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Quarantine: A Concept to Preparedness.

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ABSTRACT

The concept of Quarantine dates back to A.D.549 during the time of the Epidemics of bubonic plague and recently it was used in the Influenza A(H1N1) pandemic in 2009. Quarantine and other public health practices provide effective and valuable ways to control communicable disease outbreaks and public anxiety. It is done when someone has been exposed to a contagious disease and it is not yet known if they have caught it, they may be quarantined or separated from others who have not been exposed to the disease, disease spread cannot be prevented by other means, such as by post-exposure prophylaxis (e.g., SARS) and or when exposed individuals refuse other disease prevention means, such as vaccination (e.g., smallpox). With the emerging new challenges posed in the twenty-first century by the increasing risk for the emergence and rapid spread of infectious diseases, quarantine and other public health tools remain central to public health preparedness. But these measures, by their nature, require vigilant attention to avoid causing prejudice and intolerance. In the face of a dramatic health crisis, individual rights have often been trampled in the name of public good. The use of segregation or isolation to separate persons suspected of being infected has frequently violated the liberty of outwardly healthy persons, most often from lower classes, and ethnic and marginalized minority groups have been stigmatized and have faced discrimination.

Keywords: Quarantine, Communicable Disease, Epidemic

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INTRODUCTION

There is no doubt that communicable diseases pose threats to populations, and the simple administration of health care is insufficient to control the spread of communicable diseases. Over the past century, public health has developed a series of strategies to apply at a population level to control the spread of communicable diseases. The mode of transmission for most communicable diseases is well known, and hence population-based strategies are undertaken. However, there are circumstances when communicable diseases threaten populations, and a broader public health strategy may be required.

The word "quarantine" originates from the Venetian dialect form of the Italian " quaranta giorni" meaning 'forty days'. This is due to the 40 day isolation of ships and people prior to entering the city of Dubrovnik – Croatia [1].

Quarantine: Separation and restriction of movement of well persons presumed to have been exposed to contagion (Centres for Disease Control (CDC)).

A period of time during which a vehicle, person, or material suspected of carrying a contagious disease is detained at a port of entry under enforced isolation to prevent disease from entering a country.

Quarantine applies to those who have been exposed to a contagious disease but who may or may not become ill whereas isolation applies to persons who are known to be ill with a contagious disease [2].

Working Quarantine

Separation and restriction of movement of employees at their homes or designated facilities during off-duty hours based on the occupational risk [3].

Community-wide Quarantine

Closing community borders or erecting real or virtual barriers around a defined geographic area (cordon sanitaire) [3].

Modern quarantine [4]

Modern public health places quarantine within a broader spectrum of interventions generally referred to as "social distancing."

Modern quarantine is used when

- A person or a well-defined group of people has been exposed to a highly dangerous and highly contagious disease,
- Resources are available to care for quarantined people, and
- Resources are available to implement and maintain the quarantine and deliver essential services

Modern quarantine includes a range of disease control strategies that may be used individually or in combination, including:

- Short-term, voluntary home curfew.
- Restrictions on the assembly of groups of people (for example, school events).
- Cancellation of public events.
- Suspension of public gatherings and closings of public places (such as theaters).
- Restrictions on travel (air, rail, water, motor vehicle, pedestrian).
- Closure of mass transit systems.
- Restrictions on passage into and out of an area.



Modern quarantine is used in combination with other public health tools, such as:

- Enhanced disease surveillance and symptom monitoring.
- Rapid diagnosis and treatment for those who fall ill.
- Preventive treatment for quarantined individuals, including vaccination or prophylactic treatment, depending on the disease

Historic Roots of Quarantine [1,5]

A.D.549: Epidemics of bubonic plague, the Byzantine emperor Justinian enacted a law meant to hinder people arriving from plague-infested regions.

1300s: European and Asian countries began enforcing quarantines of infected regions by encircling them with armed guards.

1348: Venice established the world's first institutionalized system of quarantine, giving a council of three the power to detain ships, cargoes, and individuals in the Venetian lagoon for up to 40 days. The Black Death, a plague epidemic that eventually took the lives of 14 to 15 million people across Europe, or up to one-fifth of the population.

1663: The English monarchy issued royal decrees calling for the establishment of permanent quarantines. All London-bound ships, whether English or foreign, were paused at the mouth of the Thames River for 40 days (and sometimes 80).

1712: A plague epidemic around the Baltic Sea led England to pass the Quarantine Act.

1738: With smallpox and yellow fever threatening to strike New York, the City Council set up a quarantine anchorage off Bedloe's Island (home of the Statue of Liberty today).

1832: After about 30,000 people in Britain alone died in a cholera epidemic in 1831-1832, New York mandated in June 1832 that no ship can approach within 300 yards of any dock if its captain suspects or knows the ship has cholera aboard. The disease slipped through the safety net, however, killing nearly 3,500 of the city's 250,000.

1893: The U.S. Congress passed the National Quarantine Act.

1903: The New York City Department of Health opened a quarantine facility at Riverside Hospital on North Brother Island.

1944: The Public Health Service Act is codified, clearly establishing the quarantine authority of the federal government, which has controlled all U.S. quarantine stations since 1921.

1953: PHS and Quarantine joined the Department of Health, Education and Welfare.

1967: Quarantine to the National Communicable Disease Center, now the Centers for Disease Control and Prevention (CDC).

1986: Indefinite quarantine for citizens testing positive for HIV.

1990s: To help control multidrug-resistant tuberculosis, New York City detained more than 200 people who refuse voluntary treatment, confining most of them to the secure ward of a hospital for about six months.

2003: An outbreak of severe acute respiratory syndrome, or SARS, in Asia and Canada occurred in the spring. Officials credit the use of both isolation (for those sick with SARS) and quarantine (for those exposed to the sick) with forestalling an even more severe epidemic

2009: Influenza A(H1N1)pdm 09 pandemic

In the face of new challenges posed in the twenty-first century by the increasing risk for the emergence and rapid spread of infectious diseases, quarantine and other public health tools remain central to public health preparedness. But these measures, by their nature, require vigilant attention to avoid causing prejudice and intolerance. Public trust must be gained through regular, transparent, and comprehensive communications that balance the risks and benefits of public health interventions. Successful responses to public health emergencies must heed the valuable lessons of the past [5].

The common quarantinable diseases includes; Cholera, Diphtheria, Infectious Tuberculosis, Plague, Smallpox, Yellow Fever, Viral Hemorrhagic Fever (Marburg, Ebola, And Congo-crimean), SARS and Influenza . Quarantine achieves 2 goals [6].

- First, it stops the chain of transmission because it is less possible to infect others.
- Second, it allows the individuals under surveillance to be identified and directed toward appropriate care if they become symptomatic. This is more important in diseases where there is presymptomatic shedding of virus

Types of quarantine [6]

Absolute

Which consists of a limitation of freedom for a period equal to the longest usual incubation period of the disease.

Modified

Which involves selective or partial limitation of movement, based on known differences in susceptibility. Examples of a modified quarantine are the exclusion of children from school and the confining of military personnel to their base.

Quarantine is required, when someone has been exposed to a contagious disease and it is not yet known if they have caught it, they may be quarantined or separated from others who have not been exposed to the disease, disease spread cannot be prevented by other means, such as by post-exposure prophylaxis (e.g., SARS) and or when exposed individuals refuse other disease prevention means, such as vaccination (e.g., smallpox) [4].

Key Considerations in Quarantine Decisions [6]

3 major questions that pose significant importance for a particular outbreak;

- Do public health and medical analyses warrant the imposition of large-scale quarantine?
- Are the implementation and maintenance of large-scale quarantine feasible?
- Do the potential benefits of large-scale quarantine outweigh the possible adverse consequences?

Principles

Ross Upshur has given 4 principles that must be met in order for public health to contemplate an autonomy-limiting strategy [7].

First, the harm principle must be met: In other words, there should be clear and measurable harm to others if a disease or exposure go unchecked. For quarantine, this infection should be spread from person to person.

Reproductive Number, R_0

$R_0 = p \cdot c \cdot d$

p: Probability of Transmission per Contact

c: Contacts per Unit Time

d: Duration of Infectiousness



Secondly, the proportionality, or least-restrictive-means, principle should be observed: This holds that public health authorities should use the least restrictive measures proportional to the goal of achieving disease control. This would indicate that quarantine be made voluntary before more restrictive means and sanctions such as mandatory orders.

Thirdly, reciprocity must be upheld: If society asks individuals to curtail their liberties for the good of others, society has a reciprocal obligation to assist them in the discharge of their obligations. That means providing individuals with adequate food and shelter and psychological support, accommodating them in their workplaces, and not discriminating against them.

Finally, there is the transparency principle: This holds that public health authorities have an obligation to communicate clearly the justification for their actions and allow for a process of appeal.

If the above conditions can be met, there is a prima facie justification for the use of quarantine

Some ethical values given consideration when we are addressing the issue like [8]

- Individual liberty: Isolation and quarantine should be proportional, necessary, relevant, equitably applied, and done by least restrictive means.
- Protection of public from harm: Officials must weigh the imperative for compliance and review decisions.
- Proportionality: Restrictive interventions should be limited to the actual level of risk to community.
- Privacy: There must be a necessity for overriding the public's protection.

Other measures

Quarantined persons must be among the first to receive all available disease-preventing interventions like Vaccination (e.g., smallpox), Antibiotics (e.g., plague), Early, rapid diagnostic testing and symptom monitoring and Early treatment if symptoms appear [4].

Division of Global Migration & Quarantine [9]

Mission

To protect the health of the public from communicable diseases through science, partnerships and response

Functions of CDC Quarantine Station [10]

- Responding to reports of illnesses on maritime vessels (cruise and cargo) and airplanes
- Emergency planning and preparedness
- Inspecting animal and human products posing threat to human health
- Monitoring health, and collecting, distributing and managing medical information of new immigrants, refugees, and parolees
- Performing inspections of cargo and hand-carried items for potential vectors of human infectious diseases
- Distributing immunobiologics and investigational drugs
- Providing travelers with essential health information
- Responding to mass migration emergencies

Whenever emergency arises especially in cases of quarantine i.e., Implementation of containment measures requires coordinated planning by many sectors like:

- Public health practitioners
- Health-care providers/facilities
- Transportation authorities

- Emergency response teams
- Law enforcement
- Security/Credentialing personnel
- Legal authorities
- Foreign quarantine
- Interstate quarantine

In India: Departments which are working towards it are

1. Government of India
2. Ministry of health and family welfare
3. Directorate general of health services, New Delhi
4. Airport and port health organisation
5. Centers for Disease Control and Prevention (CDC), U.S. Embassy, New Delhi

Limitations [5,6]

- Quarantine has been historically used to discriminate against minorities
- Studies demonstrate that mass quarantine is ineffective
- A large scale quarantine would be difficult to implement
- Effective quarantine requires the identification of “all, or virtually all, people incubating the infection.”
- Compliance is necessary in order for quarantine to be effective

Quarantine and other public health practices are effective and valuable ways to control communicable disease outbreaks and public anxiety, but these strategies have always been much debated, perceived as intrusive, and accompanied in every age and under all political regimes by an undercurrent of suspicion, distrust, and riots. These strategic measures have raised (and continue to raise) a variety of political, economic, social, and ethical issues. In the face of a dramatic health crisis, individual rights have often been trampled in the name of public good. The use of segregation or isolation to separate persons suspected of being infected has frequently violated the liberty of outwardly healthy persons, most often from lower classes, and ethnic and marginalized minority groups have been stigmatized and have faced discrimination. This feature, almost inherent in quarantine, traces a line of continuity from the time of plague to the 2009 influenza A (H1N1) pdm09 pandemic [5].

In dentistry-as public health dentists

In case of bio-terrorism or other severe attacks of infectious diseases, Dentistry can contribute valuable assets, both in personnel and in facilities, to the preparation for and in the immediate response to the attack and its aftermath. In a major attack, the local needs could be massive and immediate. The traditional medical resources—both personnel and facilities—of a community under attack will be overwhelmed, especially in the first few days after the determination that the community has been deliberately subjected to an infectious agent. It will fall to non physicians to provide many services ordinarily supplied by physicians. As hospitals become filled, alternate sites for the provision of health care may be required, and dental offices could fill that need. Hence a thorough knowledge about it is essential.

CONCLUSION

After a long process involving better medical knowledge and international negotiations, epidemic controls has largely outgrown the early stage involving essentially local control measures. While forced quarantine is no longer practiced, several recent examples of heated debates illustrate that strong emotional feelings are still present in societies threatened by epidemic disease outbreak. Since the major responsibility for disease control now rests in our hands, we must take these factors into account for management of possible future epidemic crises. Though many of these actions may be controversial, particularly when they begin to affect the livelihood of individuals, there is not an excuse for deviating from a control strategy.



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