Managing genetic disorders

A study analysing the data from patients visiting the Johannesburg genetic counselling clinic for the six months January to June 1982.

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Curriculum vitae

Dr Jennifer Kromberg is a South African, born and bred in Johannesburg. She qualified as a social worker at the University of the Witwatersrand and has worked in South Africa, England and Zambia for some years. She has been attached to the Department of Human Genetics of the School of Pathology, South African Institute for Medical Research and University of the Witwatersrand since 1971 and has been involved in genetic counselling, with Professor Trefor Jenkins, since the inception of this service in 1973. She has recently been awarded a PhD for a thesis entitled 'A genetic and psycho-social study of albinism in Southern Africa'.

Dr Kromberg has presented papers at several international congresses. She has also published 19 papers in national and international medical and social work journals.

As the Honorary National Secretary of SAIDA (The Southern African Inherited Disorders Association) she works with many families with genetic disorders. She is the Chairman of the Southern Transvaal Subcommittee which is developing group services for affected families, under the auspices of SAIDA. She is also on the committee of the Witwatersrand branch of the Society for Social Workers for 1986/87. At present she is a member of the sub-committee for the genetically disabled, investigating the needs of affected persons and the services available for them throughout the country, on the government commission for the Year of the Disabled.

Curriculum vitae

Dan Berkowitz graduated at the University of the Witwatersrand MB ChB in 1984. He was an elected member of the MSC Conference Committee in 1982 and 1983. He spent 7 weeks of fifth year elective period at John Hopkins University School of Medicine, Baltimore, Maryland, and completed his internship in surgery, obstetrics and gynaecology and medicine at Coronation Hospital, Newclare.

Other interests include classical guitar, astronomy, hiking and modern art. He subscribes to various professional and popular journals. He is married and lives in Johannesburg.

Summary

A study of patients presenting during the first six months of 1982 to the genetic counselling service in Johannesburg shows a similar distribution of genetic problems to that occurring in other countries. Women of child-bearing age and people from the higher socio-economic groups are the main users of the service.

Introduction

The field of human genetics has experienced rapid development over the past few decades. The number of disorders for which genetic aetiology was proven or suspected, increased nearly five times between 1958 and 1971 and since then has nearly doubled again [1]. In 1958 only 412 disorders were either known or suspected to be genetic whereas in 1982 that number was 3 368 (see Table 1).

Table I. *Number of genetic disorders identified by year**

Year	Autosomal Dominant	Autosomal Recessive	X-linked	Total
1958	285	89	38	412
1971	943	783	150	1876
1982	1827	1298	243	3368

* after McKusick (1983)[1]

This expansion of genetic knowledge has meant that several of the disorders seen in general practice are now known to be partly or fully genetically determined. Therefore genetic counselling is an integral part of the management of patients and their families.

Genetic counselling has been available in Johannesburg informally since 1969 and more formally since the genetic counselling clinic was set up in 1972. In that year only 21 new families were seen whereas 319 families attended [2] in 1975, and in 1985 the number was about 600. In most cases the families or couples came because they wanted to know the risks for their future off-spring and the practice was to see both members of the couple together with the affected child.

The clinic's policy is to provide counselling which is defined, according to the World Health Organisation, as 'a communication process which deals with human problems associated with the occurrence of a genetic disorder in a family'[3]. The process involves attempts to help the affected individual or family:

a) to comprehend the medical facts, diagnosis, prognosis and necessary management
b) to appreciate the genetics and the risk of recurrence
c) to understand the options for dealing with the risk and to choose an appropriate course of action
d) to make the best possible adjustment.

About 1 in 40 or 2,5 per cent of births produce infants with a significant congenital defect. In Johannesburg alone in 1984 there were 11 291 white births and therefore approximately 282 babies with defects.

In 1958 only 412 disorders were known or suspected to be genetic – in 1982 there were 3 368

With the other population groups included there are, therefore, a vast number of individuals who would benefit from genetic counselling. It is not anticipated that the clinic would take over all this work, and medical practitioners should be encouraged to counsel all families with straightforward genetic disorders. In the past they have been invited to refer families with diseases of complex genetic aetiology to the clinic, and those in which the inheritance does not conform to the usual genetic pattern [2]. Some practitioners may feel that assistance is needed in taking a family history or searching the background literature, and the clinic staff would also offer this service. The genetic counsellor is, therefore, a member of the team which exists to manage the sick child and his family, including prospective siblings.

The aim of the present paper was to draw up a profile of a sample of patients attending the clinic in terms of socio-economic class, population and age group, geographical area of origin, the source of their referral and reasons for attending, in order to obtain some insight into what type of patients were being managed there.

Methods

The subjects for the study were all those patients who attended the genetic counselling clinic in a six-month period from January to June 1982.

Altogether 241 patients were seen during this period. The files for these patients were drawn and all their details relevant to the aims of the study were recorded.

2,5% of births produce infants with a significant congenital defect

The data obtained on the occupations of the patients were categorised according to Schlemmer and Stopforth's Guide to the coding of occupations in South Africa, [4] using a descending order of prestige, i.e.:

1: professional and managerial
2: middle white collar
3: manual foreman, skilled artisans and farmers
4: routine non-manual and semi-skilled manual, and
5: unskilled manual and menial.

The findings for the sample were then compared with those presented in terms of percentages per category for a white urban population sample by Richardson and Cleaton-Jones [5].

The disorders for which the patients attended the clinic were categorised according to mode of inheritance, (autosomal dominant and recessive, X-linked, multifactorial and chromosomal) wherever possible. For some patients, however, the aetiology was unknown, for others it was non-genetic, and there was a group of patients with other miscellaneous reasons for attending. These latter three groups will be described separately in the results.

Results

1. *Socio-economic group*

Among the patients who attended the genetic counselling clinic information on occupation was available on 209 males and 157 females of the total sample of 241 subjects in each group. Categories 1 and 2 were found to be unusually strongly represented among the occupations reported (see Figure 1). In the general population sample used as a control group category 3 was the largest single category, containing about 50% of the population, but in our subjects 72% of the males and 92% of the females had occupations which were classified in categories 1 and 2.

2. *Population group*

The subjects were classified into groups, generally by surname. Because of the obvious, limitations of this method this was only a tentative classification. The majority of the patients (79%) were from the English, Afrikaans or Jewish population group, and Table II indicates the distribution in these and the other groups. The white group represented 85,5% of the sample and the black, coloured and Indian groups made up only 6,6%.

Table II. *Population groups represented by patients attending the genetic counselling clinic*

Population Group	Patients	
	No.	%
White		
English	86	35,7
Afrikaans	84	34,9
Jewish	21	8,7
Portuguese	7	2,9
Greek	3	1,2
Spanish	1	0,4
Other	4	1,7
Black	5	2,1
Coloured	1	0,4
Indian	10	4,1
Unclassified	19	7,9
Total	241	100

3. *Age groups*

The patients attending the clinic generally fell into the child-bearing age groups. In the males the age range was wider than in females (see Figure 2). Nearly one third of the women were in the 36 or 45 year group (the clinic policy is to accept any woman aged 35 or older for counselling regarding age related risks).

4. *Geographical area of origin*

The details recorded as addresses for the subjects were analysed (see Table III). Only about half the subjects were found to come from Johannesburg, the other half lived in areas spread throughout the Transvaal, as well as in other provinces and other countries (e.g. Angola, Zimbabwe, Botswana and Swaziland).

Table III. *Geographical area of origin of subjects*

Area	Patients	
	No.	%
Johannesburg		
Central	18	
North	62*	
South	14	
East	6	
West	8	
Sub-total	108	46,6
Witwatersrand		
East	42	
West	23	
Sub-total	65	28,0
Transvaal		
North	5	
South	18	
East	7	
West	13	
Sub-total	43	18,5
Other provinces	7	3,0
Other countries	9	3,9
Total	232	100

* 26,7% of total patients from Northern Suburbs, Johannesburg

5. *Source of referral*

The subjects were asked, during their counselling session at the clinic, who had referred them. Their responses appear in Table IV. About half of the group were referred by medical specialists, and the majority of these were obstetricians (74%) and then paediatricians (12,8%). General practitioners referred about a quarter of the group. Only a very small group of subjects were referred by other professionals (e.g. dentists, social workers or nurses), and a few were self-referred.

6. *Indications for seeking genetic counselling*

The disorders for which the subjects sought counselling were grouped by mode of inheritance wherever possible (see Table V). The largest group was found to be the chromosomal problems (35,7%), which included families with one or more members with an actual chromosome defect (e.g. Down, Turner or Klinefelter Syndrome), couples who were at risk of having such a defect (e.g. those of 35 years and over) and those who had had multiple miscarriages (3 or more). The next largest group was those with monogenic conditions (23%) which included those inherited as autosomal dominants and recessives and those which were X-linked (see Table VI). The

Table IV. *Source of referrals to the genetic counselling clinic*

Referring person	Patients referred No.	%
Medical Specialists (in private practice)		
Obstetrician	87	
Paediatrician	15	
Neurologist	5	
Surgeon	4	
Physician	2	
Orthopeadic	2	
Dermatologist	1	
Ophthalmologist	1	
Sub-total	117	48,6
General Practitioner	56	23,2
Hospitals/clinics		
Johannesburg	24	
Baragwanath	3	
JG Strydom	2	
South Rand	2	
Coronation	1	
Edenvale	1	
Other	9	
Sub-total	42	17,4
Self-referral	7	2,9
Other	3	1,2
No Information	16	6,7
Total	241	100,00

multifactorial group which comprised 12,7% of the sample included conditions such as spina bifida and other neural tube defects, cleft lip and palate, congenital heart disease, club foot and epilepsy.

There was, however, a group of subjects in which the aetiology of their condition was unknown. This group included mainly those families in which there was or had been a child with multiple congenital anomalies, where a diagnosis had not been made, no blood tests or X-rays had been done and the affected child had died and no autopsy had been carried out. Also in this group were families with a child or relative with mental retardation, which could not be associated with any chromosome defect or genetic condition or syndrome.

Another smaller group of subjects came for non-genetic reasons, but they were at risk for a congenital defect in their off-spring. In this group were women who had had rubella or teratogenic medication during pregnancy, and women who had either themselves had radiation therapy during pregnancy or whose husbands had had such therapy shortly prior to conception.

Included in the 'other' indications group were couples who came for counselling because their marriage was consanguineous, or there was excessive maternal or paternal fear of defects in the foetus, or there was a history of infertility. One case in this group involved race classification, since the baby had been put up for adoption, and the father was unknown.

Table V. *Indications for seeking genetic counselling*

Indication	Patients No.	%
Autosomal dominant	20	8,3
Autosomal recessive	25	10,4
X-linked	10	4,1
Multifactorial	31	12,9
Chromosomal	86	35,7
Unknown aetiology	44	18,2
Non-genetic	5	2,1
Other	15	6,2
No information	5	2,1
Total	241	100

Table VI. *Monogenic conditions for which subjects attended the clinic*

Condition	Patients No.	%
Autosomal dominant		
Tuberous sclerosis	3	
Huntington Chorea	3	
Porphyria Variegata	2	
Marfan Syndrome	2	
Spinocerebellar degeneration	2	
Neurofibromatosis	1	
Neuromuscular disorders	5	
Other	2	
Total	20	8,3
Autosomal recessive		
Tay-Sachs	7	
Gauchers	3	
Mucopolysaccharidoses	2	
Sickle cell anaemia/ thalassaemia	1	
Albinism	1	
Cystic fibrosis	1	
α_1-antitrypsin deficiency	1	
Epidermolysis bullosa	1	
Werdnig-Hoffman	1	
Other	7	
Total	25	10,4
X-linked		
Duchenne muscular dystrophy	4	
Haemophilia	3	
Aarskog Syndrome	2	
Testicular feminization	1	
Total	10	5,0

Figure 1 *Occupational groups in genetic counselling patients and the general population*

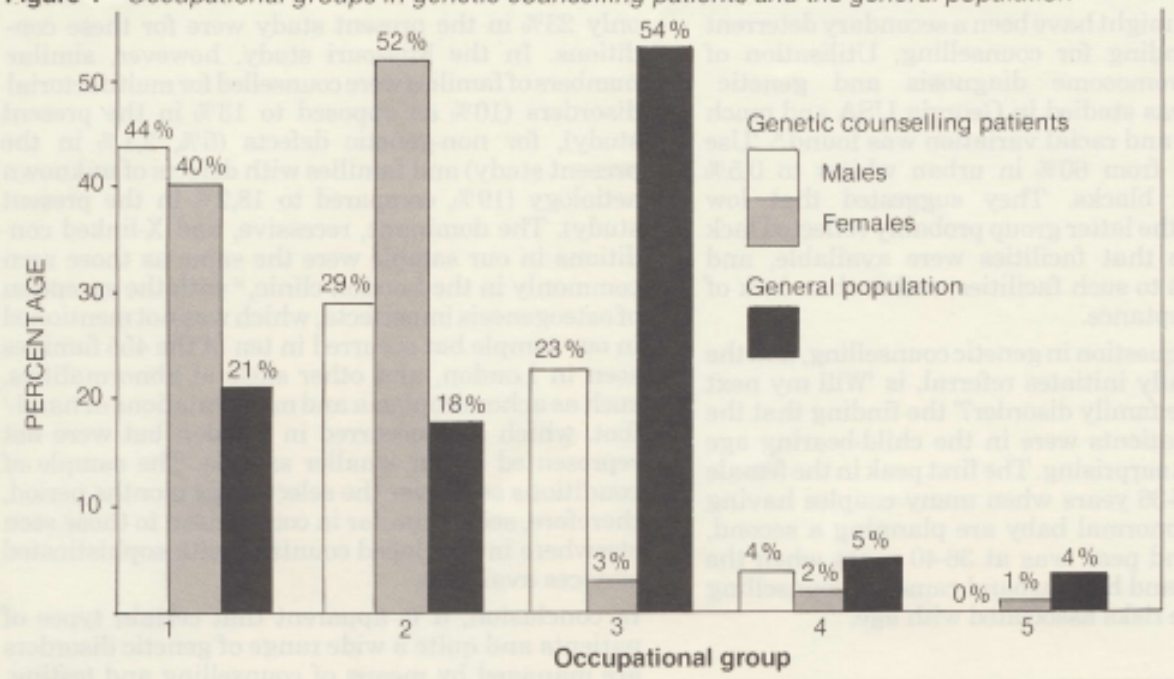
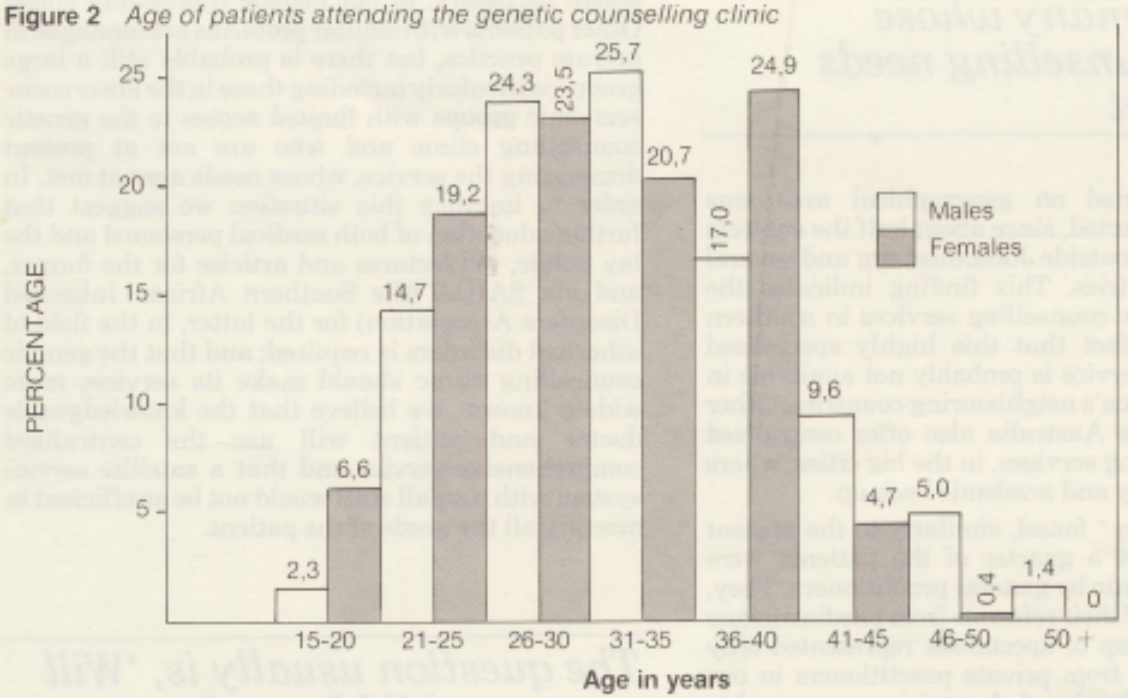


Figure 2 *Age of patients attending the genetic counselling clinic*



Discussion and conclusion

Upon examining the results of this study of patients attending the genetic counselling clinic a picture emerged of who was using the service. In general, the patient was likely to be from the higher socio-economic classes, English-speaking, in the child-bearing age group, from the northern suburbs of Johannesburg, referred by an obstetrician and attending for either a chromosomal or a monogenitically inherited problem.

The disproportionately high number of genetic counselling patients in the socio-economic classes 1 and 2 has been noted by other workers. In London an excess in these groups was recorded [6] and attributed to the fact that generally couples themselves initiate the enquiry regarding genetic counselling and they are, therefore, to some extent a sample selected for intelligence and education. This was probably the case in our sample too. Another group of workers [7] found, however, that client education level was not related to learning during counselling and therefore counsellors should not assume that the well-educated client would have little or no trouble absorbing the information presented during counselling.

The distribution of subjects according to population group might also have been expected if the request for genetic counselling was self-initiated and associated with level of education. Logistically, however, it is difficult for the black, coloured and Indian population to get to the hospital where the clinic is

held, and this might have been a secondary deterrent to their attending for counselling. Utilisation of prenatal chromosome diagnosis and genetic counselling was studied in Georgia USA and much geographical and racial variation was found [8]. 'Use ratio' ranged from 60% in urban whites to 0,5% among rural blacks. They suggested that low utilisation in the latter group probably reflected lack of knowledge that facilities were available, and limited access to such facilities, rather than lack of maternal acceptance.

Since the key question in genetic counselling, and the one that usually initiates referral, is 'Will my next child have the family disorder?' the finding that the majority of patients were in the child-bearing age group was not surprising. The first peak in the female group was 26-36 years when many couples having had a first abnormal baby are planning a second, and the second peak was at 36-40 years when the older woman and her husband came for counselling because of the risks associated with age.

There are many whose genetic counselling needs are not met

The data obtained on geographical area was somewhat unexpected, since about half the subjects came from areas outside Johannesburg and several from other countries. This finding indicates the paucity of genetic counselling services in southern Africa and the fact that this highly specialised comprehensive service is probably not available in any of South Africa's neighbouring countries. Other countries such as Australia also offer centralised genetic counselling services, in the big cities, where there is laboratory and academic back-up.

The London study [6] found, similarly to the present study, that about a quarter of the patients were referred to the clinic by general practitioners. They, however, had half their referrals from paediatricians whereas this group of specialists represented only 6,2% of referrals from private practitioners in our sample. On the other hand obstetricians appeared to be making more use of our clinic than of the London clinic, possibly because of our policy of encouraging the counselling of all pregnant women over 35 years of age. It is also possible that genetic counselling may only really become relevant to a couple when there is an actual foetus to consider, and the question leading to referral may often be put, in the first instance, to the obstetrician.

The indications for referral were rather biased by the clinic policy of offering preamniocentesis counselling to older couples and, as in most USA clinics [9], these couples formed the largest single group at our clinic. In a study of clinic patients in Missouri [10], from which such couples were excluded, half the families were counselled for Mendelian genetic defects, whereas only 23% in the present study were for these conditions. In the Missouri study, however, similar numbers of families were counselled for multifactorial disorders (10% as opposed to 13% in the present study), for non-genetic defects (5%, 2,1% in the present study) and families with defects of unknown aetiology (19%, compared to 18,2% in the present study). The dominant, recessive, and X-linked conditions in our sample were the same as those seen commonly in the London clinic, [6] with the exception of osteogenesis imperfecta, which was not mentioned in our sample but occurred in ten of the 455 families seen in London, and other skeletal abnormalities, such as achondroplasia and malformations of hand/foot, which also occurred in London but were not represented in our smaller sample. The sample of conditions seen over the selected six months period, therefore, seems similar in comparison to those seen elsewhere in developed countries with sophisticated services available.

In conclusion, it is apparent that certain types of patients and quite a wide range of genetic disorders are managed by means of counselling and testing, where necessary, at our genetic counselling clinic. Other patients with similar problems are managed in private practice, but there is probably still a large group, particularly including those in the lower socio-economic groups with limited access to the genetic counselling clinic and who are not at present demanding the service, whose needs are not met. In order to improve this situation we suggest that further education of both medical personnel and the lay public, via lectures and articles for the former, and via SAIDA (the Southern African Inherited Disorders Association) for the latter, in the field of inherited disorders is required; and that the genetic counselling clinic should make its services more widely known. We believe that the knowledgeable doctor and patient will use the centralised comprehensive service and that a satellite service system with a small staff would not be as efficient in meeting all the needs of the patient.

The question usually is, 'Will my next child have the family disorder?'

Prenatal diagnosis is available for the chromosome disorders as well as for many other disorders, such as the neural tube defects, and for some recessive conditions such as Tay-Sachs disease, cystic fibrosis and thalassaemia. Prenatal sexing is also available for the X-linked conditions, such as haemophilia and Duchenne muscular dystrophy. Research is rapidly moving onto the molecular level and DNA studies in informative families are providing prenatal diagnostic information for some conditions and soon will for

many more. Demands on the genetic counsellor's expertise are, therefore, likely to increase as the management of genetic disorders becomes more and more complex (or perhaps more simple) and the enlightened patient becomes anxious about risks, concerned about prevention and keen to use the service to its maximum benefit.

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Forum (continued from p. 276)

Snyckers:

There is something we must just be very careful of. I agree entirely that people are responsible for their own health. We're not saying that health is a privilege, but health care is a privilege, or access to health care. I think the most difficult problem of the whole lot, although it's easily said, is to determine what is the minimum health care level when you finally get down to it. There one has to be very practical and just look at how much of tax money is going to be left over for this.

I think first of all the basic concept of subsidising the individual is very important, as a preparation for making it easier to privatise because we keep thinking that the public sector actually produces a cheaper service than the private sector. I maintain it does not. We need to be able to compare the services. This will be possible if both systems are financed in the same way.

Dr Retief:

Mr Chairman, as far as the maldistribution of doctors is concerned, it's a given fact. There is no doubt about it. It is not peculiar to SA. Everywhere, even in the most advanced countries, there is a measure of maldistribution. In the Third World countries in general this maldistribution tends to be even worse, doctors congregating where the bright lights are.

Now the other thing is, it is very true, that in totalatarian countries it is easy to handle. People can be told to go here or there. In certain South American countries I believe it is done to very good effect. But now the problem is having a country which considers itself a democratic, free, capitalistic country where people have the right to decide what they want to do and what they do not want to do. Who is going to decide and force doctors to go where they will not be normally? This will remain a problem, as long as we are a free country.

The other problem is, in this country, as elsewhere, people tend to be and to live and to set up practices where they are most comfortable. That means that in our country with its cultural minorities, its cultural groupings, one would really need an equal distribution of doctors in all the cultural groupings in order for this distribution to disappear gradually on its own. Once again the training institutions in this country are all free institutions, they can decide who they want to admit. It is not for a central body to tell them. Unless that central body is given the authority to do so, and that would cause an uproar in many places. This is our dilemma.

Dr Gurnell:

On the question of maldistribution of medical manpower. I think at the root cause is the training doctors get in medical schools. Young doctors are too terrified to go out and practise on their own, away from the big hospitals and away from second opinions. And I think the sooner we can get the concept of vocational training across to the authorities to fund this sort of training, the better our chances to get doctors to go out of the big urban areas.

The other interesting thing is, if you run any other form of business and you want somebody to go and sit on the other end of the world, to do something, you pay him an incentive, and we must look into the question of giving doctors incentives to go and practise out in the platteland.

Dr Stott:

I would support the point completely, that vocational training is essential to achieve what you suggested. Britain has passed through two interesting stages. The maldistribution was dissolved partly through vocational training and partly through incentive schemes to go to deep rural areas that were underdoctored. The pendulum has come back, and we now need incentive schemes for, say doctors to work in the deep inner city area. The rural areas are now highly desirable, so I imagine the same thing will happen here.