only 3



Ralph Hendrikse, James Njongwe, Arthur Letele, Wilson Conco

dozen medical aides. This was partly because of a shortage of applicants prepared to undergo a training that was only 1 year shorter than a medical degree, without the benefit of being able to practise as a doctor on graduation despite having been taught how to use a stethoscope and administer anaesthetics. The scheme had therefore promised more than it delivered, and the opening of full training to black students at the medical schools at UCT and Wits in the early 1940s sealed its fate.¹⁰ However, training as a medical aide had not robbed Lebona of his altruism and determination, as shown in a short article by him entitled 'What I hope to do for my own people', published in the *SAMJ* in 1944.¹¹ The selflessness expressed in the title was clearly an inspiring ideal as he wrote of his 'mission in life' and the 'preparation for my future work among my people', reflecting that 'I felt the urge to join the forces at work fighting disease, superstition and ignorance among my countrymen.'¹¹ After graduating from Wits in 1948 he worked at the Bochabela Location in Bloemfontein, and the Queen Elizabeth II Hospital in Maseru, Lesotho, before becoming a general practitioner in Bloemfontein. Later he had to move back to Lesotho for political reasons, but held official positions there, and initiated a flying doctor service in 1966.¹²

We have seen that Donald Moikangoa and James Njongwe were the first black individuals to qualify in medicine at Wits in 1946. As a young doctor at Serowe Hospital in the Bechuanaland Protectorate, Dr Moikangoa encountered racial prejudice, with some white maternity patients objecting to being in his care.¹³ Njongwe was born in 1919 at Qumbu, and before undergoing medical training had obtained a BSc degree at Fort Hare. At Wits he had been a founder member of the ANC Youth League in 1944, and 5 years later he became a member of the national ANC Executive. While his self-confidence and independence alienated some contemporaries, his hard work and superb organisational skills meant that he managed the Defiance Campaign in the Eastern Cape in 1952 very efficiently. He also served as President of the provincial ANC in the Cape from 1952 to 1954. Njongwe's medical practice in the township of New Brighton collapsed because he prioritised politics over his practice. But he moved to Matatiele and his practice there was a long-standing one.¹⁴

Arthur Letele (1916 - 1965) was born in Lesotho but grew up in Ladybrand and was schooled at Lovedale Institution, before reading medicine at Wits, where he qualified in 1946. The following year he became an intern at Victoria Hospital, Lovedale where concern for his patients was conspicuous. For example, he recorded that a young patient, Sipelo Zozi, had acute broncho-pneumonia, and noted that 'The father is unwilling to have the child treated in hospital, and it [sic] is therefore in grave danger at the moment.' Moving to Kimberley to set up his first practice, Letele became Secretary of the Kimberley Youth League, having earlier joined the league as one of its first members in 1944. His political activism led to four arrests, including one during the Defiance Campaign. He became a member of the ANC Executive in 1953, and ANC Treasurer General 2 years later. He was charged with treason in 1956, although (as with Dr Motala above) the charge was later withdrawn. In 1961 prudence dictated exile in Lesotho, where he set up practice, and there he continued to represent the ANC overseas.¹⁵

William Frederick Nkomo (1915 - 1972) qualified from Wits as a doctor in 1947, before setting up practice in Atteridgeville, near Pretoria. Nkomo was the first black on the Wits Student Representative Council, the first President of the ANC Youth League, an activist in the Black People's Convention, and later the first African President of the South African Institute of Race Relations (SAIRR). Lionel Mxolisi Majombozi qualified as a doctor at Wits. While a medical student he was a founder of the ANC Youth League. In 1948 he set up practice in King William's Town, and like some other black colleagues, experienced problems with the referral of his patients to the local Grey Hospital.¹⁶ He was killed in a car accident in 1949.¹⁷

Wilson Zamindlela Conco (1919 - 1996) was the son of a Zulu cattle farmer from Ixopo, Natal. He did his premedical studies at Fort Hare before reading medicine at Wits, where, as a brilliant student, he graduated top of his year in 1948. But the appointment of Conco as demonstrator in the histology laboratory provoked a furore among Nationalist MPs that led to his demotion to the position of demonstrator to non-European students only, an experience that began to radicalise him.¹⁸ He set up practice in Umzimkhulu where, as a practitioner



of Western medicine, he showed sensitivity to the traditional cultural beliefs of his Natal patients.¹⁹ However, it was the poverty of these rural patients that deepened his political commitment, although this was informed by a belief in non-violence and passive resistance. He was active in the Defiance Campaign of 1952, served as acting Treasurer of the ANC, participated in the Congress of the People and chaired the Kliptown meeting, which produced the Freedom Charter in 1955. The government banned him and later charged him with treason. Conco was chosen by the defence lawyers to give the first speech at the Treason Trial, where he spoke eloquently on the aspirations of the black population. Dr Conco moved to Golela in Swaziland, after his release in 1961. Further moves followed – in 1968 to London and in the early 1970s to Canada, where he specialised in psychiatry.²⁰ He returned from exile in 1990.



26 June 1955. The Congress of the People met at the Kliptown football ground with 3 000 delegates. It was made up out of four member bodies, the ANC, the Indian Congress, the Coloured Peoples Organisation and the Congress of Democrats. The Freedom Charter, which the Congress of the People adopted on 26 June, was read and signed by delegates. Many speakers on the Freedom Charter sounded the note that the day might not be far off when its demands would be met; the road might be long, but a united democratic front was the only solution. ANC President Albert Luthuli, in his message read to the Congress, said among other things that 'it should have been plain to the architects of Union that by excluding from the orbit of democracy the majority of the population, the non-whites, they were laying a false foundation for the new state and making a mockery of democracy to call such a state democratic'. The Freedom Charter read as follows: 'The people shall govern; All national groups shall have equal rights; The people shall share in the country's wealth; The land shall be shared among those who work it; All shall be equal before the law; All shall enjoy equal human rights; There shall be work and security; The doors of learning and of culture shall be opened; There shall be houses, security and comfort; There shall be peace and friendship.' (Photograph by Drum photographer © Baileys Archive.)

Ntatho Motlana qualified at Wits and went into practice in Orlando, Johannesburg. He had been a founder member of the ANC Youth League. Dilizantaba Mji was born in Buntingville, Nggeleni (near Mthatha) and qualified as a doctor at Wits in 1952. Even before this he had been politically active, heading the Transvaal Youth League, and for a short time he was a member of the ANC's national executive committee, and was banned by the state. After a short spell in the Cape in 1954 he returned to Johannesburg where, along with Dr Motlana, Mji made news by being the first intern at Baragwanath Hospital. However they could work only in wards with black sisters, and as registrars they could treat only black patients; as such they were restricted in their exposure to the range of pathologies present in a full cross-section of the population.^{21,22} Mji later practised at Orlando, in Johannesburg, and in Durban.

SAMJ thanks Professor Ralph Kirsch for sourcing the photos that have appeared in this series of articles and for providing the captions above. SA History Online was a valuable resource and is acknowledged.

1. Cape Archives. HBC 157, file A45/3 and HBC 174, File A91A training of medical students.
2. Phillips H. *The University of Cape Town, 1918 - 48. The Formative Years*. Cape Town: University of Cape Town Press, 1993: 114, 323-324.
3. University of Cape Town Archives. Lawrence papers in Internal Reconciliation papers for the Health Sciences Faculty, UCT.
4. Interview conducted by Dr Helen Sweet.
5. Murray BK. Wits as an 'open' university 1939 - 1959. Black admissions to the University of the Witwatersrand. *Journal of Southern African Studies* 1990; 676.
6. Murray BK. *Wits. The Open Years. A History of the University of the Witwatersrand, 1939-59*. Johannesburg: University of the Witwatersrand Press, 1997: 174-175.
7. Kuzwayo E. *Call me Woman*. Johannesburg: Ravan Press, 2006: 283-285.
8. Gerhart GM, Karis T. *From Protest to Challenge. A Documentary History of African Politics, 1882-1964*. Palo Alto: Hoover Institution Press, 1977: vol. IV.
9. Brown A, Barnes J. The Medical School of the Witwatersrand – a brief history. *Adler Museum Bulletin* 1997: 9.
10. Digby A. *Diversity and Division in Medicine. Health Care in South Africa from the 1800s*. Oxford: Peter Lang, 2006: 195-197.
11. *S Afr Med J*, 25 November 1944.
12. Obituary. *Sunday Times*, 7 December 2003.
13. Botswana National Archives. MED 16/4, medical services complaints.
14. Benson M. *The African Patriots. The Story of the African National Congress of South Africa*. London: Faber, 1963.
15. Rhodes University. Cory Library MS 16,458. Medical reports on African patients: 22 January 1947.
16. Monamodi IS. Medical doctors under segregation and apartheid. A sociological analysis of professionalization among the doctors in South Africa, 1900 - 1980. PhD thesis, Indiana: 342, 396.
17. In Memoriam: William Frederick Nkomo. *S Afr Med J* 1972: 556.
18. Murray BK. Wits as an 'open' university 1939 - 1959. Black admissions to the University of the Witwatersrand. *Journal of South African Studies* 1990: 659.
19. Conco WZ. The African Bantu traditional practice of medicine: Some preliminary observations. In: Ademuwagun ZA, Ayoade JAA, Harrison IE, Warren DM, eds. *African Therapeutic Systems*. Waltham, Mass.: African Studies Association, 1979.
20. *From Protest to Challenge*, IV, 20. Buthelezi M. Remarks on the unveiling of a tombstone. www.ifp.org.za/archive/speeches.
21. *South African Institute of Race Relations. A Survey of Race Relations in South Africa*. Johannesburg: SAIRR 1952-3: 71;
22. Report of the Witwatersrand Faculty of Health Sciences Internal Reconciliation Commission. Johannesburg: 20.