Case reports and case series versus modern evidence-based medicine: Merit for an individual patient and public health

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ABSTRACT

Abstract is not required for Editorial

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EDITORIAL

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Medicine is a science which is used by clinicians to heal patients. At the same time, the patients teach their doctors. Since directly contacting their patients, doctors may encounter with different unusual clinical presentations of common diseases or even common manifestations of rare diseases. These experiences have been expressed as case reports or case series as one of the teaching tools to assist young physicians and colleagues to apply the information for other patients who encounter with similar scenario. Today's practicing medicine requires evidence-based medicine to be cooperated into medical practices and the majority of the evidences are resulted from more complex research study designs including analytic and experimental studies. However, it is common that the original idea or motivation to conduct these types of research studies are based on case reports or case series. Some may believe in hierarchical value of evidence with the lowest one are case reports or case series. Several aspects of case reports or case series and evidence-based medicine are different, but the goal of these are to enhance medical knowledge and subsequently improve patient care. Therefore, case reports and case series remain contributing to medical knowledge and even originate new knowledge. This editorial aims to emphasize several important aspects of case reports and

case series from general sense for managing individual patient through their impacts on public health aspect.

Several scientific knowledge arise from observation of people and scientists. Sir Isaac Newton studied and worked on the theory of gravity from observing a fall of an apple [1]. Many invention came from inspiration. Wright brothers dreamed to fly after having a toy helicopter [2]. In addition, the previously unsuccessful experiments make scientists to further observe and research. Thomas Alva Edison who was not the first light bulb inventor, but was the first inventor of the light bulb, which can be used in a practical way, successfully invented a light bulb after several people failed to do so at that time [3].

Similar to any scientific fields, medical knowledge started from an observation from a single patient who has unusual presentations of common diseases or even usual presentations of uncommon conditions. Documentation and sharing experiences about the things that are still unclear lead the young generation to extend that knowledge to become more evidence and innovation.

Among non-experimental studies, case reports and case series are the most basic type of the study, but they are often the fundamental knowledge of all other types of non-experimental studies including case series, cross sectional, case-control, or cohort studies and experimental study like clinical trial [4] (Figure 1).

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Figure 1: Conceptual framework demonstrates the potential relationship and a 'cycle of medical knowledge' generating from observation, different processes of obtaining information, and the impact of different types of research study designs on an individual patient through public health.

Nowadays, medical knowledge progresses continuously and rapidly. Medical research from different study designs including case reports and case series can bring different values to medical fields in different ways. The goal of these studies is to discover and add on to new medical knowledge. However, there are some different aspects that unique for each study design (Table 1).

All clinicians and healthcare providers practice and learn from their patients. Most clinicians consult their colleagues or specialists whenever they encounter with unclear clinical situations in terms of clinical manifestations, diagnosis, interpretation of laboratory data or investigation, and management particularly in the setting of rare conditions or diseases as well as rare manifestations in common diseases. Nevertheless, uncertainties sometimes remain. Previously published clinical case reports or case series are therefore other resource that are helpful to assist in their clinical decision making.

Not only the benefit of case reports to help in the management for a single patient, they also potentially extend the benefit to societies at large or even to public health. The recent example that emphasizes this benefit

is Zika virus epidemic. A clinical case report [5, 6] can lead to subsequent analytic studies to characterize clinical manifestations, investigations, transmission, and complications of Zika virus infection in human and further studies during Zika virus outbreak [7–13] as well as discovery of management and prevention such as vaccine [14, 15].

Several values of case reports and case series are not only contributing to the field of medicine, but also impacting or changing regulation or even public health policy. Particularly, the initial step of analytic research for drug safety often starts with case reports or case series [16]. This can be demonstrated by one of the new field of public health, pharmacoepidemiology involving in drug utilization, effectiveness, and safety. With so many innovative drugs, biological, biosimilars, or medical devices undergoing accelerated approval process, uncertainties and uncovered information particularly adverse drug experiences (ADE) or unintended side effects may arise. For instance, a report of new or unusual ADE can guide drug consumers, providers, manufacturers, and governmental organizations responsible to the regulation of drug utilization, effectiveness, and safety like Food and Drug Administration (FDA) to be alerted. This subsequently leads to further investigation, conducting research to prove the causal inference of the ADE and drug utilization. Ultimately, the action of these research leads to new regulation and management of the drug utilization for the public [17–21].

Therefore, case report and case series are actually the origin of several observational and experimental studies and can expand observation from characteristics of a single or multiple cases to more complex studies and eventually evidence-based knowledge, which can be applied for patient care through public health. The experiences from this application can subsequently lead to further observation of unknown knowledge requiring additional processes of obtaining knowledge from self-study, consultation, or research. This becomes a “cycle of medical knowledge” as demonstrated in the Figure 1.

Although several merits of case reports and case series, some disadvantages may take into the consideration when utilizing the information from case reports or case series mainly due to limitation of making causal inferences from a small number of studied patients (Table 2).

CONCLUSION

From the past, nowadays, and in the future, case reports and case series tell us the stories and clinical entities of rare conditions or diseases or rare presentations of the common diseases. They are also the foundation of many descriptive as well as analytic studies and eventually experimental trials. Case reports and case series can not only be a way to help and communicate other physicians and healthcare providers about unusual aspect of individual case or a small group of patients, but

Table 1: Comparison between case-based studies and modern evidence-based medicine

	Case-based studies	Modern Evidence-based Medicine
Examples	- Case reports - Case series	Observational studies - Cross sectional study - Case-control study - Cohort study Experimental studies - Clinical trial
Background or motivation	Typical presentation of rare diseases/ conditions or uncommon presentations in common diseases/ conditions	Determine relationship or causal inference
Aim	Improve medical knowledge [18].	
Population	Single or several cases	Groups of patients
Level of evidence	Lower [4]	Higher [4]
Application to regulation and policy	May lead to prompt changing e.g. drug safety and withdrawal	Takes time to collect data and conduct studies
Medical education	Common presentation as clinical vignette for house staff and physicians in almost all levels of scientific meetings.	Evidence-based medicine
Consequences	Lesson for healthcare providers Available resource for consultation	Extend evidence to become more analytic and experimental studies.

Table 2: Common values of case reports or case series

	Main value	Comments	Examples
Values	Generating new hypothesis, knowledge and changing medical practices	History of medicine changing knowledge or medical practices	Alexander Fleming discovered penicillin [19].
	A tool to communicate among medical professionals	Published case report, case series, letter, or brief communication	
	Common way to teach medical trainees	Integration for teaching since pre-clinical years through all of medical professional careers as well as lesson to avoid repeated pitfalls	
	Promoting scholarly activity for medical trainees	Special case report sessions for trainees in several specialty medical scientific meetings	Case report section in medical journals
	Foundation of more complex medical research	A motivating factor to conduct further complex observational and experimental medical research to determine causal inferences	Zika epidemic [5, 6]
	Alternative way for experimental studies	Unethical to conduct randomized clinical trial Study of rare diseases or condition	Re-challenge criteria of causal inference which may be unethical for clinical trials [20].
	Public regulation	Initial trigger for drug utilization, effectiveness, and safety in pharmacoepidemiology	
Disadvantages	Unable to make causal inferences	Lack of quantitative data, epidemiologic and statistic methods	Not representative and generalizability
	Anecdotal fallacy [21]	Over interpretation and personal emotional aspect of the readers [4].	
	Biases	Subjective Incomplete information from a retrospective in nature	

also a foundation of idea and motivation in conducting. In addition, case reports and case series are also another method to formally inform involved and responsible stakeholders to further examine and again conduct further more complex research studies to determine causal inferences and this subsequently leads to further action and regulation to ultimately improve patient care. Therefore, case reports and case series should remain one of the efficient tools to inform and educate our colleagues, extend further medical knowledge for patient care, and potentially involve in public health.

Keywords: Case reports, Case series, Modern evidence-based medicine, Pharmacoepidemiology, Public health

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Ekamol Tantisattamo – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor

The corresponding author is the guarantor of submission.

Conflict of Interest

Authors declare no conflict of interest.

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