Building an effective infection prevention and control system in Japan: a historical review

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Contents

Foreword

In May 2022, the World Health Assembly adopted the *Global strategy on infection prevention and control*, harnessing heightened global awareness and investments made during the COVID-19 pandemic to address an ever-present public health issue.

Infection prevention and control (IPC) is essential to ensure the safety and well-being of patients and health-care workers. A practical, evidence-based approach, IPC must be comprehensively integrated into health systems with sustainable resources and high-level commitment to be effective. At present, however, degrees of integration vary widely between countries in the Western Pacific Region.

In addition to concerns for patient and health worker, and safety and wellness, effective IPC systems help fight global threats to public health – ranging from the current war on antimicrobial resistance to infectious diseases that could cause the next pandemic.

This report provides a historical review of how Japan established its IPC system, including what helped and hindered the process and how IPC was integrated into the overall health system.

The findings may prove useful for other countries at various stages of embedding IPC into health systems. The Japanese experience has identified, for example, the importance of timing actions based on the needs and developmental status of societies.

IPC also plays a key role in the Region's shared vision for the work of WHO, Member States and partners to improve health in the Western Pacific Region: *For the Future: Towards the Healthiest and Safest Region.* Adopted by Member States in 2019, *For the Future* stresses the use of systemic approaches to sustainably address the Region's most pressing health challenges.

We look forward to continued collaboration with Member States to craft tailored approaches that strengthen health systems and ensure IPC is in place at every step in the delivery of health-care services to the people of the Western Pacific Region.

Mr Martin Taylor

Director
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Abbreviations

AMR	antimicrobial resistance
CDPA	Communicable Disease Prevention Act
CN	certified nurse
CNS	certified nurse specialist
COVID-19	coronavirus disease 2019
EBS	event-based surveillance
FETP	Field Epidemiology Training Program
HAI	health-care-associated infection
ICD	infection control doctor
ICN	infection control nurse
ICT	infection control team
IDCL	Infectious Diseases Control Law
IDSC	Infectious Disease Surveillance Center
IHR	International Health Regulations
IPC	infection prevention and control
JANIS	Japan Nosocomial Infections Surveillance
JES	Japan-EPINet™ Surveillance
JHAIS-SSI	Japanese Healthcare-Associated Infections Surveillance – Surgical Site Infection
JNA	Japanese Nursing Association
JSIPC	Japanese Society for Infection Prevention and Control
J-SIPHE	Japan Surveillance for Infection Prevention and Healthcare Epidemiology
JVARM	Japanese Veterinary Antimicrobial Resistance Monitoring System
KIDSS	Kawasaki Infectious Disease Surveillance System
LMICs	low- and middle-income countries
LTCF	long-term care facility
MHLW	Ministry of Health, Labour and Welfare
MRSA	methicillin-resistant *Staphylococcus aureus*
NESID	National Epidemiological Surveillance of Infectious Diseases
NIID	National Institute of Infectious Diseases
WHO	World Health Organization

Executive summary

This report provides a historical review of how Japan established its infection prevention and control (IPC) system, including what helped and hindered the process, and how the IPC system became well rooted in the health system. The history of the IPC system can be divided into three periods: the pioneering period (before 1990), the development period (1990–2010) and the present (after 2010).

Modern infection countermeasures in Japan started with the enactment of the Communicable Disease Prevention Act in 1897. However, it was some time before infectious disease prevention became a central issue with the rapid adoption of epidemiology after the Second World War. In 1981, the Ministry of Health, Labour and Welfare (MHLW) started pathogen surveillance of infectious diseases nationwide. At that time, public concern over the emergence and re-emergence of infectious diseases was growing, and strains of bacteria resistant to antibiotics were starting to become a problem in Japan. An academic society, the Japanese Society for Infection Prevention and Control (JSIPC), was established in 1986 to address these issues.

Over the following two decades (1990–2010), IPC systems were established and developed in Japan. In 1996, the MHLW began providing health-care reimbursements for nosocomial infection control. This financial incentive, through the addition and deduction of health-care reimbursements, accelerated the implementation of IPC in the health-care field. Multidisciplinary certification schemes for infection control were launched to train specialists such as infection control doctors and nurses. The new Infectious Diseases Control Law, which came into force in 1999, included pathogen surveillance as an infectious disease control measure. Various surveillance systems for IPC were also launched and adopted during this period.

The 2010s were a period of maturation. IPC systems, which had made significant progress in the previous decades, continued to develop and improve. The driver of improvement was the financial incentives provided through health-care reimbursements. Changes in the reimbursement scheme promoted the deployment of infection control personnel, collaboration between teams, and accelerated inter-facility and inter-community cooperation. The international response to infectious disease control has also advanced. Surveillance and reporting systems are now being developed for collaboration with the international community. To fully realize a robust IPC system in Japan, additional policies are needed to promote IPC in long-term care facilities (LTCFs) and home nursing care settings, which are becoming more prevalent with the ageing of society, and the surveillance system must be utilized further.

This review of the history of the IPC system in Japan suggests (1) the importance of identifying appropriate steps based on different time frames needed to respond to the demands of the health-care field and society, and (2) the need for human resource development in the short term, stakeholder collaboration in the medium term, and system infrastructure development in the long term.

Accordingly, laws and regulations on IPC should be regularly reviewed and updated to ensure alignment with global standards. Also, it must be reiterated that the financial incentives provided by the health-care reimbursement scheme based on political commitments and legal foundations helped to accelerate the development of IPC in Japan. Therefore, it is important that low- and middle-income countries (LMICs) develop their own plans for IPC systems based on appropriate timelines. Throughout the process, it is important to clarify which organizations and which departments are responsible for each task. Furthermore, it is recommended to allocate limited budgets effectively with strategic foresight to foster an IPC system appropriate for the needs of each country. The coronavirus disease 2019 (COVID-19) pandemic has raised public awareness of the need to reconsider the relevant IPC systems, laws and regulations in LMICs. Hence, now may be the right time to consider building IPC systems that are more robust.

Background

Despite years of training, surveys and assessments conducted with the aim of improving infection prevention and control (IPC) in countries in the Western Pacific Region, the coronavirus disease 2019 (COVID-19) pandemic has exposed systemic weaknesses in our preparedness to minimize infectious disease transmission within the health sector and beyond.

Lapses in IPC during the COVID-19 pandemic have resulted in hundreds of thousands of preventable infections and economic losses of US$ 8.8 trillion, according to the latest estimate (Park et al., 2020). The pandemic has raised the profile of public health across virtually every sector and presents a fleeting once-in-a-lifetime opportunity to sustainably elevate IPC to its deserved position in society. Guided by the *Asia Pacific Strategy for Emerging Diseases and Public Health Emergencies* (APSED III), the World Health Organization (WHO) aims to support countries in the Western Pacific Region in using pandemic preparedness as a driver for strengthening critical systems; IPC has been endorsed as an essential tool for achieving this goal. It is particularly important to analyse country models where IPC has been successfully established and maintained, to identify system levers and pitfalls through a historical review, and to support WHO's efforts within the Western Pacific Region.

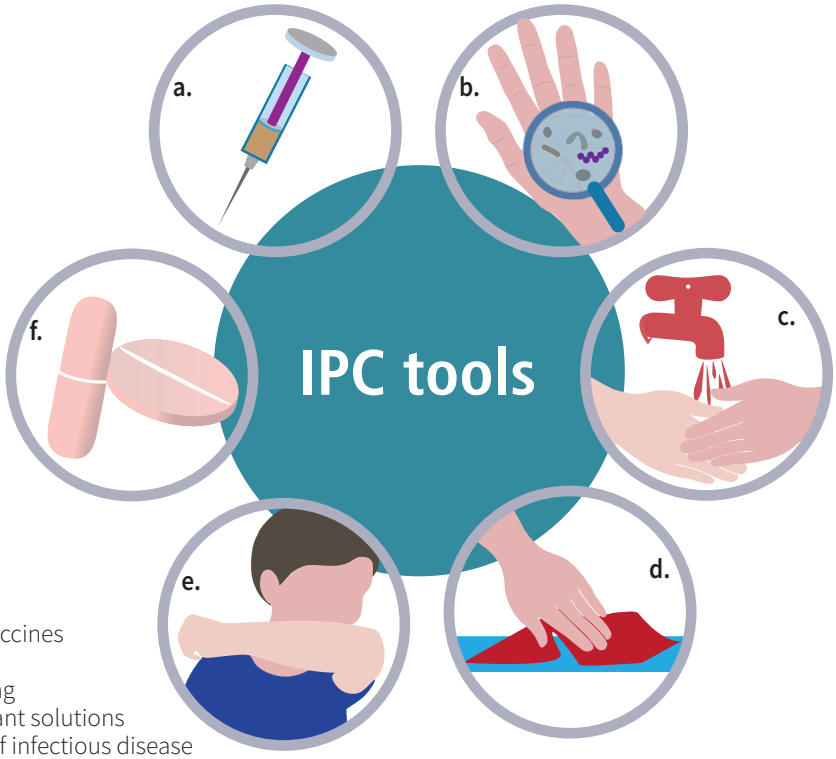
This report aims to provide a historical review of how Japan established its IPC, what helped and hindered the process, and how the IPC system became well rooted in the health system.

1. Introduction

Although Japan's IPC system complies with the International Health Regulations (IHR) and was highly praised by a joint external evaluation of IHR capacities (World Health Organization, 2018), the foundations of today's IPC system were laid over the course of 30 years. Even though its beginnings lagged behind those of Europe and the United States of America, Japan's IPC system is one of the most advanced in the world today.

The history of Japan's IPC system can be divided into three main periods: the pioneering period (before 1990), the development period (1990–2010) and the present (after 2010). To respond to the growing need for an IPC system, policies such as health-care reimbursement and related legislation, as well as stakeholder collaboration, capacity-building and information systems, have been developed step-by-step in each of these periods (*see* Fig. 1 and Table 1 for a historical overview and the details of reimbursement, respectively). This report contains chapters dedicated to each of these three periods and describes the background and factors that contributed to today's IPC system.

Illustration showing some tools used to improve infection prevention and control.



a. provide influenza vaccines
b. survey pathogens
c. enforce handwashing
d. clean with disinfectant solutions
e. prevent spreading of infectious disease
f. proper use of antibiotics

FIG. 1 History of the IPC system in Japan

	BEFORE 1990	1990–2010	2010–PRESENT
	Pioneering period	**Development period**	**Current situation**
Policy and regulations	« Communicable Disease Prevention Act (1897) « Institutionalization of Health Center (1930s) « Public Health Center Act enacted (1937) « Total revision (1947)	« Policies to prevent infection led by MHLW Notification « Enactment of the Infectious Disease Control law (1999) *Policy guidance based on medical remuneration (refer to Table 1 for details)*	« National Action Plan on AMR (2016)
Human resource development and multidisciplinary cooperation		« Nosocomial infection control seminar (1993) « Certification system for infectious disease specialists (1995) « ICD system council established (1999) « FETP-J (1999) « CNIC course (2000) « Certification of ICD/ICN (2006)	
Information management	« Enforcement of pathogen surveillance (started in 1981) « Expansion of target diseases and introduction of computers (1987)	« Establishment of Infectious Disease Surveillance Center (1977) « Japanese version of EPINet and EPIsys (1999), JHAIS-SSI (1999), JANIS (2000), NESID (2006)	« J-SIPHE (2019)
Stakeholder collaboration	« Higashi-Hachiman-daira Symposium (1983) « Preparatory Committee (1985) and Japanese Society for Infection Prevention and Control (1986)	« Joint surveillance by Japan Society of Chemotherapy, Japanese Association for Infectious Diseases, and Japanese Society of Clinical Microbiology (2009)	
Major outbreaks in Japan	**1980s** « Social concern about MRSA « HIV/AIDS and hepatitis as social problems	**1990s–2000s** « O-157 group infection « Outbreak of MDRP and MDRA	
What happened in the world	« Establishment of academic societies for hospital infections (HIS in UK and SEHA in USA, 1980)	« Development of the standard precaution (1996) « Revision of IHR (2005)	« Adoption of Global Action Plan on AMR (2015)

AMR, antimicrobial resistance; **HIS,** Healthcare Infection Society; **FETP-J,** Field Epidemiology Training Program Japan; **CNIC,** certified nurses in infection control **ICD,** infection control doctor; **ICN,** infection control nurse; **IHR,** International Health Regulations; **JANIS,** Japan Nosocomial Infections Surveillance; **JHAIS-SSI,** Japanese Healthcare-Associated Infections Surveillance – Surgical Site Infection; **J-SIPHE,** Japan Surveillance for Infection Prevention and Healthcare Epidemiology System; **MDRA,** multidrug-resistant *Acinetobacter;* **MDRP,** multidrug-resistant *Pseudomonas aeruginosa;* **MHLW,** Ministry of Health, Labour and Welfare; **MRSA,** methicillin-resistant *Staphylococcus aureus;* **NESID,** National Epidemiological Surveillance of Infectious Diseases; **SEHA,** Society of Hospital Epidemiologists; **UK,** United Kingdom of Great Britain and Northern Ireland; **USA,** United States of America.

Source: Compiled by the author.

TABLE 1. List of health-care reimbursement changes related to IPC

Year of change	Addition/deduction of reimbursement	Points for remuneration*	Requirements for calculation	Remarks
1996	Addition	5 points/day	● The MRSA Nosocomial Infection Control Committee, composed of the heads of each department, meets monthly. ● Infection information reports are prepared about once a week and fully utilized. ● An alcohol-based hand rub dispenser is installed in each hospital room.	● The first expenses for infection control in the health-care reimbursement system
2000	Deduction	– 5 points for non-implementation	● Non-implementation of the nosocomial IPC measures described in the 1996 requirements for additional reimbursement.	● Shift to the idea that nosocomial infection prevention measures should be implemented at all health-care facilities (deduction as a penalty for non-implementation)
2006	Addition	50 points on the first day of hospitalization (only for the facility standards for medical safety premiums)	● Standards for inpatient treatment plans, nosocomial IPC measures, medical safety management systems and pressure ulcer measures. » Standards for nosocomial IPC measures: 1. Nosocomial IPC measures shall be implemented at relevant health-care facilities. 2. Nosocomial infection control committees shall be established at the health-care facilities concerned, and these committees shall meet monthly. 3. The committee for Preventive Measures against Nosocomial Infections shall consist of staff members, such as the hospital director or the director of the clinic, the director of the nursing department, the manager of the pharmaceutical department, the manager of the laboratory department, the manager of the administrative department, and physicians with considerable experience in carrying out measures against infectious diseases (in clinics, the person may also serve concurrently as the manager of each department). 4. An infection information report, which describes the status of microbiological examinations in each ward within the relevant insured medical institution, shall be prepared weekly, and a system shall be established by which the committee for Preventive Measures against Nosocomial Infections can fully utilize the report. The purpose of this report is to characterize the status of the detection of various bacteria and the patterns of drug susceptibility results in hospitalized patients as epidemiological information in hospitals and clinics with beds so that this information can be utilized to implement IPC measures, and it does not include the detection status of various bacteria from wipes from each ward.	

2006 *(cont'd)*			5. As a measure to prevent nosocomial infection, enforce handwashing by staff by installing disinfectant solutions such as tap water and alcohol-based hand rub dispensers in each hospital room. Portable quick-drying disinfectants may be used in mental wards, paediatric wards, and so on when the use of standard disinfectant solutions is judged inappropriate due to the characteristics of the patient. ● Facility standards for medical safety premiums: » Assign a full-time nosocomial infection control manager (criteria not specified; physician, nurse, pharmacist, clinical laboratory technician, etc.).	
2010	Addition	100 points on the first day of hospitalization	● Facility standards for additional IPC measures: 1. Reports pertaining to Medical Safety Measures Addition 1 must be made. 2. Establish an IPC division (the Medical Safety Management Division may act as the IPC division). 3. Organize infection control teams (ICTs) composed of the following members (within the division listed in 2) to perform daily duties for infection prevention: a. a full-time physician with at least 3 years of experience in infectious disease control; b. a full-time nurse who has been involved in infection control for 5 years or more and has completed appropriate training in infection control. Here, training refers to that which falls under the following items: i. a training programme sponsored by the national Government and medical-related organizations (minimum training period of 6 months with a certificate of completion); ii. training of nurses with specialized knowledge and skills for infection control; and iii. lectures and exercises that include the following content: — IPC systems — health-care-associated infection surveillance — infection control technology — occupational infection control — infection control guidance — infection control consultation — cleaning, disinfection, sterilization, facility management; c. a full-time pharmacist involved in IPC measures with at least 3 years of experience working in health-care facilities; and d. a full-time clinical laboratory technician with at least 3 years of experience working in health-care facilities.	

Year of change	Addition/deduction of reimbursement	Points for remuneration*	Requirements for calculation	Remarks
2010 *(cont'd)*			One of the physicians specified in a) or one of the nurses specified in b) shall be full-time. One person specified in a) to d) shall be assigned as a hospital infection control manager within the relevant insurance health-care facility. 4. Guidelines for infection control measures and specific work content of the hospital infection control manager or team shall be established. 5. Based on the latest evidence, the following procedures (manuals) shall be prepared and distributed to each department based on ICT: standard precautions, transmission-based precautions, occupational transmission precautions, infection control by disease, cleaning, disinfection, and sterilization, and proper use of antibiotics. In addition, the procedure manual shall be periodically revised by incorporating new knowledge. 6. Regular training on nosocomial infection control shall be provided at least twice a year by the ICT. 7. A system should be established to monitor the proper use of antibiotics in the hospital. In particular, a reporting system or a permit system should be established for specific antibiotics (broad-spectrum antibiotics, anti-MRSA drugs, etc.). 8. Participation in regional and national surveillance is desirable.	
2012	Addition	400 points on the first day of hospitalization	❶ Additional reimbursements for infection prevention 1**: 1. A full-time nosocomial infection control manager is assigned, and an IPC department is established. 2. Establish an ICT consisting of the following personnel to carry out daily IPC activities: a. a full-time physician with at least 3 years of experience in infectious disease control; b. a full-time nurse with at least 5 years of experience in infectious disease control who has completed appropriate training in infection control; c. a full-time pharmacist specializing in infection control who has at least 3 years of experience working at a hospital; and d. a full-time clinical laboratory technician with at least 3 years of experience at a hospital. 3. Health-care facilities that calculate additional reimbursements for infection prevention 1 should hold a joint conference with health-care facilities that calculate additional reimbursements for infection prevention 2 at least four times a year.	It was difficult for relatively small health-care facilities to have their personnel participate in the required training programmes. Infection prevention measures #1 and #2 were separated to avoid widening the disparities between large and small health-care facilities, as well as to provide easier qualifications for smaller facilities. These requirements are designed to strengthen the network between large hospitals and small health-care facilities, enabling them to learn from each other.

2012 *(cont'd)*		100 points on the first day of hospitalization	● Additional reimbursements for infection prevention 2**: 1. Applies to health-care facilities with fewer than 300 beds as standard. 2. Organize an ICT and carry out daily duties for infection prevention. Members of the ICT are not required to complete the nurse training specified in 2b in the requirements for the additional reimbursements for infection prevention 1 above. 3. Participate in a joint conference hosted by a health-care facility that calculates additional reimbursements for infection prevention 1 at least four times a year.	
		100 points on the first day of hospitalization	● Additional reimbursements for community cooperation on IPC measures: » Additional reimbursements for infection prevention 1 shall be calculated. » Health-care facilities that calculate additional reimbursements for infection prevention 1 must cooperate with each other and visit each other's health-care facilities at least once a year to evaluate each other's infection control measures.	
2014	Not changed		● Participation in a national or regional surveillance system such as JANIS is required for health-care facilities that calculate additional reimbursements for infection prevention 1.	

* Points for remuneration fees are used to calculate reimbursements. If health-care facilities satisfy the requirements for calculation, they can claim and be reimbursed for specific fees for specific services or materials; 1 point equals ¥10. Points for services and materials are determined by the Ministry of Health, Labour and Welfare based on discussions held by the Central Social Insurance Medical Council every two years.

** Additional reimbursements for infection prevention refers to the implementation of infection control measures at medical institutions by setting up infection control teams within hospitals to monitor the status of nosocomial infections, ensure proper use of antimicrobial agents, and prevent infection among staff, as well as to strengthen the network between large hospitals and small health-care facilities, enabling them to learn from each other.

Source: Suzuki & Kobayashi (2015), arranged and translated by the author.

2. Pioneering period *(before 1990)*

Summary

This chapter describes how the IPC system in Japan started and what the health-care infrastructure was like before the pioneering period.

The Communicable Disease Prevention Act (discussed in section 2.1.1) was enacted in 1897, during the period at the end of the 19th century when Western medicine was introduced to Japan. The Act focused on preventing the spread of infectious diseases among the population and was in effect for just over 100 years. After the Second World War, Japan underwent a rapid epidemiological transition, shifting from a focus on infectious and deficiency diseases to chronic noncommunicable diseases. During this transition period, infectious disease prevention was not a central issue in the health-care system and in the clinical setting. Meanwhile, efforts were made to improve living conditions and the infrastructure of public health, more health-care facilities were built, and the supply of medical products was increased. In 1937, the Public Health Center Act was passed to strengthen sanitary administration through the national and prefectural governments (refer to section 2.1.2).

In 1981, the Ministry of Health, Labour and Welfare (MHLW) began nationwide epidemiological surveillance of infectious diseases. In 1987, computers were introduced, and the surveillance system increased its coverage from 18 to 27 diseases (refer to section 2.1.3).

Although little emphasis was initially placed on infectious disease prevention, public concern about infections grew after the emergence and re-emergence of infectious diseases was recognized as a new threat. In addition, strains of bacteria resistant to antibiotics, including methicillin-resistant *Staphylococcus aureus* (MRSA), started to become a major issue in Japan (refer to section 2.2).

The Japanese Society for Infection Prevention and Control (JSIPC) was founded in 1986 with the aim of applying knowledge gained from infectious disease programmes in Europe and the United States to public health policy in Japan. The mission of the society was to hold discussions on infectious diseases in modern society that involved a wide range of stakeholders, thereby increasing awareness of infections related to the living environment, providing a basis for the adoption of Western countermeasures against infectious diseases, and enhancing the skills of doctors, nurses and other health-care professionals (refer to section 2.3).

2.1 Earlier laws and rules related to infectious diseases and public health

2.1.1 Communicable Disease Prevention Act (1897)

Sanitary administration in Japan began to take off in 1868 when the Government announced the adoption of Western medicine. In 1874, Japan's first modern medical and hygiene regulations were enacted, setting out various provisions relating to the medical system and hygiene administration. During this period, Japan's active contact with other countries resulted in an influx of infectious diseases, including cholera and smallpox. In addition, poor urban sanitation led to frequent epidemics, and the focus of sanitary administration at this time was on fighting acute infectious diseases. In 1897, the Communicable Disease Prevention Act (CDPA) was enacted as a measure to prevent the spread of infectious diseases. The CDPA was the first modern law on infectious diseases in Japan. The CDPA covered eight infectious diseases – cholera, diphtheria, dysentery, scarlet fever, smallpox, typhoid, typhus, and the plague – and allowed for the designation of other contagious diseases as necessary (Medical Affairs Bureau, Ministry of Health, 1976). This Act remained in effect for just over a century, when it was replaced with the Infectious Diseases Control Law (IDCL) in 1999 (refer to section 3.3 for the details of IDCL).

2.1.2 Institutionalization of the public health centre and its related act

In 1937, the Public Health Center Act was enacted with the aim of establishing health centres across the country to provide public health guidance, particularly in rural areas. In 1947, after the Second World War, the Public Health Center Act was revised and public health centres were required to carry out infectious disease prevention and control measures that were previously covered by policies before the start of the Second World War. During the 1940s, public health centres performed IPC activities as their main duty because tuberculosis and other infectious diseases were widespread due to the poor state of public health (Medical Affairs Bureau, Ministry of Health, 1976).

2.1.3 Enforcement of pathogen surveillance

National surveillance of infectious diseases started in July 1981 as a government-funded project. Surveillance data were used to generate two reports, one on the pathogens (laboratory-based surveillance) and another on the infectious disease patient.

At this time, infectious diseases, which were previously associated with high incidence and mortality, markedly decreased thanks to improvements in living standards, hygiene and vaccination rates. However, it became necessary to deal with infectious diseases that had relatively mild symptoms and rarely caused serious complications or sequelae but sometimes caused large epidemics. At the same time, infectious diseases that were not seen in the past began to spread due to the emergence of new pathogenic microorganisms,

a change in the susceptibility of people to infectious diseases, and an increase in opportunities for infection resulting from larger class sizes in nurseries and schools, shorter commutes and increased food imports (Horita, 1982).

The abovementioned surveillance was launched by the National Institute of Health (later renamed the National Institute of Infectious Diseases) in response to these changes. The Institute's mission was to prevent or reduce the scale of infectious disease epidemics by collecting information on the occurrence of 18 diseases beyond those mentioned in the CDPA. These diseases were becoming increasingly prevalent among infants and schoolchildren in certain areas throughout the country, as documented in weekly nationwide reports. An outbreak of *Clostridium botulinum* intoxication, which was caused by fried mustard-stuffed lotus roots that were sold in vacuum packs in 1984, necessitated the prompt exchange of pathogen information (National Institute of Infectious Diseases, 2010). In 1987, the target diseases were expanded from 18 to 27, and a patient reporting system was added to the online system. The National Institute of Health consolidated information from local public health centres, which collected epidemiological data from local health-care facilities. The information enabled residents to receive early and appropriate diagnosis and treatment and to take preventive measures such as lifestyle management for children (Horita, 1982). Prior to this, the Hygiene and Microbiological Technology Council was established in 1980 to establish a network for the control of infectious diseases.

2.2 Nosocomial infections

Although MRSA was already an issue in Europe and the United States in the 1970s, it was not until the 1980s that the isolation rate of MRSA increased in Japan (Suzuki & Kobayashi, 2015; Okubo, 2016). Accordingly, the importance of infection control was gradually recognized by health-care professionals. At that time, nosocomial infection control was neglected in clinical practice, and the necessary procedures were not followed. This led to MRSA outbreaks and deaths in the 1980s. In one MRSA outbreak in a 275-bed hospital in 1990–1991, MRSA was detected in 109 inpatients over a six-month period, and 80 of these patients died. It was thought that MRSA was the primary cause of death in more than a dozen of these patients. In this case, appropriate measures were not taken. For example, patients with and without MRSA were kept in the same room, and unnecessary antibiotics were administered for a long time (The Asahi Shimbun, 1992a, 1992b).

2.3 Establishment of the Japanese Society for Infection Prevention and Control

As mentioned in the previous section, the importance of nosocomial infection control was increasingly recognized in Japan in the 1980s. The Higashi Hachimantaira Symposium was held in 1983 to host a study group with the aim of spurring infection control in Japan. In his speech at the symposium, Dr Hiroyoshi Kobayashi remarked that experts in Europe and the United States had urged him to establish an organization or an association of Japanese societies, such as the Hospital Infection Society in the United Kingdom of Great Britain and Northern Ireland or the Society of Hospital Epidemiologists in the United States (Suzuki, 2015). The symposium was semi-closed with a limited number of participants, including pharmacists, nurses, laboratory technicians and administrators who discussed issues such as nosocomial infections, immunocompromised hosts, and prevention and control measures.

Finally, the Preparatory Committee was established in 1985, and the Japanese Society for Environmental Infection was founded in 1986 with 231 members. The Society later changed its name to the Japanese Society for Infection Prevention and Control in 2013. Since its establishment, the JSIPC has been open to doctors, pharmacists, nurses, clinical laboratory technicians and hospital administrators who are interested in promoting IPC throughout Japan. The Society has made substantial contributions to the development of IPC systems in Japan. The people involved in the establishment of the JSIPC petitioned the MHLW and the Japan Medical Association to obtain the first additional reimbursement for hospital infection control, which was approved as part of the medical fee revision in 1996 (Matsumoto, 2017).

3. Development period *(1990–2010)*

Summary

The two decades spanning 1990–2010 were a period of development for IPC systems in Japan, and significant milestones were reached in terms of policy, capacity development and information management.

The situation and the necessity for nosocomial infection control measures revealed in the previous decade were recognized by the Government. In addition, the need to respond to emerging and re-emerging infectious diseases became apparent from the perspective of public health. The MHLW issued a report on nosocomial infection, revised the Medical Care Act and provided financial incentives as well as the first medical reimbursement for nosocomial infection control in 1996, which benefits hospital management. These political measures led to the rapid implementation of infection control in health-care facilities across Japan (refer to sections 3.1, 3.3 and 3.4).

At the same time, efforts were made to develop the capacity of the workforce. Multidisciplinary certification schemes for infection control doctors (ICDs) and infection control nurses (ICNs) were launched. The standardized approach to IPC employed in Europe and the United States began to be applied in Japan (refer to section 3.2).

In addition, an information management infrastructure was established and refined. The pathogen surveillance that had been conducted since 1981 was repositioned as an IPC measure in accordance with the Infectious Diseases Control Law of 1999. The MHLW organized the Japan Nosocomial Infections Surveillance (JANIS) in 2000, with the aim of providing basic information on the incidence and prevalence of nosocomial infections and antimicrobial-resistant bacteria. Other surveillance platform systems related to health-care-associated infection (HAI), such as Japan-EPINet™ Surveillance (JES) and the Japanese Healthcare-Associated Infections Surveillance – Surgical Site Infection (JHAIS-SSI), were established during this period (refer to section 3.5 and Table 2).

3.1 Infection prevention and control and health-care reimbursement

Given that the health-care system in Japan is centrally controlled by the MHLW in terms of health-care financing and price-setting, the biannual revision of reimbursement and price-setting is used to promote specific health-care initiatives through financial incentives. In 1996, additional reimbursements for implementing preventive measures related to nosocomial infection were introduced as the first IPC-related remuneration in Japan. Although this additional reimbursement targeted only MRSA, it had the effect of driving the implementation of IPC in health-care facilities. Since then, financial incentives as additions and deductions of reimbursements have continued to promote IPC in health-care facilities throughout Japan.

3.2 Capacity development

IPC-related capacity development was active from 1990 to 2010 and included IPC-related certification systems and a range of IPC-related training and educational programmes. These systems for capacity development produced well-trained and competent infectious disease experts. At the same time, guidelines were issued based on those in Europe and the United States, which were already ahead of the rest of the world in the IPC field, and thus a standardized approach could be implemented in the field by these trained and certified health workers.

3.2.1 Establishment of the infection control doctor system

The Infection Control Doctor Council was launched through a joint initiative of six societies in 1999. The purpose of the Council is (1) to train and certify qualified ICDs who understand the roles of the various professions involved in IPC in hospitals and (2) to certify their level of competence.

The roles and duties of ICDs, as stipulated by the Infection Control Doctor Council (1999), are as follows:

» investigating actual conditions of hospital infection (surveillance);
» planning and implementing hospital infection control measures;
» evaluating and reviewing countermeasures;
» educating other health-care professionals;
» responding to HAI outbreaks; and
» responding to occurrences of infectious diseases.

The Council grants ICD accreditation not only to physicians but also to other medical professionals in order to develop and secure a wide range of human resources to act against nosocomial infections. To be certified as an ICD, the Council requires applicants to satisfy the following three conditions: (1) applicants must be a member of one of the societies that compose the Council; (2) applicants must have been a physician or a PhD for at least five years, have a record of activities related to hospital infection control (infection control committee memberships, attendance at seminars, publication of papers), and provide a recommendation from the head of an affiliated institution; and (3) applicants must have a recommendation from an affiliated academic society. The certification must be renewed every five years. The requirement for renewal is based on the number of points obtained for achievements and participation in seminars and academic conferences; therefore, the system allows applicants to renew their certificate only after they demonstrate active efforts to improve their qualifications. Today, 27 societies are affiliated with the Council (Infection Control Doctor Council, 2021).

3.2.2 Certified nurses and certified nurse specialists in infection control nursing

In Japan, the qualification of nurses is stipulated by law, whereas specialized nurses are certified by the Japanese Nursing Association (JNA). The JNA has three types of credentialing systems, namely certified nurse (CN), certified nurse specialist (CNS) and certified nurse administrator. There are CN and CNS certifications in the field of infection control.

The CNS certification is for nurses with a master's degree. CNSs are required to have specific advanced nursing knowledge and skills. In contrast, the CN certification is granted to nurses who pass the JNA exam after completing the requisite six-month educational programme (600–800 hours, depending on the curriculum). Applicants must have six years of work experience after obtaining their nursing licence. The role of a CN is to practise nursing at a high level and to educate and consult with other nurses. Both the CN and CNS certifications must be renewed every five years.

The CN in infection control certification was launched in 2001. Nurses with this certification (namely infection control nurse, or ICN) are required to implement HAI surveillance, perform assessments and develop IPC systems for each facility. As of January 2020, there were 2852 ICNs in Japan, the highest number among the 20 nursing credentialing fields. The CNS in infection control certification started in 2006 to provide a high standard for the nursing care of patients with infectious diseases. Nurses with this certification are required to participate in the prevention of infections among individuals and groups in facilities and in the community, and to take appropriate measures in the event of an outbreak (Annex: Standard curriculum for the education of certified nurses). As of January 2020, there are 77 nurses with this certification (Japanese Nursing Association, 2021).

Although nurses must have completed more than six months of training to satisfy the health-care reimbursement requirement (additional reimbursement 2010, 2012), there is no stipulated training time for doctors, pharmacists and clinical technologists (see Table 1 for the requirements for each profession).

3.2.3 Certification system for infectious disease specialists

A certification system for infectious disease specialists (formerly referred to as infectious disease doctors) was launched in 1995 by the Japanese Association for Infectious Diseases. The scope of the system is to certify and train physicians with excellent knowledge and practice in the field of infectious diseases. IPC-related knowledge and skills are not necessarily required for this certification. As of February 2021, there were 1630 doctors with this certification in Japan (Japanese Association for Infectious Diseases, 2021).

3.2.4 Establishment of the Field Epidemiology Training Program

In 1999, the National Institute of Infectious Diseases launched the Field Epidemiology Training Program (FETP), a two-year practical training course for epidemiologists, which was established with technical support from the United States Centers for Disease Control and Prevention, based on its post-doctoral training programme, the Epidemic Intelligence Service. The establishment of the FETP was a direct response to the need of prefectures to implement IPC measures in accordance with the Infectious Diseases Control Law (IDCL).

The aim of the FETP is to train core field epidemiologists who can rapidly detect and respond to infectious disease crises as well as to establish a nationwide network of such epidemiologists. As of March 2019, there were 77 FETP epidemiologists working at designated medical institutions for infectious disease in 19 of Japan's 47 prefectures, contributing to local infectious disease control (National Institute of Infectious Diseases, 2019). The FETP promotes a career path for clinician trainees into the field of public health, including in local governments where they can contribute to building crisis management systems (National Institute of Infectious Diseases, 2020).

3.3 Enactment of the Infectious Diseases Control Law

For nearly 100 years after the enactment of the Communicable Disease Prevention Act (CDPA) in 1897, infectious disease control in Japan focused on preventing the spread of infectious diseases among the population. Because individual-level prevention and treatment of many infectious diseases was available and because the global situation surrounding infectious diseases had changed, a new basic law for the control of infectious diseases was enacted to replace the CDPA in 1997.

The IDCL (official name: Act on the Prevention of Infectious Diseases and Medical Care for Patients with Infectious Diseases) stipulated that the national and local governments, along with other relevant organizations, should work together to take measures aimed at preventing the outbreak and spread of infectious diseases, with the national Government being required to improve the surveillance of infectious disease outbreaks and provide the public and medical professionals with the information necessary for the prevention of

infectious diseases. Moreover, to focus on the prevention and treatment of infection at the individual level and to respect the human rights of each patient, the law stipulated that infectious diseases should be classified according to their infectivity and the severity of their symptoms, and that all necessary measures be taken.

With the enactment of the IDCL, the national pathogen surveillance, which had been conducted since 1981 (refer to section 2.1.3 for details), was changed in accordance with the new law. The management of the surveillance programme was transferred to the Infectious Disease Surveillance Center (IDSC), which was established at the National Institute of Infectious Diseases (NIID) in 1997 in order to confirm the detection and characteristics of prevalent pathogens and plan appropriate countermeasures against infectious diseases.

3.4 Responses to infection control by the Ministry of Health, Labour and Welfare

At the beginning of the 1990s, the MHLW responded to the growing need for nosocomial infection control in health-care settings by issuing ministerial reports and organizing liaison meetings and councils, as follows:

» a notification entitled “Prevention of Nosocomial Infection in Healthcare Facilities” (1991);
» a liaison conference of sections related to infection control in facilities entitled “Comprehensive Measures for Infection Control in Facilities” (1993);
» an Expert Committee on Nosocomial Infection Control report entitled “Future Nosocomial Infection Control” (2003);
» a notification entitled “Prevention of Nosocomial Infection in Healthcare Facilities” (2005); and
» the Central Conference on Nosocomial Infection Control (held 12 times from 2005 to 2015).

In April 2007, the revised Medical Service Act came into effect. Safety management, including HAI, which was previously mandatory only for hospitals and clinics with beds, became mandatory for other types of health-care facilities, such as hospitals, clinics and midwifery centres, either with or without beds. This Act mandated the implementation of operational safety measures against HAI, including IPC guidelines, IPC training and disease reporting.

The MHLW has held the Nosocomial Infection Seminar every year since 1993. The purpose of the seminar is to provide health workers with appropriate knowledge based on the latest scientific findings with the aim of promoting IPC in the country. Although initially for doctors and nurses, since 1999, the seminar has also targeted pharmacists and clinical laboratory technicians (Suzuki & Kobayashi, 2015).

3.5 Enhancement of information infrastructure related to surveillance

For an effective IPC system to be realized, surveillance must be implemented to assess the burden of HAI at each facility and to prioritize the necessary actions that can be taken with limited resources. In Japan, several surveillance systems can be used as databases for HAI. During the developing period of the IPC system in 1990–2010, major HAI surveillance systems, as well as the National Epidemiological Surveillance of Infectious Diseases (NESID) system, were launched (refer to Table 2 for an overview of each surveillance system). These systems are currently independent; that is, each surveillance community has its own group of participating health-care facilities and data input by member facilities. Moreover, these databases are not interconnected, except for the surgical site infection (SSI) surveillance shared between JANIS and JHAIS and the information on SSI and bacteria shared by JANIS with the Japan Surveillance for Infection Prevention and Healthcare Epidemiology System (J-SIPHE) (Kajihara et al., 2021).

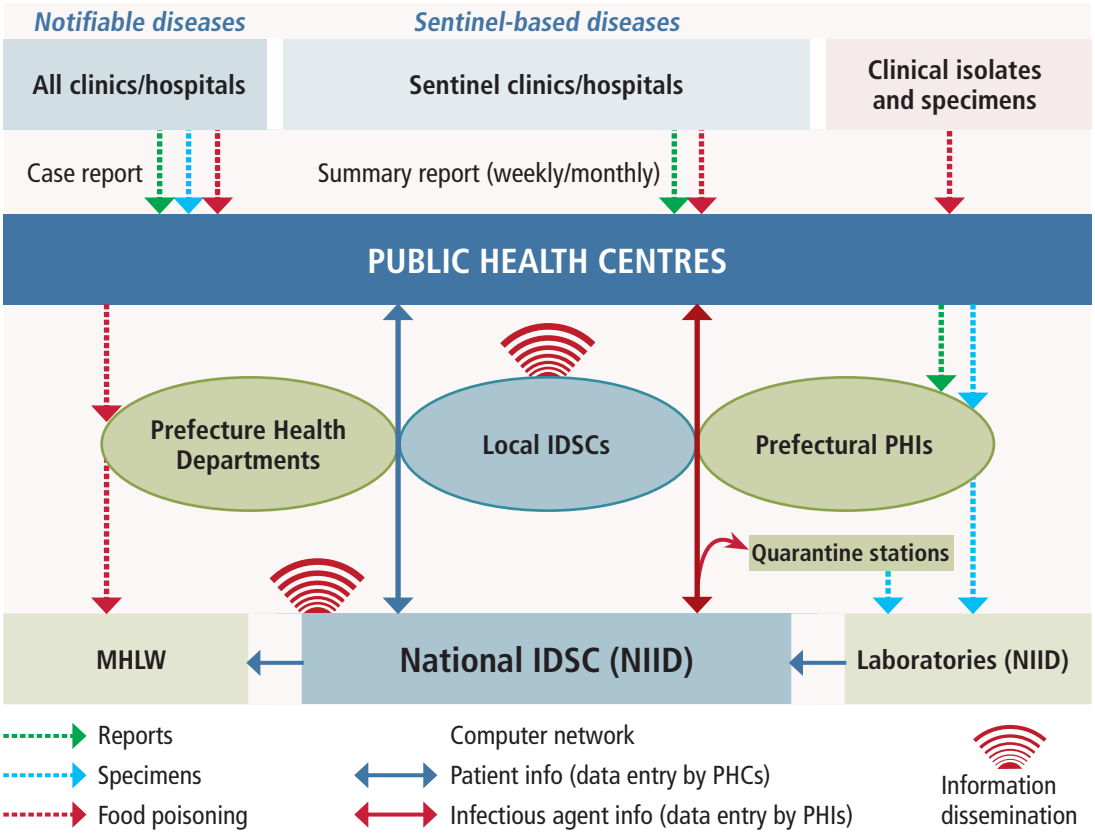
3.5.1 Infectious Disease Surveillance Center and NESID

In 1997, the National Institute of Health was renamed the National Institute of Infectious Diseases (NIID) to clarify its role. At the same time, the Infectious Disease Surveillance Center (IDSC) was established at NIID to consolidate and monitor outbreaks of infectious diseases throughout the country and to facilitate rapid response.

The primary functions of the IDSC are (1) to compile surveillance data on infectious diseases, collect and analyse information on infectious diseases, and provide this information to the public; (2) to exchange information with foreign infectious disease agencies; (3) to conduct epidemiological investigations of outbreaks of infectious diseases and train the experts who will carry out these investigations; and (4) to study and recommend strategies for IPC (National Institute of Infectious Diseases, 2018).

In accordance with the IDCL of 1999, the IDSC conducts pathogen surveillance (as described in section 2.1.3) and infectious disease surveillance by collecting incident reports from sentinel clinics and hospitals across the country. These surveillance reports are published on a weekly or monthly basis and are available for reference by communities and hospital facilities. The pathogens and diseases targeted by the surveillance are divided into five categories according to severity and communicability, each having different reporting criteria. In 2006, the IDSC launched NESID as a centralized online system. Figure 2 shows the NESID reporting flow and how the system centralizes the reporting data.

FIG. 2 National Epidemiological Surveillance of Infectious Diseases (NESID) reporting flow



IDSC, Infectious Disease Surveillance Center; **NIID,** National Institute of Infectious Diseases; **PHC,** public health centre; **PHI,** public health institute

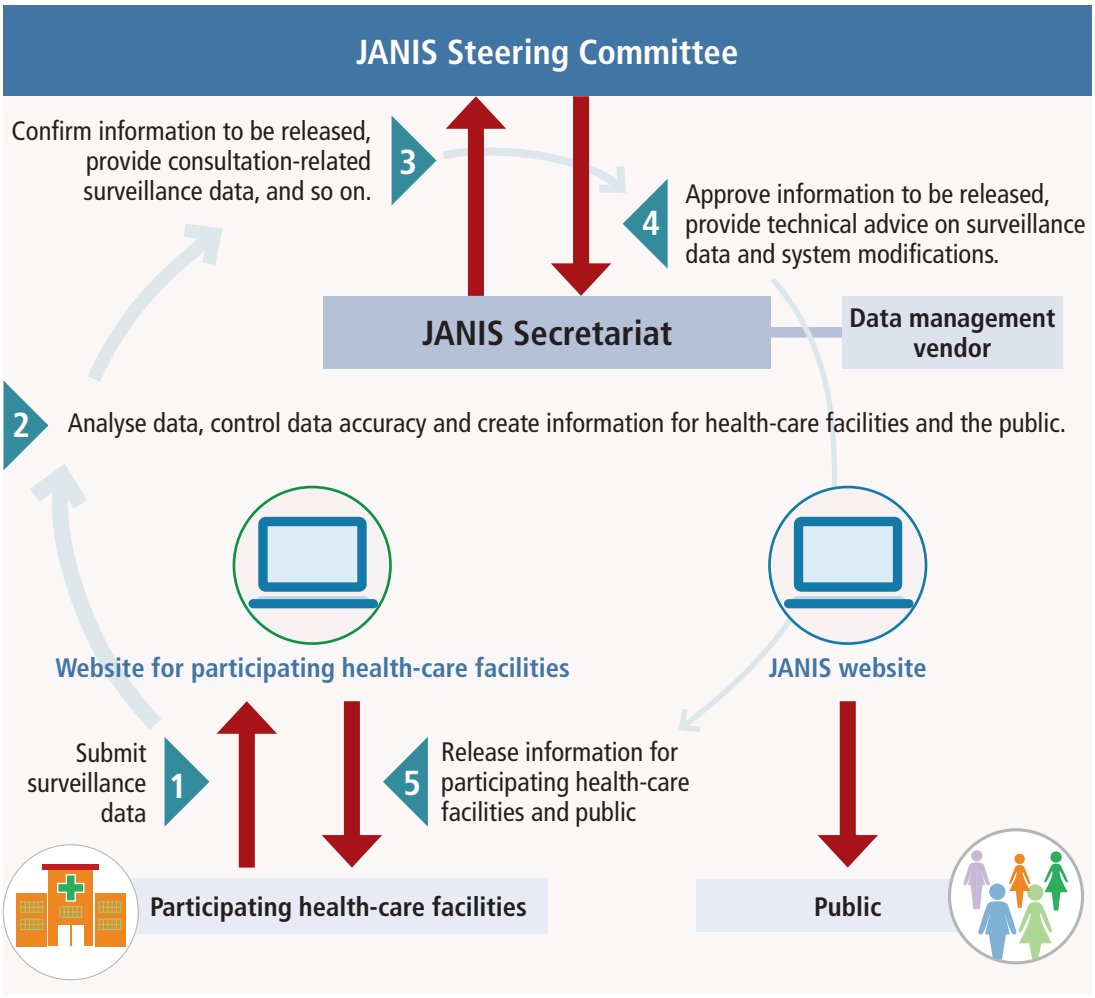
Source: Adapted and reproduced by permission of the publisher (National Institute of Infectious Diseases, 2018). Information arranged by the author.

3.5.2 Japan Nosocomial Infections Surveillance

Japan Nosocomial Infections Surveillance (JANIS) is a national surveillance programme organized by the MHLW to provide basic information on the incidence and prevalence of nosocomial infections and antimicrobial-resistant bacteria in health-care settings. JANIS was launched in 2000 with three divisions, namely, the clinical laboratory division, the antimicrobial-resistant bacterial infection division and the intensive care unit division; the SSI and neonatal intensive care unit divisions were added in 2002 (Ministry of Health, Labour and Welfare, 2018).

The revised Medical Care Act, which came into force in 2007, made it compulsory for all health-care facilities to implement a nosocomial infection control system. JANIS renewed its system the same year, making it more practical and user-friendly. Participation in JANIS is voluntary for health-care facilities, but participation in either a regional or national surveillance system such as JANIS is one of the requirements for additional reimbursements for infection prevention 1 (refer to Table 1 and section 5.1.2). There were 2418 participating facilities as of January 2021 (Ministry of Health, Labour and Welfare, 2021).

FIG. 3 Japan Nosocomial Infections Surveillance (JANIS) reporting flow



Source: Adapted and reproduced by permission of the publisher (Ministry of Health, Labour and Welfare, 2018). Information arranged by the author and JES (Japanese version of EPINet™). The JHAIS-SSI and JES systems are both independent, but JHAIS collaborates with the SSI surveillance department of JANIS by using the same system (refer to Table 2).

TABLE 2. List of surveillance systems

SCOPE	Name of surveillance system	Secretariat institution	Year	Explanation	Data input by
Nationwide trends of infectious diseases					
	NESID	Infectious Disease Surveillance Center (IDSC), National Institute of Infectious Diseases (NIID)	2006	● Surveillance based on the Infectious Diseases Control Law enacted in 1999. ● Integrated the pathogen detection reporting system (started in 1981 and went online in 1987) and the infectious disease surveillance system which collected patient outbreak reports.	● Public health centres across the country
Trends of infectious diseases in medical institutions					
	JANIS	AMR Center, National Institute of Infectious Diseases (NIID)	2000	● Surveys the incidence of nosocomial infections, the isolation of AMR bacteria, and the incidence of infections caused by AMR bacteria at participating health-care facilities. ● Analyses trends of nosocomial infections in Japan, and provides useful information on nosocomial infection control to health-care facilities. ● In principle, data from clinics and nursing care facilities are not collected because the survey only covers hospitals.	● Participating health-care facilities
	J-SIPHE	AMR Clinical Reference Center, National Center for Global Health and Medicine (NCGM)	2019	● The Japanese Government formulated the National Action Plan on AMR in 2016, following the adoption of the Global Action Plan on AMR at the World Health Assembly in 2015. ● Collects information on the status of infectious disease treatment, infection control efforts and structures, the incidence of health-care-associated infections, the incidence of major bacteria and AMR bacteria and bloodstream infections caused by them, as well as the use of antimicrobial agents at medical institutions. ● Imports information on SSI, major bacteria and AMR bacteria from JANIS.	
	JHAIS	JHAIS Committee, Japanese Society for Infection Prevention and Control (JSIPC)	1999	● Surveillance for SSI (1999–present) and device-related infection (2009–present). ● Collaborates with the SSI surveillance department of JANIS (based on same system).	
	JES	The Research Group of Occupational Infection Control & Prevention in Japan (JRGOICP)	2009	● Japanese version of EPINet™. ● Surveys the trend of needlestick and incised wound in health-care facilities.	

AMR, antimicrobial resistance; **JANIS,** Japan Nosocomial Infections Surveillance; **JES,** Japan-EPINet™ Surveillance; **J-SIPHE,** Japan Surveillance for Infection Prevention and Healthcare Epidemiology; **NESID,** Japan Surveillance for Infection Prevention and Healthcare Epidemiology; **SSI,** surgical site infection; **WHO,** World Health Organization.

Sources: National Institute of Infectious Diseases, 2018; Ministry of Health, Labour and Welfare, 2018; National Center for Global Health and Medicine, 2021; Japanese Society for Infection Prevention and Control, 2020; The Research Group of Occupational Infection Control and Prevention in Japan, 2021. Compiled by the author.

4. Current situation

(2011 to present)

Summary

The 2010s saw the further development of IPC systems, which had made significant progress in the previous decades.

The key to this progress was a change in the health-care reimbursement scheme (refer to section 4.1), which led to increased collaboration among teams (refer to section 4.2) and accelerated inter-facility and inter-community cooperation (refer to section 4.3). However, despite this progress, challenges remain for long-term care facilities (LTCFs) (refer to section 4.4). The international response to infectious disease control has also advanced. Surveillance and reporting systems are now being developed in collaboration with the international community. In the context of COVID-19, Japan's strong IPC system has been fully utilized.

4.1 Infection prevention and control and health-care reimbursement

In 2012, an additional reimbursement for infection prevention was included as an independent evaluation system in the revised health-care reimbursement scheme. In addition, the amount of reimbursement for implementing countermeasures and regional cooperation was the largest ever. Since the first additional reimbursement for infection prevention in 1996, reimbursements for infection prevention have tended to increase, which is thought to be a result of greater recognition of the importance of IPC. Major revisions are as follows (refer to Table 1 for the detailed requirements for the calculation).

4.1.1 Additional reimbursement for infection prevention measures (2010)

- The nosocomial infection prevention committee holds a meeting about once a month.
- An infection information report is published about once a week.
- Staff are encouraged to wash their hands, and an alcohol-based hand rub dispenser is placed at the entrance of each hospital room.
- A full-time manager for nosocomial infection control is assigned.

4.1.2 Additional reimbursement for infection prevention measures 1 and 2 (2012)

In 2012, an additional reimbursement for the prevention of infection was included as an independent evaluation system in the revised health-care reimbursement scheme. In addition, the amount of money added to the calculation of the additional reimbursement for implementing countermeasures plus an additional reimbursement for regional cooperation was the largest ever. If both reimbursements are fully claimed on the first day of a patient's hospitalization, it is 500 points (¥ 5000), an amount that enables facilities to assign an infection control manager.

- Additional reimbursement for infection prevention 1:
  - » Assign a full-time manager for nosocomial infection control.
  - » Organize an infection control team (ICT) that oversees daily operations for infection prevention (same as the change in 2010).
  - » Host joint conferences with health-care facilities with additional reimbursement for infection prevention 2 at least four times a year.
- Additional reimbursement for infection prevention 2 (applicable to health-care facilities with up to 300 beds):
  - » Organize an ICT that oversees daily operations for infection prevention (same as the change in 2010). However, it is not necessary for nurses to have an ICN certification.

» Attend joint conferences hosted by health-care facilities with additional reimbursement for infection prevention 1 at least four times a year.

- Additional reimbursement for regional (community) cooperation:
  - » Facilities that calculate additional reimbursement for infection prevention 1 must collaborate and visit each other's facility at least once a year to evaluate each other's IPC measures.

4.1.3 Additional requirement for reimbursement for infection prevention 1 (2014)

- Participate in a surveillance system such as JANIS.

4.2 Promoting infection prevention and control at health-care facilities through infection control teams

Although organizing an infection control committee is mandated by the revised Medical Care Act, organizing an ICT is not. Nevertheless, ICTs are important for implementing IPC in health-care facilities. Since the health-care reimbursement change in 2010, ICTs have been organized in relatively large health-care facilities and, with the remuneration change in 2012, in health-care facilities having 300 or fewer beds (Sugawara et al., 2008) (for details of the remuneration requirements for ICT, please refer to Table 1).

4.3 Building networks through inter-facility and inter-community cooperation

Inter-facility and inter-community collaboration makes it possible to improve the quality of IPC at individual health-care facilities by collecting, comparing and applying data to the field. Such collaboration also has epidemiological importance and creates a foundation for inter-facility measures in emergencies.

Inter-facility cooperation is also driven by financial incentives because it is a requirement for the additional reimbursement for community cooperation, which involves visiting and evaluating the IPC of facilities that calculate the additional reimbursement for infection prevention 1 (hereinafter referred to as #1 facilities) and facilities that calculate the additional reimbursement for infection prevention 2 (hereinafter referred to as #2 facilities). The revised

remuneration in 2012 requires holding joint conferences between #1 and #2 facilities at least four times a year. The requirement has led to greatly improved inter-facility cooperation. Because the number of beds is used to calculate additional reimbursement for infection prevention in #1 and #2 facilities, a larger health-care facility can provide support to a smaller health-care facility, leading to successful models. As an example, the ICT of a university hospital in a community coordinated cooperation among health-care facilities with the support of the local health-care facility association. In this case, a common format was used to submit data every month, allowing the quality of IPC at each facility to be visualized by referring to JANIS. This helped the #1 facilities give feedback to #2 facilities, which implemented a Plan–Do–Check–Act cycle. After three years of collaboration, there was a significant increase in the number of facility rounds, the rate of multiple sets of blood cultures collected, and the amount of rubbing alcohol used (Murakami et al., 2015).

The revised remuneration scheme of 2014, which requires participation in a surveillance network system, was a driver of inter-community cooperation. However, to implement comprehensive community-based IPC measures, health-care facilities that have not yet calculated the additional reimbursement for infection control, as well as geriatric health-care facilities and home care settings, must overcome challenges in terms of information sharing, lack of consistent procedures, types of infectious diseases different from those found in acute hospitals, and human resource development.

4.4 Infection prevention and control in long-term care facilities

4.4.1 Overview and current situation

Although the National Action Plan on AMR stipulated the promotion of IPC and strengthening of regional (community) cooperation, the implementation of regional (community) cooperation depends on communities, given that the plan is not an enforceable law.

As mentioned in section 4.3, facilities such as LTCFs face challenges in the implementation of IPC. In Japan, there are two main categories of LTCFs: medical and non-health-care facilities (refer to Table 3 for the features of each category).

The organization of infection control committees in non-medical LTCFs is mandated by MHLW guidelines, but the deployment of IPC experts is not legally required. According to an investigation, influenza and acute gastroenteritis were the most frequently reported HAIs. Nearly all facilities had infection control manuals, assigned a representative infection control professional, conducted periodic HAI surveillance, established hand hygiene policies, and provided hand hygiene supplies and influenza vaccines to residents. In addition, many facilities cooperated with external facilities such as medical institutions, regional (community) health-care facilities, and communal public health centres to provide external consultations (Kariya et al., 2018).

TABLE 3. Types of long-term care facilities

Classification	Type of facility	Underlying laws and regulation	IPC system	Issue recognition
Health-care facility				
	Rehabilitation facility **Inpatient behavioural health facilities for patients with mental illnesses** **Long-term care hospital**	Health Insurance Act	• Implementation of IPC measures is incentivized in the medical remuneration system.	• Because the reimbursement points are calculated at the first day of hospitalization, the incentive could be insufficient for outpatient hospitals and long-term hospitalization.
Non-health-care facility				
	Nursing home (special nursing home and health-care facility in the classification of nursing home in Japan)	Long-term Care Insurance Act	• Structure of IPC in LTCFs is defined by the Ministry of Health, Labour and Welfare. • The "IPC Manual for Nursing Homes" was published in 2013 and revised in 2019.	• Personnel assignment is defined as "either caregiver or nurse" and the assignment of full-time IPC staff or IPC experts is not mandatory.

Source: Compiled by the author.

4.4.2 Challenges for LTCFs

Few epidemiological studies have investigated drug-resistant bacteria, HAIs and interventions for infectious diseases in LTCFs, including medical LTCFs. The lack of data makes it difficult to assess the current situation and take appropriate measures. The HAI rate per 1000 resident-days at LTCFs in Japan is similar to that in Western countries, suggesting that the degree of implementation of infection control measures in LTCFs in Japan is also similar to that in Western countries (Kariya et al., 2018). However, most facilities do not have IPC specialists, their budgets for personal protective equipment are small, and compliance with standard precautions is low (Kariya et al., 2018). Given that most workers at non-health-care facilities are caregivers who lack medical qualifications, they may have limited knowledge and experience related to IPC. In addition, inpatients and residents at LTCFs are vulnerable to infections. Furthermore, compared with acute hospitals, LTCFs often have different infectious diseases, including influenza, infectious gastroenteritis caused by norovirus and scabies (Mitsubishi Research Institute, 2013); therefore, different IPC measures than those used at non-LTCFs should be considered.

4.4.3 Requirements for further development

For both medical- and non-medical LTCFs, it is important to take measures such as consulting with IPC specialists, developing human resources, and reviewing and revising the facility's infection control manual. In addition, it must be pointed out that surveys and investigations are also needed to understand the current situation at LTCFs. Moreover, further inter-facility cooperation, as described in section 4.3, is vital. However, it can be challenging to foster cooperation without the requisite regulations and financial incentives.

4.5 Antimicrobial resistance countermeasures

4.5.1 The National Action Plan on AMR

In 2015, the World Health Assembly adopted the Global Action Plan on Antimicrobial Resistance (AMR), and Member States were requested to develop their own action plans.

The following year, the Japanese Government formulated the National Action Plan on AMR, which calls for awareness campaigns, education, surveillance and monitoring (of drug resistance and antimicrobial use), IPC and appropriate use of antimicrobials, as well as the promotion of IPC and regional cooperation in health care and nursing care.

Table 4 lists the six current notifiable diseases caused by drug-resistant pathogens. However, multidrug-resistant *Neisseria gonorrhoeae,* drug-resistant *Mycobacterium tuberculosis,*[1] fluoroquinolone-resistant *Salmonella* and ST-synthesis-resistant *Shigella* are not included.

4.5.2 Japan Surveillance for Infection Prevention and Healthcare Epidemiology system

One of the outcomes of the National Action Plan on AMR was the Japan Surveillance for Infection Prevention and Healthcare Epidemiology (J-SIPHE), a system that can be used for AMR control in health-care facilities. Launched in 2019, the system is managed by the AMR Clinical Reference Center, which was established in 2017 to promote the National Action Plan on AMR.

J-SIPHE collects information on the status of infectious disease treatment, infection control efforts and structures, outbreaks of HAIs, outbreaks of major bacteria and drug-resistant

1. Although tuberculosis is classified as a Category II infectious disease, which is included in the scope of national surveillance, neither JANIS nor NESID covers information on drug-resistant *Mycobacterium tuberculosis*. Therefore, information on multidrug-resistant tuberculosis was collected and compiled through the tuberculosis patient registration system. The latest AMR information was collected by the AMED Research Team in 2018 as one of the strategies of the National Action Plan on AMR (AMR Alliance Japan, 2020; the Government of Japan, 2016).

bacteria, outbreaks of bloodstream infections caused by these bacteria, and the use of antimicrobial agents at health-care facilities throughout Japan. Given that other existing surveillance systems are not interconnected, J-SIPHE plays a role in building a national database by aggregating data. The system can import infectious disease data from JANIS and receive information from health-care facilities, enabling users to utilize data on IPC for each facility (National Center for Global Health and Medicine, 2021).

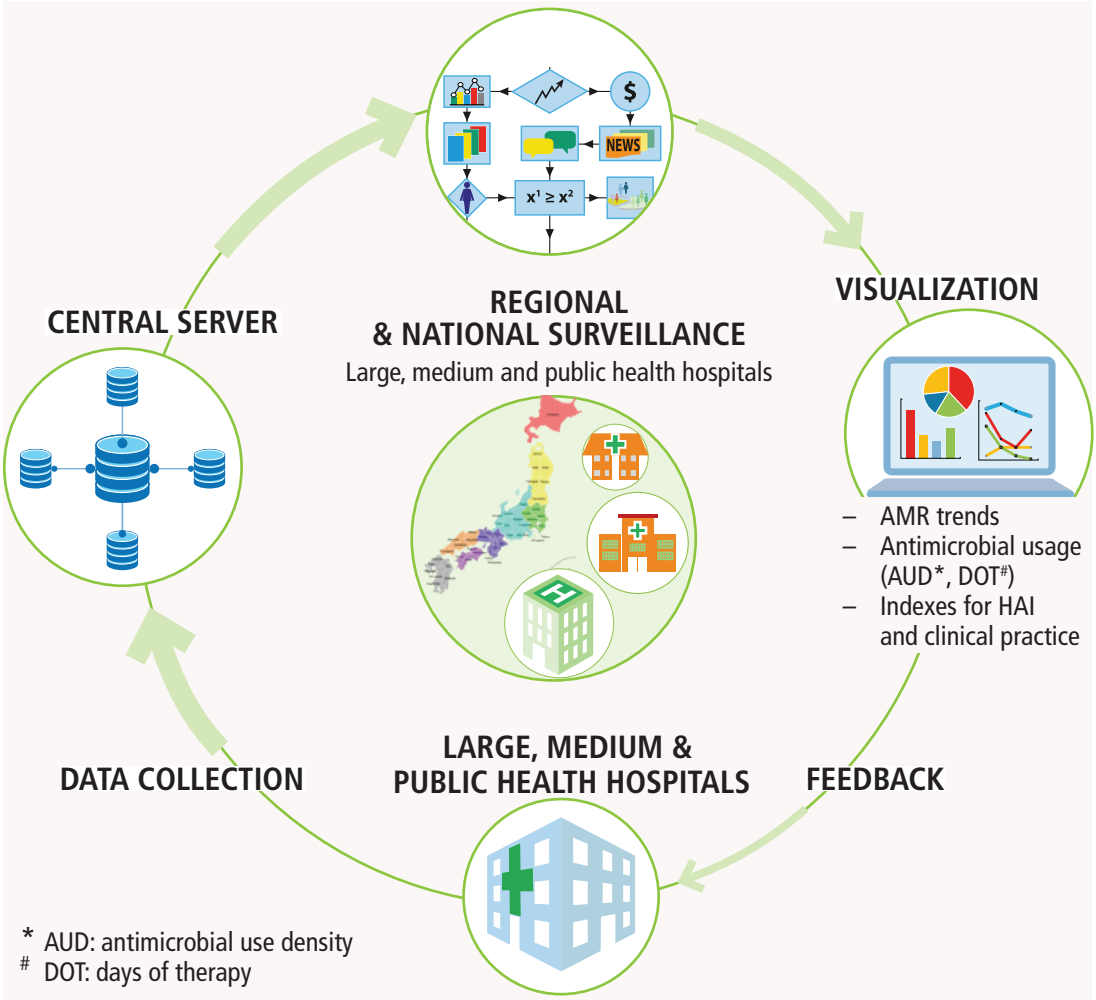
J-SIPHE also has analysis and visualization tools that enable participating facilities to improve their drug susceptibility programme. As an example, a hospital group in southern Hokkaido developed regional antibiograms, which are required by the National Action Plan on AMR but difficult for small and rural institutions to implement, by using J-SIPHE without the need for personnel with advanced data processing skills (Sakurada et al., 2020).

TABLE 4. Current list of notifiable diseases caused by drug-resistant pathogens

Name of drug-resistant pathogens	Category based on Infectious Diseases Control Law	NESID	JANIS
Vancomycin-resistant *Staphylococcus aureus* (VRSA)	Category V Infectious Diseases Notifiable disease surveillance	• All health-care facilities • Need to report in 7 days	• In principle, health-care facilities with 200 beds or more
Vancomycin-resistant enterococcus (VRE)			
Penicillin-resistant *Streptococcus pneumoniae* (PRSP)	Category V Infectious Diseases Sentinel surveillance	• Designated notification facilities (hospitals having internal medicine and surgery with 300 beds or more) (approximately 500 health-care facilities across the country) • Need to report next month	
Methicillin-resistant *Staphylococcus aureus* (MRSA)			
Multidrug-resistant *Pseudomonas aeruginosa* (MDRP)			
Multidrug-resistant *Acinetobacter* (MDRA)			

Sources: Ministry of Health, Labour and Welfare, 2012; Ministry of Health, Labour and Welfare, 2016. Compiled by the author.

FIG. 4 **Overview of the Japan Surveillance for Infection Prevention and Healthcare Epidemiology system**



Source: Adapted from the publisher (National Center for Global Health and Medicine, 2019).

4.5.3 Other AMR surveillance (food, animal and environmental)

To eliminate the transmission pathways of AMR, a One Health approach needs to be taken that covers various areas such as human and veterinary medicine, livestock and aquatic products, agriculture, food hygiene and the environment. To that end, the Ministry of Agriculture, Forestry and Fisheries launched the Japanese Veterinary Antimicrobial Resistance Monitoring System (JVARM) in 1999, with AMR surveillance of livestock animals conducted by the National Veterinary Assay Laboratory. JVARM has been enhanced to cover AMR surveillance of companion and aquatic animals in addition to livestock animals. In the context of AMR in food, research has been carried out on multidrug-resistant *Enterobacteriaceae* and Vancomycin-resistant *Enterococci*. Furthermore, data on AMR bacteria of food origin are collected by prefectural and municipal public health institutes (the Government of Japan, 2016).

In 2019, the AMR One Health Platform was launched. Currently, the system facilitates the analysis of AMR data from JANIS and JVARM, with plans to cover AMR data from other areas in the future (National Center for Global Health and Medicine, 2020).

4.6 Strengthening the infection prevention and control system through global events

Global events hosted in Japan, such as the G20 summit in Osaka and the Rugby World Cup in 2019, have also led to improvements in surveillance. At the G20 summit in Osaka in June 2019, the G20 Infectious Diseases Analysis Center was established to strengthen the monitoring of infectious diseases. Osaka launched new types of surveillance, including police surveillance, ambulance surveillance, health facility surveillance, and surveillance for diseases requiring quick response (Osaka City, 2019).

4.7 Event-based surveillance

During the COVID-19 pandemic, collaboration has been successful in areas where inter-organizational collaboration had taken place in normal times. However, to prevent the spread of COVID-19, it is important to detect early signs of clusters that may be spreading. Event-based surveillance (EBS) is one of the most effective measures.

The Kawasaki Infectious Disease Surveillance System, or KIDSS, was established by the City of Kawasaki as a network for connecting medical institutions with municipal authorities. Information on infectious diseases is provided daily and shared in both directions between health-care facilities and the city government. KIDSS has been in operation since April 2014 and is accessible via the Internet per OED. The system had previously functioned as an EBS system during an outbreak of parrot disease at a social welfare facility in 2014 (Okabe et al., 2020).

In the context of COVID-19 countermeasures, the EBS system can be utilized for information collection and evaluation. When large clusters occur at facilities with many people at high risk of severe disease, such as facilities for elderly people, there is a risk that the local medical system may become overwhelmed.

EBS systems are expected to play critical roles in future pandemics, disasters and emergencies, but their effectiveness will depend on data interoperability and uniformity of standards.

5. Lessons learnt and implications for other countries

5.1 Lessons learnt from Japanese history

IPC in Japan has continued to develop over the past few decades. The following factors contributed to the rapid and successful implementation of a robust IPC system:

- **Human resource development**
  Starting with the establishment of academic societies, education, training and accreditation systems were developed. Although ICNs function as the core of IPC in the clinical setting, there is multidisciplinary collaboration among physicians, pharmacists and clinical laboratory technicians.

- **Stakeholder collaboration**
  Strengthening inter-facility, inter-municipal and inter-prefectural cooperation, as well as local cooperation (mainly public health centres and health-care facilities), is key to promoting information sharing and preparedness.

- **Momentum**
  Public concerns about nosocomial infections and advocacy by the medical community and academic societies helped build momentum that influenced the Japanese Government (political commitments and legal foundations).

- **Financial incentives**
  Adding policy-based economic incentives and penalties through the health-care reimbursement scheme accelerated the implementation of IPC measures in facilities nationwide. Participation in regional or national surveillance programmes should be one of the requirements for health-care facilities to receive additional reimbursements for implementing IPC measures.

Although the above factors contributed to the development of the IPC system in Japan, there were also some barriers, as follows:

- Due to limited budgets, it has been difficult for some facilities to deploy dedicated infection control personnel and ICTs.
- Despite progress in the capacity development of health workers through the certification system, much work remains in terms of organizational development and team building to promote effective IPC management at each facility.
- Sufficient IPC measures have not been implemented at some health-care facilities, such as LTCFs.

5.2 Implications for other countries

The IPC system in Japan was successfully developed over a 30-year period by using a top-down approach involving health-care reimbursements. As human resources were developed and teams and organizations were established, inter-organizational collaboration became possible. However, low- and middle-income countries (LMICs) cannot afford to wait 30 years to develop their own IPC systems because the health challenges they face at present are urgent. Furthermore, the limited financial resources of the health-care reimbursement system mean that measures implemented without sufficient planning will not be sustainable. Thus, developing an IPC plan with an appropriate time frame is critical. The development of the IPC system in Japan can be used as a model for identifying the necessary activities according to different time frames in order to meet the health-care needs of various societies (refer to Fig. 5).

Short term

Human resource development programmes should be established to rapidly build capacity via training programmes. They should be later refined and maintained through health professional licensing and hospital accreditation systems.

Medium term

Stakeholder collaboration should be promoted at various levels, including inter-facility, inter-community and among academic societies. Such collaboration increases capacity at the facility level through the sharing of knowledge and experiences, and at the regional level, particularly in the case of emergencies, by accelerating communication between stakeholders compared with normal times.

Long term

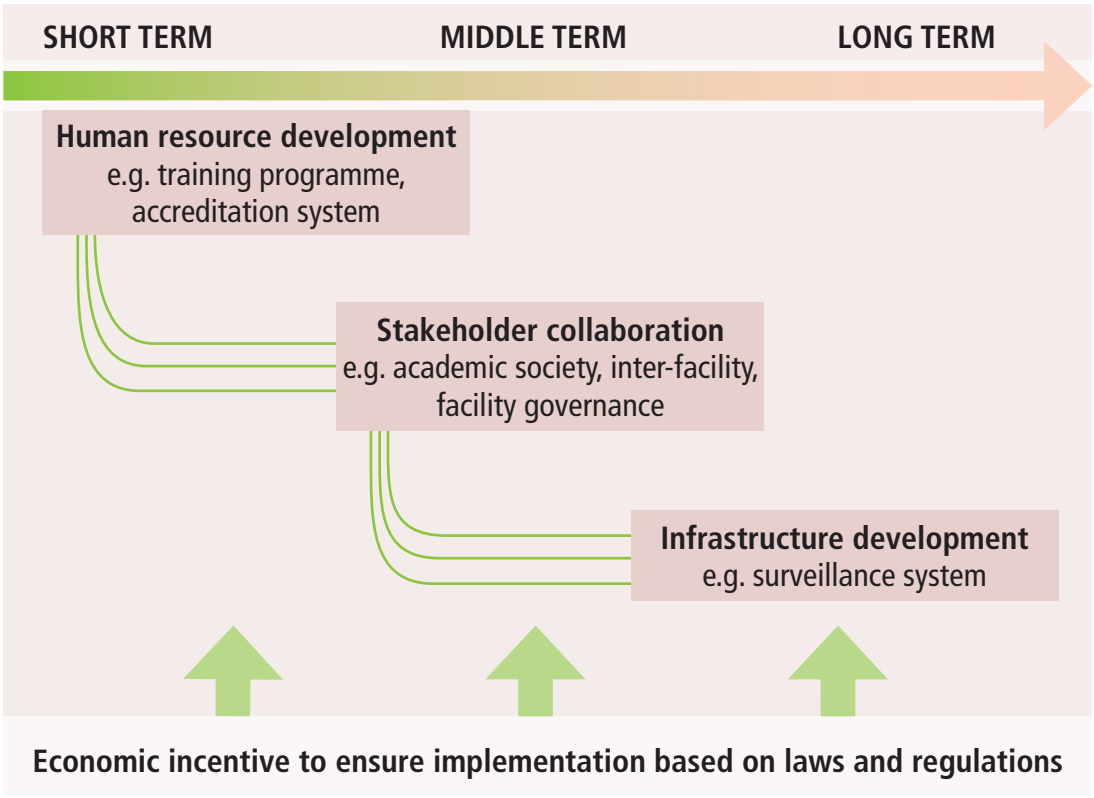
Information infrastructure, including a shift from analogue to electronic systems, and laboratory capacity should be developed to facilitate statistical analysis of trends as well as prediction and preparation activities for future outbreaks. Laws and regulations on IPC should be regularly reviewed and updated to ensure alignment with global standards. International collaboration and support from the WHO Regional Office are also important for realizing a sustainable, robust IPC system in LMICs.

Key drivers

Throughout the process, it is important to clarify which organizations and departments are responsible for each task. Also, it must be pointed out that the financial incentives provided by the health-care reimbursement scheme based on political commitments and legal foundations have accelerated the development of IPC in Japan. Even though health-care budgets are often limited in LMICs, it is recommended to allocate an adequate budget with strategic foresight to foster an IPC system that is appropriate for the needs of each country.

Issues related to IPC identified during the response to the COVID-19 pandemic have raised public awareness of the need to reconsider the relevant IPC systems, laws and regulations in LMICs. Just as this is an opportunity for Japan, now may be the right time for other countries to consider building more robust IPC systems.

FIG. 5 IPC implementation plan



Source: WHO.

Annex.
Standard curriculum for the education of certified nurses

Curriculum that incorporates training for specified acts[a]: Course B

Educational field: Infection Control

Prepared in March 2019

PURPOSE

1. To develop the capacity to practise high-level nursing skills and knowledge based on advanced management skills for the prevention of health-care-associated infections (HAI), high clinical reasoning, and judgment of pathological conditions for individuals, families and groups.
2. To develop the capacity to provide guidance to nurses in the infection control field through nursing practices.
3. To develop the capacity to provide consultations to nurses in the infection control field.
4. To develop the capacity to collaborate within a multidisciplinary team and to play a key role in team-based medical care in the infection control field.

EXPECTED CAPACITY

1. Assess conditions at facilities and in the community as well as develop and promote HAI prevention and control systems systematically and strategically.
2. Implement HAI surveillance tailored to the facility settings.
3. Identify patients at high risk of infection as well as patients with signs of infection at a multidisciplinary level, prevent the progression and reduce the severity of infection, and facilitate recovery based on clinical reasoning and pathology judgment.
4. Serve as role models in the infection control field and provide guidance and consultation to nurses.
5. Collaborate with other professions and act as key members in team medicine in order to provide a higher quality of health care.
6. Implement infection prevention and control and ensure the appropriate use of antibiotics while giving ethical consideration to all people working in the medical service sector, patients, and their families.

CORE KNOWLEDGE AND SKILLS

1. Knowledge and skills needed to establish prevention and management systems for HAI at facilities and in the community.
2. Knowledge and skills needed to evaluate scientific evidence for the prevention and management of HAI and to improve care.
3. Skills needed to plan, implement and evaluate HAI surveillance.
4. Knowledge and skills needed to determine the pathogenesis of physical findings and to administer occasional medication to patients with signs of infection.

a. Specified acts: Medical assistance that specifically requires practical comprehensibility, the ability to think and make judgments, and advanced and specialized knowledge and skills needed to render medical assistance by referencing procedure manuals.

Category	Course name	No. of hours[b]	
Common subjects			
	1. Clinical pathophysiology	40	**380**
	2. Clinical inference	45	
	3. Clinical inference: Healthcare interview	15	
	4. Physical assessment: Basic	30	
	5. Physical assessment: Advanced	30	
	6. Clinical pharmacology: Pharmacokinetics	15	
	7. Clinical pharmacology: Pharmacology	15	
	8. Clinical pharmacology: Drug therapy and management	30	
	9. Overview of diseases and clinical pathophysiology	40	
	10. Introduction to diseases and clinical pathology by situation	15	
	11. Medical safety: Medical ethics	15	
	12. Medical safety: Medical safety management	15	
	13. Team medical theory (practice of specified acts)	15	
	14. Practice of specified acts	15	
	15. Pastoral counsel	15	
	16. Consultation	15	
	17. Nursing care management	15	
Specialized subjects			
	Specialized subjects in certified nursing care		
	1. Infection control	15	**195**
	2. Epidemiology and statistics	30	
	3. Microbiology	30	
	4. HAI surveillance	45	
	5. Infection control skills	30	
	6. Occupational infection control	15	
	7. Infection control guidance and consultation	15	
	8. Cleaning, disinfection, sterilization and facility management	15	
	Specialized subjects for specific acts		
	1. Drug administration related to nutrition and fluid control	22	**61**
	2. Drug administration related to infection	39	
Exercises and practical training			
	Joint exercise	15	**165**
	On-site practical training	150	
		TOTAL NUMBER OF HOURS	**801**

b. The Authorized Nurse Educational Standards Curriculum applies "deemed time", in which 45 minutes is regarded as 1 hour. "Actual time", in which 60 minutes is set as 1 hour, is applied to training for specified activities, but the number of hours in the applicable subjects is set and indicated as "deemed time".

Source: Japanese Nursing Association (2019), translated by the author.

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