

Nurses' Knowledge about Genetics

Indirani Dhasaradan, A. Vengatesan and R. Shankar Shanmugam

A study to assess knowledge of nurses on genetics in selected urban & rural hospitals in Tamil Nadu.

One of the first questions we ask when a baby is born is who does he or she look like? But it is not just the colour of our eyes or the shape of the nose that we inherit from our parents. We have more than 30,000 genes each in our DNA and every single one has an effect on the way our bodies work; including our susceptibility to illness.

Our genetic understanding is about to be taken to another level with the completion of the Human Genetic Project (HGP), which first maps the entire human genome. It will pave the way for a revolution in health care.

Jagaljan has predicted that by 2010 to 2020, "genetherapy" will become a common treatment for a select set of conditions. By 2020, customized drugs will target the molecular basis of common illnesses. By 2050, numerous potential diseases will be cured at the molecular level before they arise. In fact, in future comprehensive genomic-based health care will be the norm in India and western countries and the average life span will reach 90 to 95 years.

Application of genetic discoveries in clinical health care will require that advanced practice nurses are prepared to discuss genetic information with their patients and

their families. Knowledgeable nurses are needed to be part of the inter-disciplinary effort to incorporate new genetic knowledge into all aspects of health care.

Need for Study

The genetic basis of more and more disorders is being discovered every day. The human genome project has also been completed. This has brought with it a new array of molecular diagnostic and screening tests into practice. Education of nurses in genetics is often limited to identification of inheritance patterns for rare single gene disorders or recognition of physical signs of chromosome abnormalities in newborn.

Due to greater family size, inadequate spacing between successive children and ignorance or lack of knowledge, it is not uncommon to find 2-3 affected members in the same family in a genetic clinic. Many families come in with two children having died of severe anemia due to thalassemia or there are two males affected with hemophilia or muscular dystrophy. These diseases exhaust the financial resources of the family and create psychological tension.

Recent population based studies suggest that birth defects and genetic disorders account for about 100% of hospitalization and about 30% of hospitalization charges.

Approximately 7% of pediatric admissions are single gene and chromosomal disorders and another 15-20% for congenital malfor-

mations of different types. The death of about 35% of children who die in children hospitals are caused by genetic conditions or birth defects. Chromosomal anomalies occur in 0.4% of all live births. Prevalence of congenital anomalies is much higher among spontaneous abortions and still births.

As genetic based diagnosis and treatment become more common, nurses will be required to interpret genetic information and counsel patients undergoing genetic treatments and tests. Knowledge of disorders would enable proper referrals for genetic tests, avoid undue anxiety and ensure effective prevention in affected or risk families. This would also reduce the burden on the health care system and society.

Biesecker and Martear predict that gene testing will be thoroughly integrated into medical practice and that counselling and education before testing will initially fall to nurses working in specialty areas. Research by Bernhard et al. suggest nurses can successfully and competently do this.

Objectives

- ♦ To assess the knowledge of nurses on genetics.
- ♦ To compare selected demographic variables with knowledge of nurses about genetics.

Methodology

Research approach selected for the study was explorative cross sectional survey method. The

The authors are Reader, College of Nursing, MMC, Statistician, Govt. Stanley Medical College Hospital and Final Year M.Sc. (N), College of Nursing, MMC respectively, at Chennai.

study was conducted in hospitals in Chennai and rural areas. The sample consisted of 61 nursing personnel. Convenient sampling technique was used to select 61 nursing personnel and a structured questionnaire was used to collect the data. This schedule has 4 sections.

Section A includes demographic data like age, sex, professional qualifications, designation, institution, experience etc.

Section B deals with fundamental knowledge items such as unit of hereditary, pairs of chromosomes, sex chromosomes, cell division, etc. Section C deals with applied knowledge of genetics such as constitution of DNA, RNA, determination of sex, ingredients of gene, genetic make up, chromosomal error, Down's syndrome, hemophilia, genetic counselling, X linked disorders, impact of consanguineous marriage, indication of amniocentesis, infections causing congenital malformations and prevention of genetic disorders.

Section D deals with current genetic knowledge in clinical practice such as gene mapping, cloning molecular genetics and human genome project etc.

Section I consists of 10 questions, which are more of fundamental knowledge of genetics. Section II consists of 15 questions which are more of application of genetic knowledge in clinical practice and Section III comprises of 10 questions which include human genome project, cloning gene mapping etc.

The samples selected for study were nursing personnel of

different qualifications such as diploma, degree, post-graduation and different designations such as Staff Nurse, Nursing Tutor, Lecturer, etc.

Statistical Analysis

Univariate analysis of person's chi-square test and Fisher's exact test were employed to find out the relationship between demographic variables and genetic knowledge scores on fundamental, applied and current.

Multivariate analysis of unconditional logistic regression was employed to find out the odds ratio and 95% confidence interval for the significantly different variable in univariate analysis.

Pearson's correlation coefficients were employed to calculate the correlation between fundamental knowledge score, applied knowledge score and current knowledge score.

Findings of the Study

The findings show that lesser age group nursing personnel have

(60%) more fundamental knowledge than above age group nursing personnel (40%). It is statistically significant ($\chi^2=5.99$, $p=0.05$).

In professional qualification, fundamental knowledge increases as the qualification increases. In diploma, it is 4.5%, degree - 18.27%, M. Sc. - 77% having above average fundamental knowledge on genetics. It is also statistically significant ($\chi^2=31.97$, $P=0.001$).

In designation, fundamental knowledge increases as the designation status increases. It is 18.2% in Nurse, 27.3% in Nursing Tutor, 54.5%, in Lecturers. It is also statistically significant ($X^2 17.73$, $P=0.001$).

In experience, fundamental knowledge increases as nurses experience increases. With less than 10 years of experience, nursing personnel are having 36.4% and greater than 10 years are having 63.6% of above average fundamental knowledge. It is also statistically significant ($X^2=9.09$, $P=0.01$).

The applied knowledge about

Association between demographic variables VS fundamental knowledge, applied knowledge and current knowledge on "genetics"

Variables	χ^2 Test	P value
Fundamental Knowledge		
Age	5.59	0.05
Qualification	31.93	0.001
Designation	17.73	0.001
Experience	9.09	0.01
Applied Knowledge		
Qualification	19.35	0.001
Designation	12.98	0.001
Institute	7.22	0.007
Experience	15.53	0.001
Current Knowledge		
No association in all variables	-	> 0.05

Multi Variable Logistic Regression

Variables	P value	Odds ratio	95% confidence Interval
Qualification	0.007	5.27	1.57-17.68
Experience	0.004	4.02	1.03-15.68

genetic increases as the qualification increases. It is about 16% in diploma, 25.8% in degree, 58.1 in post graduation are having above average knowledge. It is statistically significant ($X^2 = 19.35$, $P = 0.001$).

As the designation increases from nurses to lecturer, the applied knowledge also increases. It is about 12.9% in Diploma Staff Nurse, 22.6% in Degree Nurse/Nursing Tutor, 64.5% in Post Graduate Lecturer /Nurse are having above average knowledge. It is statistically significant ($X^2 = 12.98$, $P = 0.001$).

The applied knowledge is also increased based on the institution they are working, rural 32.3%, urban – 67.7% are having above average knowledge. It is statistically significant ($X^2 = 22$, $P = 0.007$).

The application of genetic knowledge increases as the experience increases. It is about 32.1% in less than 10 years of experience and 67.7% in greater than 10 years of experience are having above average applied knowledge ($X^2 = 15.53$, $P = 0.001$).

There is no relationship between demographic variables and current knowledge on genetics. The p value is greater than 0.05 for all the variables.

CORRELATION

The correlation of knowledge on genetics among nursing personnel shows there is strong correlation between fundamental knowledge and applied knowledge on genetics ($X^2 = 0.88$, $P = 0.001$). There is a moderate correlation between fundamental knowledge of genetics and current knowledge on genetics ($X^2 = 0.33$, $p = 0.01$) and also moderate correlation between applied knowledge of genetics and current knowledge on genetics ($X^2 = 0.39$, $P = 0.02$).

Conclusion

In general, the knowledge of genetics is strongly associated with

qualifications and experience. If the qualifications increase, from one grade to another, they gain 5 times more knowledge (OR = 5.27, 95% CI: 1.57 – 17.68). Similarly, as experience increases from less than 5 years to 5-10 years, they gain four times more knowledge. (OR = 4.02, 95% CI: 1.03 – 15.65).

Nursing has the central responsibility for discovering how human life style, behaviour and environmental factors prevent or limit the manifestations of gene mutation as disease and how quality of life can be enhanced despite the presence of genetic conditions.

Donaldson (1999)

Recommendations

For Diploma nurses: They are working continuously in clinical area. When we compare them to other groups, their promotional opportunities are limited. These people must be given priority in service, and short-term training regarding genetics in clinical practice.

They must be given opportunity for participating in scientific genetic conferences / workshops / seminars / projects to uplift their current knowledge on genetics.

For B.Sc. (N) and M.Sc. (N): Clinical nurses need to update knowledge on genetics since they are the people who can apply the theoretical knowledge to practice. It is a current trend in nursing due to revolutionary changes in the molecular genetics.

♦ Government of India and State Governments need to take more interest in these people. They may get opportunity to practice as nurse clinicians or Genetic nurse counsellors.

♦ The curriculum need to be re-structured to incorporate genetics/ molecular biology, since a number of diseases are due to genetic alterations. Preventable congenital malformations can be prevented in the initial stage itself.

The key strategies include educational preparation, appropriate research methods, institutional support and research collaboration. Nurses must understand genetics in order to participate in knowledge discovery regarding relationship between genetics, health and nursing. Integration of genetic concept into nursing science requires development of relationships among nursing researchers as well as with those in genetics and related disciplines.

Genetic research: Nursing personnel can be encouraged for more research work on genetics and molecular biology.

References

1. Godmilow L. et al. (1986) "Clinical genetics in nursing practice, 1st Ed. J.B. Lippincott Company, Philadelphia, pp.16-29.
2. Neilkenworthy et al. (1996), "Common Foundation studies in Nursing, 3rd Edition, Churchill Living Stone Ltd., New York, pp.7-12.
3. Rudolph (1998), "Fundamentals of Paediatrics", 2nd Edition, Appleton Lange Publication, Stanford, pp.148-198.
4. Margarer et al. (2000) "Nursing Practice, 2nd Edition, Churchill Living Stone Ltd., New York, pp. 201-206.
5. Jo Hartley (2003) "Genetics & Nursing – What you need to know", Nursing Times, 99:34-36.
6. Karen A. Johnson (2000) "Genetics & Nursing – Planning for Future, The Nursing Clinics of North America, W.B. Saunders Company, Philadelphia, pp. XV-XIX.
7. Janet et al. (2004) "Advancing Genetic Knowledge". Nursing Outlook, 32: 73-79.