Community Health Nurses' Role in Genetic Sequencing: A Prospect for Health Team Preparedness Against Covid-19

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Abstract

Genetic sequencing is a scientific process of reading genetic material using advanced technology. Through genetic sequencing, we can better comprehend super-spreader events and outbreaks, and strengthen national public health responses. A better understanding of the transmission of viruses, the severity of patient illness, and mortality rates can be gained by combining this information with that from the IDSP and patient reports. Connecting the dots between the data and the host's genetics, immunology, clinical outcomes, and risk factors is also possible. Many roadblocks must be overcome before raw sequence data can be put to direct clinical application. Since DNA sequencing has so many potential applications in the field of nursing, it ought to be a required topic for students in the profession. Group wellness Preparing patients for procedures, identifying those most at risk, doing sentinel surveillance, and conducting in-depth studies are all areas in which nurses can be of assistance. The goals of this paper are twofold: (1) to present the notion of genetic sequencing and (2) to highlight the role of Community health nurses. To reduce the impact of pandemics and endemics and improve nursing care, Western countries are seeing an uptick in the participation of nurse scientists in genetic sequencing; the case of newborn screening provides a particularly apt example.

Key words: Genetic sequencing; epidemics; community health Nurses

Introduction of Genetic Sequencing

Genomics is "the study of all of a person's genes, including the interaction of genes with each other and the environment," according to the NIH, genetics is the "research of genes and their involvement in inheritance of illness."Genome project has advanced the knowledge related to gene and chronic diseases [1]. All living things, including bacteria, plants, and mammals, have their own genetic code, or genome, which is made up of nucleotide bases (A, T, C, and G). If you know the order of the bases in an organism, you have found its unique DNA fingerprint, or pattern. Sequencing means to figure out the order of the bases. Whole genome sequencing is a lab process that tells in one step how the bases in an organism's genome are put together. Genetic sequencing understanding will help the in preparation of the nursing workforce for the future of personalized healthcare [1].

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Genetic sequencing for public health: This helps us understand super spreader events, outbreaks, and boost public health responses across the country. When this data is combined with IDSP data and patient symptoms, we can learn how viral infections spread, how sick patients get, and how many die. The data can also be linked to the host's genetics, immunology, clinical outcomes, and risk factors. [2]

Background: Recently the Indian SARS-CoV-2 Genomics Consortium (INSACOG)[2] was formed by the Union Health Ministry of Health, the Department of Biotechnology (DBT), the Council for Scientific and Industrial Research (CSIR), and the Indian Council of Medical Research (ICMR). CoV-2's INSACOG is a multi-laboratory, multi-agency, Pan-India network to track SARS-CoV-2 genomic alterations. This is done by the NCDC in Delhi and the CSU under the Integrated Disease Surveillance Program (IDSP). The data from genome sequencing labs are examined based on field data patterns to see if genomic variations are linked to epidemiological trends. The group is attempting to link genomic sequencing with clinical outcomes. The partnership has put up a network of hospitals to study the host's immunological response and COVID's long-term impact on immunity. This section of the consortium will examine clinical correlations between moderate and severe COVID cases, as well as long-term consequences and immune alterations. Many variants have been uncovered using INSACOG's Whole Genome Sequencing operations.[2]

Steps in Genetic sequencing [1]

1. **DNA shearing:** First, scientists use molecular scissors to cut the DNA, which is made up of millions of bases (A's, C's, T's, and G's), into pieces that are small enough for the sequencing machine to read.
2. **DNA bar coding:** Scientists use small pieces of DNA tags, or bar codes, to figure out which bacteria each piece of cut DNA belongs to. This is like how a bar code at a grocery store tells you what a product is.
3. **DNA sequencing: DNA** sequencing is done by putting the bar-coded DNA from several different bacteria into a DNA sequencer. The sequencer figures out which A's, C's, T's, and G's, also called bases, and are in each bacterial sequence. The bar code is used by the sequencer to keep track of which bacteria's bases go with which bases.
4. **Data analysis:** Scientists use computer tools for data analysis to compare the sequences of different bacteria and find differences. Scientists can tell how closely related the bacteria are and how likely it is that they are all part of the same outbreak by the number of differences between them.

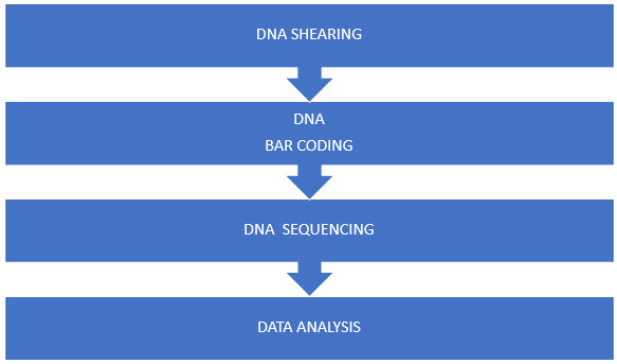

Figure 1: steps in genetic sequencing

Genetic sequencing in Nursing care: High-throughput DNA sequencing is now both economically and technically feasible, which means it can be used to develop treatments for people at high risk of inherited disorders. Western nation studies in review Suggest Nurse Scientists are uniquely qualified to assess reports based on DNA sequencing and to explain genetic information to patients and their families, both of which can have a considerable impact on health outcomes; neonatal genomic screening is a prime example of their work5. There are a lot of obstacles on the way from raw sequence data to direct clinical use. Benefits of genetic sequencing suggest it should be incorporated in Nursing curriculum [6]. Because Nurses are frontline health workers, nurses can make a huge impact in the lives of persons with genetic disorders [8]. In order to better assist those patients in most need, nurses in clinical practice and those in research will share their experiences and insights with one another. Gene discoveries impact community health nurses. Nurses identify genetic disease risk groups and participate in newborn screening, carrier discovery, and pre symptomatic genetic testing programs [13]. Newborn screening is a way for the public health system to find rare but treatable health problems in young babies. In the US, nurses, nurse educators,

and nurse researchers can make a difference in the field of newborn screening by making sure programs are carried out safely and effectively, by helping to educate the nursing workforce, and by creating and contributing to research programs in newborn screening[3]. Community health nurses give direct nursing care to people with genetic diseases. The community health nurse's duty includes protecting clients from hazardous genetic information, developing and implementing genetic screening programs, and locating genetic resources [8]

Proposed Role of community health Nurses in genetic sequencing [6][7][8]:

1. **Building knowledge**: Community health Nurses can build knowledge among members regarding genetic sequencing procedure, its benefits which will develop readiness among community members for testing.

1. **Motivation:** Community health Nurse can work for motivation of family members or community members for choosing genetic sequencing as safest method of diagnosis.

2. **Epidemiology** :Community health Nurses identify Burden of hereditary diseases through survey can be identified and refer for genetic sequencing for accurate diagnosis.

- **Sample Collection** : Collection of sample can be assisted by community Health Nurses.
- **Sentinel surveillance:** During pandemic genetic sequencing will serve in early identification of variants. CHOs, Community health Nurses can help in updating the information through sentinel sites.
- **Research practices**: Evidence based researches can be generated to promote its clinical utility for choosing better treatment options.

Conclusion

Community health nurses can broaden their scope of practice by learning the basics of DNA sequencing to better assist with routine community care and emergency situations such as those caused by pandemics, epidemics, and endemics.

Conflict of interest: none

Source of funding: nil

Ethical clearance: This study is a perspective article regarding role of community health nurses no subjects are direct involved in this study so ethical clearance is not applicable.

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