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Criteria for the Diagnosis of Infectious Disorders based on Clinical Physiological Characteristics

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Abstract

The identification of microorganisms such as bacteria, viruses, fungi, protozoa, or helminths in a patient exhibiting a clinically compatible illness is the gold standard for infectious disease diagnosis. In order to assess the factors, many tests are employed, including culture sensitivity testing, white blood cell (WBC) count, GRBS/HbA1c, serum creatinine, USG abdomen/CT abdomen, and urine routine. A complete medical history and physical examination are the starting points for infectious disease diagnosis. Clinical evaluation, in conjunction with a battery of laboratory and imaging tests, is an integral part of the diagnostic process for infectious diseases. The key to successful disease management and treatment is a correct identification of the infectious agent, and our all-encompassing method guarantees it. The capacity to identify newly developing infections and improve patient outcomes is being further enhanced by the continuous evolution of diagnostic tools. The findings of diagnostic tests and imaging studies, along with global data on clinical characteristics, will help doctors make an accurate diagnosis, improve patient care, and overcome diagnostic hurdles in the fight against infection.
Keywords: *infectious diseases, virus, urine, diagnosis, pathogens.*

INTRODUCTION

An infectious disease is a clinical condition caused by a virus or its toxic byproduct, transmitted from an infected individual, an infected animal, or a contaminated inanimate object to a vulnerable host. Infectious diseases contribute significantly to the global burden of disease, which has a profound influence on public health systems and economics globally, particularly affecting disadvantaged communities. As of 2013, infectious diseases caused more than 45 million years of disability and over 9 million deaths (Naghavi et al., 2015). Primary contributors to worldwide mortality include lower respiratory tract infections, diarrhoeal illnesses, HIV/AIDS, malaria, and tuberculosis (TB) (Vos T et al., 2015). Emerging infectious diseases encompass diseases that have recently emerged (such as Middle East Respiratory Syndrome) or have already existed but are seeing a rapid rise in occurrence or geographical distribution (such as extensively drug-resistant tuberculosis (XDR TB) and Zika virus (Morse, 1995). Effective control and prevention of infectious diseases depend on a comprehensive knowledge of the elements that determine transmission. This article provides a concise overview of the basic concepts of infectious disease transmission, emphasising the key factors on which public health experts place significant importance, including the agent, host, and environmental determinants of these diseases.

Prior to spreading to another reservoir and infecting a new host, an infectious organism must first infect a fresh reservoir. An illness can propagate through several dissemination mechanisms. The predominant means of conveyance (vectorised) include contact, vehicle, aircraft, and vectorbrone. The classification of infectious disease as airborne is based on its transmission through contact with droplets. Viable droplets from an infected individual's cough or sneeze can infiltrate the nasal passages, oral cavity, or ocular structures of a non-infected individual. Fecal-oral transmission is the term used to describe the spread of diseases in faeces from one person to another when food or water contamination occurs due to inadequate sanitation or hygiene standards. Giardia, Entameba histolytica, and tapeworm infections are the predominant pathogens transferred by fecal-oral contact. The occurrence of gastroenteritis is a frequent consequence of several of these illnesses. One possible consequence of sexual transmission is the transfer of diseases when inappropriate sexual contact is employed. Syphillis Transmission via the oral cavity Infectious diseases mainly transmitted by oral routes, such as those transferred by kissing or by sharing a cigarette or a drink of water. Contact transmission is employed; Athlete's foot, impetigo, and warts, for instance, can be transmitted via direct physical contact or through an inanimate reservoir such as food, water, or soil. During gestation or childbirth, a woman with an infection may transmit it to an embryo, foetus, or

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infant. Surgical procedures, such as the injection or transplanting of diseased tissue, can result in iatrogenic transmission. The transfer of diseases from one host to another is facilitated by vectors, which are non-pathogenic organisms that serve as carriers of diseases (Chan MY et al., 2018).

Anthropogenic infections can arise from bacterial pathogens such as mycobacteria, chlamydiae, mycoplasmas, and rickettsiae, as well as viral, fungal, or parasitic agents. An infection might be either endogenous or external. In endogenous infections, the microbe, often a bacterium, is a constituent of the intrinsic flora of the patient. Endogenous infections may arise via the aspiration of microorganisms from the upper to the lower respiratory tract or from their penetration of the skin or mucosal barrier occurring due to trauma or surgery. Exogenous infections, in contrast, include the acquisition of the microbe from the environment (such as soil or water) or from another individual or animal. While it is crucial to determine the underlying cause of an infection, the differential diagnosis relies on a meticulous history, physical examination, and suitable radiography and laboratory tests, which include choosing suitable samples for microbiological analysis. The outcome of the medical history, physical examination, and radiographic and laboratory investigations enables the physician to seek testing for the bacteria that are most probable to be responsible for the infection.

MATERIALS AND METHODS

The investigation utilized inpatients from private tertiary care hospitals. The anticipated duration of the research was 18–20 months, subject to the number of subjects enrolled. Hospitalized people admitted to different departments. People who took part in the study were taking a lot of medications and had a lot of co-morbidities during the 18–20 month trial period. In this study, the effectiveness of the chemists' care was determined by testing and evaluating patients after their interactions with the practitioners.

Physiological indicators: This measure was utilized to assess the presence of any correlation between Hypertension, Diabetes Mellitus, Asthma, and Hyperlipidemia, which are the primary comorbidities observed in individuals necessitating multiple pharmacological therapy.

Diagnosis:

This provides information on the patient's current condition, including subjective information such as the main complaints at the time of admission and previous medical conditions, as well as objective evidence such as laboratory test results.

Pharmacological schedule:

The medication chart includes the drug's name, dosage and method of administration, frequency and duration of administration, and a daily status report.

The discharge medication document contains comprehensive information about the medication, including its name, dosage, method of administration, and the recommended frequency and duration of treatment.

Issues pertaining to drugs:

This study focused on the challenges associated with medication, including adverse drug responses, contraindications, prescription errors, and drug interactions, during the data collection phase.

Laboratory reports consist of information pertaining to the assessment of several parameters in a patient. These parameters include complete blood count examination, serum electrolytes, magnetic resonance chromatography, computed chromatography, cardiac function test, culture test, and urine analysis.

Statistical analysis:

This study employed both descriptive and inferential statistical analysis. The Mean SD (Min-Max) statistic is employed for continuous variables, whereas the Number statistic is utilised for categorical variables (expressed as a percentage). Significance is judged at the 5% threshold of significance. The Chi-square or Fisher tests should demonstrate that the dependent variables have a normal distribution. The analysis of qualitative data was performed in a non-parametric framework using an exact test to ascertain the significance of study parameters on a categorical scale. The Fisher exact method is employed while conducting tests on minuscule cell samples. The data was examined using the statistical software SPSS and the programming language R version. The visual representations, tables, and other results were generated using Microsoft Word and Excel, respectively. Statistical software: In a research project, a work plan functions as a graphical depiction of the numerous stages involved in completing the task.

RESULTS AND DISCUSSION

Physiological indicators: Diagnosis

Table 1. Urine analyses: Distribution of turbidity incidence of the Patients' data

Incidence of turbidity	Male		Female		Total	
	Numbers	Percentage (%)	Numbers	Percentage (%)	Numbers	Percentage (%)
Yes	32	05.9	47	08.6	79	14.5
No	284	52.3	179	33.0	463	85.4

Table 1 displays the frequency of turbidity occurrences in the patients' data. Among males, 32 individuals (05.9%) exhibited turbidity, while 284 individuals (52.3%) did not. Among females, only 47 (08.6%) had turbidity in their urine, while 179 (33%) showed no sign of turbidity.

Table 2. Urine analysis Distribution of Pus cells of patients' data

Urine analysis: Pus cell	**Patient's data**	
	Numbers	**Percentage (%)**
Pus cell		
Nil	429	79.1
Present	113	20.8
1 - 5	46	08.4
6 - 10	54	09.9
>10	13	02.3
Total	**542**	**100**

The table 2 provides the percentage of pus cells present in urine samples of the study population. Among the 542 patients, 429 (79.1%) had no presence of pus cells in their urine, whereas 113 (20.8%) had pus cells detected in their urine sample. Out of the total 113 patients, 46 (08.4%) had 1-5 pus cells, 54 (09.9%) had 6-10 pus cells, and 13 (02.3%) had more than 10 pus cells.

Table. 3 Urine analyses: Distribution of Epithelia cells the patient's data

Urine analysis: Epithelial cell	**Patient's data**	
	Numbers	**Percentage (%)**
Epithelial cell		
Nil	425	78.4
Present	117	21.5
1 - 5	53	09.7
6 - 10	47	08.6
>10	17	03.1
Total	**542**	**100**

The table 3 provides the percentage of epithelial cells present in urine samples of the study population. Among the 542 patients, 78.4% (425 patients) had an absence of epithelial cells in their urine, while 21.5% (117 patients) had the presence of epithelial cells in their urine sample. Out of the total 117 patients, 53 (09.7%) had 1-5 epithelial cells, 47 (08.6%) had 6-10 epithelial cells, and 17 (03.1%) had more than 10 epithelial cells.

Table 4. Distribution of variables according to Gender

Parameters	**Average**	**Gender**		**Total**
		M (%)	**F (%)**	
White blood cell count	4000-10000	117 (21.5)	169 (31.1)	286 (52.7)
	>10000	143 (26.3)	113 (20.8)	256 (47.2)
	Total	**260 (47.9)**	**282 (52.2)**	**542 (100)**
ESR Value	<20	99 (18.2)	133 (24.5)	232 (42.8)
	>20	120 (22.1)	190 (35.0)	310 (57.1)
	Total	**219 (40.4)**	**323 (59.5)**	**542 (100)**
C - Reactive protein	<1mg/L	89 (16.4)	123 (22.6)	212 (39.1)
	1-3mg/L	105 (19.3)	137 (25.2)	242 (44.6)
	>3mg/L	31 (05.7)	57 (10.5)	88 (16.2)
	Total	**317 (58.4)**	**225 (41.5)**	**542 (100)**
Basophils	0.5 to 1%	31 (05.5)	77 (14.2)	108 (19.9)

Table 4 displays the distribution of variables according on gender. Out of the total 542 participants, 286 individuals (52.7%) had a white blood cell (WBC) count ranging from 4000 to 10000, whereas 256 individuals (47.2%) had a WBC count over 10000. Out of the 256 participants with a white blood cell (WBC) count ranging from 4000 to 10000, 117 (21.5%) were male and 169 (31.1%) were female. Out of the individuals with a white blood cell (WBC) count above 10000, 143 (26.3%)

were males and 113 (20.8%) were females. Regarding the ESR level, 231 individuals (42.8%) had a value below 20, while 310 individuals (57.1%) had a value over 20. Among them, 99 males (18.2%) and 113 females (24.5%) were in the below 20 ESR category, respectively. Additionally, 120 males (22.1%) and 190 females (35.0%) were in the above 20 ESR category. Out of the study population, 242 individuals (44.6%) had a C-reactive protein value between 1-3 mg/L, whereas 212 individuals (39.1%) had a value below 1 mg/L and 88 individuals (16.2%) had a value over 1 mg/L. Within the category of 1 mg/L or below, there were 89 males (16.4%) and 123 females (22.6%). Additionally, 31 males (5.7%) and 57 females (10.5%) had a C-reactive protein level above 3 mg/L. Nevertheless, 105 males (19.3%) and 137 females (25.2%) exhibited values ranging from 1 mg/L to 3 mg/L. Among the 542 participants, 108 (19.9%) had a basophil level ranging from 0.5% to 1.0%. Out of these, 77 (14.2%) were females and 31 (05.5%) were males.

All of the first urine cultures that showed vulnerabilities were part of the inquiry. Models for future predictions were built using restricted logistic regression and other forms of statistical learning. After demographics and the comorbidity score, antibiotic allergies were among the last characteristics included in the model. This analysis confirmed that all of the models were well-calibrated. Using information from electronic health records, we were able to forecast how well antibiotics would treat UTIs in hospitalized patients. They were also successful in a group that was kept for a long time to test their models. Notifying the patient that they may be experiencing a potentially life-threatening condition is of the utmost importance when they notice the presence of pus or blood in their stools. imbalance, hearing loss, and GU symptoms such as elevated serum creatinine levels, proteinuria, oliguria, and urinary casts; elevated white blood cell (RBC) and red blood cell (RBC) counts in the patient's urine; and decreased or nonexistent hearing.

CONCLUSION

The diagnostic procedures assessed in the population included classical methods such as microscopy, immunoassays like ELISA and colorimetric assays, as well as advanced biotechnology approaches like genotyping. Research should investigate the utilisation of sophisticated nucleic acid-based technologies such as RT-qPCR, LAMP, and CRISPR for swift and precise pathogen identification. These techniques can markedly improve sensitivity and specificity in the diagnosis of diverse infections, encompassing viral and bacterial pathogens. Future research may explore the application of genomes, proteomics, and metabolomics to create complete diagnostic panels that identify pathogens and evaluate host responses to illnesses.

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