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Recommendations for the prevention of healthcare-associated infections in nursing homes

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KEYWORDS
Respiratory infection, urinary tract infection, skin and soft tissue infection, environmental hygiene measures, incentive to use vaccines

MeSH TERMS
Nosocomial infection, nursing homes, primary prevention

ABBREVIATIONS
AEMPS: Spanish Agency for Medicines and Medical Devices
AMS: Antimicrobial Stewardship
ATB: Antibiotic Treatment
CA-UTI: Catheter-associated Urinary Tract Infection
CDI: C. difficile infection
CI: Cumulative Incidence
eCDC: European Center for Diseases Control
ESBL: Extended-spectrum Beta-lactamases
GNEAUPP: National Group for the Study and Counselling on Pressure Ulcers and Chronic Wounds
HAI: Healthcare-associated Infection
ICP: Individual Care Plan
ID: Incidence Density
IMSERSO: Institute for the Elderly and Social Services
MASD: Moisture-associated Skin Damage
MR: Multiresistant
MRSA: Methicillin-resistant Staphylococcus aureus
PPCIR: Programme for the Prevention and Control of Healthcare-associated Infection in Nursing Homes
PU: Pressure Ulcer
RI: Respiratory Infection
SAAD: System for Autonomy and Care for Dependency
SEGG: Spanish Society of Geriatrics and Gerontology
SSTI: Skin and Soft Tissue Infection
UTI: Urinary Tract Infection
VRE: Vancomycin-resistant Enterococcus
WHO: World Health Organisation

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SUMMARY
Nursing homes (NH) although conceptually they should look as much like a home as possible, NH have unquestionable similarities with a nosocomium as they are places where many patients with underlying diseases and comorbidities accumulate and where the transmission of microorganisms between residents and between residents and caregivers is frequent.

We have not found any recommendations specifically aimed at the prevention of nosocomial infections in MRI by the major Public Health Agencies and, therefore, the Health Sciences Foundation (Fundación de Ciencias de la Salud) has convened a series of experts and 14 Spanish scientific societies to discuss recommendations that could guide NH personnel in establishing written programs for the control and reduction of these infections. The present document is the result of these deliberations and contains suggestions for establishing such control programs on a voluntary and flexible basis in NH. We also hope that the document can help the health authorities to encourage this control activity in the different territorial areas of Spain. In our opinion, it is necessary to draw up a written plan and establish the figure of a coordinator or person responsible for implementing these projects. The document includes measures to be implemented and ways of quantifying the reality of different problems and of monitoring the impact of the measures established.

SCIENTIFIC SOCIETIES THAT ENDORSE THIS DOCUMENT
(in alphabetical order):
- General Council of Official Colleges of Pharmacists
- General Nursing Council of Spain
- Spanish Association of Vaccinology (AEV)
- Spanish Society of Chemotherapy (SEQ)
- Spanish Society of Clinical, Family and Community Pharmacy (SEFAC)
- Spanish Society of Family and Community Medicine (semFYC)
- Spanish Society of General and Family Doctors (SEMG)
- Spanish Society of Geriatrics and Gerontology (SEGG)
- Spanish Society for Infectious Diseases and Clinical Microbiology (SEIMC)
- Spanish Society of Internal Medicine (SEMI)
- Spanish Society of Preventive Medicine, Public Health and Hygiene (SEMPSPH)
- Spanish Society of Primary Care Physicians (SEMERGEN)

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1. INTRODUCTION

Nursing homes are one of the care services included in the Spanish System for Autonomy and Care for Dependency (SAAD in Spanish). They logically try to reproduce living conditions for their inhabitants as close as possible to those at home, favouring human contact with other residents, family members and visitors.

However, they are places favouring the transmission of infections, as people with frequent and important underlying diseases live in close proximity to each other, sharing caregivers in a common habitat thus hindering the existence of control and isolation zones.

We know a lot about infection prevention measures in hospitals and healthcare centres, but we know very little about infection prevention in smaller institutions with fewer resources for this purpose, such as nursing homes.

We are not currently aware of any regional or national programme on healthcare-associated infection prevention specific to nursing homes, so we have developed a practical set of recommendations aimed at the prevention and control of infection in nursing homes.

For this reason, the Board of Trustees of the Health Sciences Foundation conducted a review of the literature on the prevention of infection in nursing homes in our country and on the existing indicators used to monitor this process. The topics were distributed among a multidisciplinary group of experts, including the views of scientific societies, patient associations, the media, government officials, geriatricians, infectious disease specialists, microbiologists and other specialists. The lines that follow are the results of multiple meetings and discussions.

2. MATERIAL AND METHODS

Two of the authors conducted a systematic literature search in PubMed using keywords: Infection Prevention Control, Nursing Homes, Long Term Care Facilities, Health Care Related Infection; as well as in official documents of the Health Departments of the Autonomous Communities, the Ministry of Health, the World Health Organisation (WHO) and the European Centre for Diseases Control (eCDC).

With the data obtained, a first document with recommendations was drawn up for subsequent discussion by a multidisciplinary drafting team, which was reviewed by the rest of the authors representing the different scientific societies and organisations that endorse the document.

3. DEFINITION AND CLASSIFICATION OF NURSING HOMES

3.1. Some characteristics of nursing homes and the people who live in them:

Nursing homes are establishments intended for the temporary or permanent accommodation of dependent individuals, with services and intervention programmes adapted to the needs of the people being cared for, aimed at achieving a better quality of life and promoting their personal autonomy.

They represent a diverse group of social and health care settings serving people of various ages and functional abilities and providing an increasingly wide range of services with varying degrees of care.

In terms of infection control, some characteristics of these centres need to be taken into account:

1. People living in nursing homes accumulate a high number of chronic diseases: the most recent study in Spain on comorbidity and resource use of people living in nursing homes shows a very significant increase in morbidity in the last decade (1). Specifically, using average figures, the age was 87 years, there were 7 chronic diseases per person and 11 pharmacological active ingredients were consumed per person, with a high yearly mortality (20.4%). Compared to the non-institutionalised elderly population they had a higher multimorbidity rate (15.2% vs. 4.2%), with a higher number of chronic diseases, especially dementia (46.5% vs. 4.6%).
2. Hospital visits by these people are very frequent: compared to the non-institutionalised elderly population, this population has a higher number of hospital admissions (47.6% vs. 27.7%), a higher number of admissions to medium-stay hospitals (27.8% vs. 7.4%) and a longer hospital stay, once admitted (10 days vs. 7.2 days).
3. Staff and resident ratios are small and directed only to care and not to infection prevention. A recent study by the Spanish Society of Geriatrics and Gerontology (SEGG) on the regulations affecting nursing homes in Spain (2), highlights the existence of very tight staffing ratios mainly aimed at general care, with little emphasis on prevention and control of intercurrent diseases and infection in these centres. As an example, the average time spent with a geriatric carer per resident ranges from 43 minutes to 83 minutes and with a nurse from 5 to 22 minutes per day.

These figures make it very difficult to establish ambitious infection control programmes and encourage indiscriminate transfer to the referral hospital, where the risk of healthcare-associated infection (HAI) is elevated.

4. The health care provided in nursing homes depends on the national health system in Spain and the health services of each autonomous community, as stipulated in all regulations. This leads to the medical management of these people with such a high complexity and burden of chronic diseases falling on the primary care referral and, in the most severe cases, on the hospitals. Instead, care is episodic, with difficult or non-existent coordination between social and health services. This also means a loss of clinical information that is vital for infection control should infection occurs.
5. Only a few autonomous communities regulate the presence of a clinical professional (usually a nurse) as the person responsible for the hygienic-health care processes of these people.

Currently, the model is in a phase of change towards smaller nursing homes, with a closer, more person-centred model of care. The recent agreement reached in 2022 between the Autonomous Communities and the State favours a model of residential care based on the following principles (3):

a) Smaller centres (maximum 75, 90 or 120 places). The classification proposed in these recommendations already covers this standard.
b) Model of person-centred care, with respect for the preferences and participation of the family in an environment free of physical and chemical restraints.
c) Very modest increase in staffing ratios.
d) Health care remains in the hands of the health services, yet there is no regulation on how to do this.

The current model poses the difficult challenge of maintaining environments that are homey, familiar and open to the community, as well as respectful of people's dignity and infection control (e.g. isolation is an enormous assault on their mental, functional and emotional balance and should be an exceptional measure).

3.2. Classification of nursing homes for infection control: a proposal

The Institute for the Elderly and Social Services (IMSERSO) still classifies nursing homes into residences for the elderly, assisted living and mixed residences. But this is a classification that is clearly in disuse nowadays and there is a tendency to speak of nursing homes in general, regardless of their size and variety of services.

The classification of nursing homes according to the greater or lesser presence of professionals dedicated to carrying out therapeutic work such as convalescence or rehabilitation stays is also found in other countries (4).

In any case, these classifications shed very little light on how to grade the risk of transmission of infection, so a self-developed classification has been proposed in these consensus recommendations. This classification is detailed below.

Classification of the risk of infection in nursing homes

We know that in social and healthcare centres, due to their characteristics, the profile of the elderly who reside in them, the existence of multiple underlying conditions, polymedication and many other variables, there is a higher prevalence of infections. In order to be able to quantify the risk of HAI and then offer different recommendations, we propose a classification system based on a series of variables chosen at our discretion that we believe can serve as indicators of the risk of HAI in nursing homes **(Table 1)**.

We are aware of the limitations that this classification may have, but it can give us a rough idea of what we want to know. These variables could be:

- Number of residents: the greater overcrowding of spaces may favour the transmission of infections.
- Number of single/double/triple rooms: sharing rooms favours possible transmission.
- Degree of dependency assessed by the Barthel scale: many of the items assessed by the Barthel scale have a lot to do with factors that may predispose to infection (incontinence, toileting, immobility). We understand that the greater the dependency, the greater the risk. We distinguish between mild, moderate and severe.
- Proportion of residents (%) with bladder catheters or invasive devices in general: all these devices are known to be a potential source of infections.
- Medical staff, pharmacists and nursing professionals in the centres, as reference personnel who contribute to prevention, detection and treatment in the case of infectious processes.
- Existence or lack of infection prevention plans: vaccination protocols, protocols for the use of antibiotics for the most prevalent infections, protocols for general infection prevention measures, staff training.
- Possibility of isolation: assess whether it is possible, if necessary, to keep affected residents isolated from contact with other healthy residents, while maintaining the care they need and taking all possible precautions with regard to the staff attending to them.

- Existence of nursing home-primary care-hospital referral: there is a relationship and contact with the specialist in the hospital for the joint assessment of cases.
- Ratio of first level direct care staff (assistants/geriatric carers): in relation to the number of assistants caring for residents. The requirements in the different communities are very different and vary according to the type of residents in relation to their degree of dependency. According to the new accreditation criteria prepared by the Ministry of Social Rights (Accreditation and Quality Agreement 28/06/2022) this ratio starts from 0.31 to 0.43 for the coming years as a minimum requirement for centres with a majority of dependent residents (grade II/III).

With these parameters we summarise in the following table **(Table 1)** a point system that could roughly classify nursing homes according to their risk of HAI into:

- Low risk of HAI: between 0 and 5 points.
- Medium risk of HAI: between 6 and 10 points.
- High risk of HAI: between 11 and 20 points.

Table 1 System for classifying nursing homes according to their risk of HAI

Indicators		Points
Number of Residents	<75	0
	75-120	1
	>120	2
Rooms (>65%)	Single	0
	Double	1
	≥ 3	2
Median number of residents with degree of dependency measured by the Barthel Scale	>55 pts Barthel Scale	0
	35-55 pts Barthel Scale	1
	<35 pts Barthel Scale	2
% persons with a bladder catheter	< 10%	0
	11-25%	1
	>25%	2
Nurses	Full Time	0
	Part-time	1
	One-time Visit	2
Medical Staff	Full Time	0
	Part-time	1
	One-time Visit	2
Infection Prevention Plan (vaccination protocols, use of antibiotics, general measures, staff training)	Total and Ongoing	0
	Partial	1
	Not available	2
Possibility of Isolation	Total	0
	Partial	1
	Not available	2
Is there hospital-medical referral and direct/telephonic hospital or community pharmacy?	Total	0
	Partial	1
	Not available	2
Proportion of staff (full-time) in direct first level care	>0.43	0
	Between 0.31 and 0.43	1
	<0.31	2

4. RECOMMENDATIONS FOR ACTION

The following are some recommendations for establishing the basis for an infection control programme in nursing homes.

4.1. The development of a programme for the prevention and control of HAI in nursing homes (PPCIR) at all levels is recommended

The main functions of the PPCIR are to prevent infection of residents through surveillance and early diagnosis activities, and to ensure that measures are in place to prevent the acquisition of infections and the transmission of pathogenic micro-organisms. To achieve these objectives in a cost-effective manner, we believe that all nursing homes should have a written plan with an active and effective programme throughout the organisation and its implementation should be supported continuously by the management.

A key component is to have written infection control protocols (including those related to environmental hygiene), and implement them so as to detect, contain and prevent the transmission of potential pathogens. Infection control programmes should be tailored to the type of facility, facility layout (including isolation facilities), risk factors among residents and available resources.

4.2. It is advisable to designate one person as PPCIR co-ordinating officer

We believe that in order to guarantee compliance with any protocol or PPCIR, it is preferable for it to be led by a healthcare professional who has the support and recognition of the centre's management and who is a point of reference for the healthcare team to coordinate activities and improve communication with the rest of the professionals, both from the centre itself and from the Public Health Service.

Regarding the person assigned as responsible, it is desirable (although not essential) that he/she has knowledge of infectious disease control and management (clinical manifestations, mechanisms of transmission and spread, and prevention measures); leadership and communication skills, as well as teamwork skills. This person is the one who must transmit all information to the rest of the professionals in the institution, as well as to the residents and their relatives, ensuring that all necessary infection prevention measures are carried out. On the other hand, this person is the one who must inform the Public Health System of relevant events and also the Primary Care physician responsible for the care at the nursing home, as well as the Specialised Geriatric Hospital Services. This work is essential for the prevention of any communicable disease; as well as to quickly implement the contingency plan, and/or isolation precautions and avoid transmission to the rest of the residents, workers and visitors.

4.3. It is recommended that an annual education and training plan for healthcare workers be drawn up

Continuous training of workers is an aspect that certainly deserves a great deal of attention. We believe that successful implementation of HAI prevention programmes in nursing homes should have very specific objectives and include aspects of training for both staff and residents. The following is a list of recommendations which, although they are not the only ones that exist, are what we consider to be the minimum necessary for the development of an infection prevention and control plan in nursing homes.

4.4. There should be a protocol for environmental prevention measures

We would particularly like to stress that except in the circumstances of immunocompromised residents, air quality control measures cannot be extrapolated to those carried out in hospital environments. We have not found any specific legislation for nursing homes in terms of air quality monitoring.

In some Autonomous Communities, there are regulations that establish the environmental cleanliness measures that all centres, in addition to complying with the general legislation in force on hygiene and health, must guarantee. These recommendations are summarised below.

- General and permanent cleaning of the building and its dependencies, especially those under heavy use, as well as disinfection using detergents with disinfectant capacity (chlorinated detergents, quaternary ammonium compounds, etc.). Disinfectants for sanitary use or products accepted by the Spanish Agency for Medicines and Medical Devices (AEMPS) for application in the sanitary field shall preferably be used.
- Annual insect and rat extermination, or as often as circumstances require.
- Cleaning and disinfection of crockery and cutlery after use, by means of automatic hot washing, as well as other commonly used instruments.
- Suitable space should be available for the temporary storage of waste in closed bins (intermediate storage).

4.5. It is recommended to have written instructions for a hand hygiene plan for staff and visitors

Hand hygiene is one of the most important infection control measures. Residents should be cared for with clean hands and the lowest microbial load to avoid infections and the transmission of potentially pathogenic microorganisms. Each nursing home needs to have a plan in place to promote proper hand hygiene for workers, detailing when, how and with which products to perform hand hygiene. In addition, it must ensure the availability of products and devices, as well as the regular training and education of workers.

Hand hygiene of workers should preferably be carried out with hydroalcoholic solutions, if the hands are not visibly soiled. The facility should be equipped with an adequate supply of alcohol-based products at the main points of resident care or provide individual flasks for staff use. If this is not the case, washing with soap and water should be carried out. The hand hygiene technique established by the WHO should always be performed and the WHO 5 Moments for Hand Hygiene should be followed in the nursing home (5).

Different complementary strategies can be used to improve compliance with this basic hygiene measure. One is the monitoring of compliance through direct observation as all hand hygiene opportunities can be explicitly accounted for, those who do not practice hand hygiene can be identified and the reasons for non-compliance explored. The observation should be carried out by a healthcare professional previously trained in the subject (6). Another indirect and less costly measure of compliance is the monitoring of consumption (quarterly, yearly, etc.) of hydro-alcoholic and/or soap solutions, and of course it is good practice to have dispensers in rooms, common areas such as gyms, consulting rooms, bathrooms and living spaces.

4.6. It is advisable to have a written document on the proper use of gloves

Common, disposable, single-use, non-sterile gloves are a protective measure for the worker. However, the use of such gloves has been identified as a barrier to proper hand hygiene and as a factor in the spread of micro-organisms.

Therefore, gloves should only be used when contact with non-intact skin, blood or body fluids such as secretions, urine, faeces, etc. is anticipated. When contact is to be made with clean whole skin or with objects that are not stained with the above liquids, gloves need not be worn.

4.7. It is desirable to have a document of recommendations for the prevention of both catheter-associated (CA-UTI) and non-catheter-associated urinary tract infection (UTI)

Residents without bladder catheters

Although the management of UTI is not the main focus of this document, we wish to emphasise that more than 20% of older people may have asymptomatic bacteriuria, which at some point could be mistaken for UTI. Current management guidelines do not recommend the indiscriminate screening for bacteriuria as a marker of infection in residents without manifestations directly attributable to the urinary tract, nor the use of urine strips as a diagnostic method for UTI. From a preventive point of view, hygiene and toileting of continent residents is very important in this group of residents, as well as frequent nappy changing and perineal hygiene in incontinent residents.

Residents with temporary urinary catheters

Below, we highlight some of the basic strategies for preventing CA-UTIs:

- Insert catheters only for appropriate indications.
- Leave catheters in place only as long as necessary.
- Ensure that only duly trained persons insert and maintain catheters.
- Insert catheters using aseptic technique and sterile equipment. Extreme hand hygiene measures before putting on gloves and after removing them.
- After aseptic insertion, maintain a closed drainage system.
- Maintain unobstructed urine flow.

Residents with indwelling bladder catheters

To reduce the incidence and duration of catheterisation, it is important to assess and communicate the presence of a urinary catheter to the medical team and reassess the indication periodically. A simple continuous quality improvement programme based on nurses asking physicians if continued catheterisation is necessary significantly reduces the duration of urinary catheterisation as well as the rate of catheter-associated urinary tract infections.

For further information, please consult the guidelines for the prevention and management of catheter-associated urinary tract infection on the European Centre for Disease Prevention and Control (ECDC) website (7).

4.8. It is advisable to have a protocol with recommendations for the prevention of respiratory infection

Outbreaks of respiratory infections occur in all residences throughout the year, but are most frequent from autumn to early spring. Such outbreaks can cause considerable morbidity and mortality, so we believe it is imperative that every nursing home, regardless of level, should have in place a set of written policies and procedures related to outbreaks of respiratory infections, including early detection of infection, staff and resident education, and vaccination requirements.

We believe that daily active surveillance is the most effective way to prevent and detect respiratory infections, which involves staff identifying symptoms of respiratory infection. Although it is beyond the scope of this document, we wish to recommend the use of self-diagnostic tests in people with new-onset respiratory manifestations. As the sensitivity of these tests does not allow the diagnosis to be excluded, it is recommended that residents with clinical manifestations avoid contact with other residents and that visitors wear masks. While a negative result does not exclude the diagnosis, a positive result has a high positive predictive value.

Some of the official recommendations currently available can be consulted in detail (8, 9). At the core of these recommendations will be the isolation of infected residents, reduction of visits and vaccination policy.

4.9. There should be a system of regular assessment of the vaccination status of residents and workers by the nursing homes

Vaccination is one of the most important cost-effective strategies for the prevention of infectious diseases available today. We consider it essential for all nursing homes to have a written protocol to verify and enhance the local vaccination programme; to this end, it is recommended that a record be kept of each resident's vaccination and that a protocol be established for action when a resident is detected who needs to update his/her vaccination schedule (10).

While we understand that it is not legally enforceable for workers or residents to provide vaccination information, a voluntary attempt to obtain such information on vaccination status is desirable and should be recorded in the medical records and medical information of the nursing home. Vaccination of workers against influenza and COVID-19 should be promoted by the nursing homes management as a principle of solidarity, ethics and protection of vulnerable people.

For further information, we refer interested parties to a recently published document entitled *The situation of vaccines for the prevention of infections in adults*: *An opinion paper on the situation in Spain* (11).

4.10 It is advisable to have a protocol for the prevention of any type of skin and soft tissue injury with risk of infection

It should be pointed out that in this field not only infections caused by bacteria should be considered, but also those potentially caused by viruses (Herpes zoster); fungi (*Candida* spp) and parasites (scabies). To this end, daily skin checks are appropriate in facilities with a high risk of infection and with more than 50% of residents with a calculated Barthel score ≤ 55 points and in residents at the end of life. In addition to observing the skin daily for warning signs of pressure ulcer (PU), residents with predisposing factors (altered mental status, incontinence, obesity, malnutrition, smoking, reduced mobility, dehydration, etc.) should be identified early. And, of course, we should stress the importance of prevention of pressure injuries and also of moisture-associated skin damage, as well as monitoring for signs of infection in injuries that have already occurred.

The Norton scale **(Table 2)**, which measures a patient's risk of pressure ulcers (PU), is also added.

Some recommendations for skin care include:

- Keep the skin clean and dry, thus limiting the skin's exposure to moisture, urine and faeces.
- Use moisture barrier creams to protect the skin from urine and faeces.
- Change bed linen and clothing as often as necessary.
- Pay attention to buttons on clothing and wrinkles in sheets that may irritate the skin and frequent nappy changing (at least twice a shift).

For more detail on skin care considerations, see the SEGG's protocols for basic care of the elderly (12), or the website of the National Group for the Study and Advice on Pressure Ulcers and Chronic Wounds (GNEAUPP) where a specific library can be consulted at the following link: https://gneaupp.info/biblioteca-internacional-de-heridas/.

Table 2 Norton Scale

General physical condition	Mental condition	Activity	Mobility	Incontinence	Points
Very bad	Stuporous/ coma	Bedbound	Immobile	Urinary and faecal	1
Poor	Confused	Chairbound	Very limited	Urinary or faecal	2
Fair	Apathetic	Walks with help	Slightly impaired	Occasional	3
Good	Alert	Ambulant	Full	None	4

4.11. Recommendations for the prevention and control of gastrointestinal infection

Infections by viruses (norovirus, rotavirus, etc.) and bacteria *(Salmonella*, *Shigella*, *Campylobacter*) are common causes of diarrhoeal disorders in people living in nursing homes, although *C. difficile* infection is particularly prevalent in this population and is related to antibiotic use.

At this point it is particularly important to take into account antimicrobial stewardship (AMS) programmes for the appropriate management of antibiotics in this population (13) of which the incidence of *C. difficile* infection (CDI) would be an indirect marker of antibiotic use or abuse.

CDI is a cause of severe diarrhoea in the elderly. Prevention of *C. difficile* transmission and infection remains a serious and difficult challenge in infection prevention and patient safety. We consider the control of antibiotic consumption to be the most important measure for the prevention of CDI and therefore recommend that all centres should keep a register of residents on antibiotic treatment, review the appropriate duration of treatment and avoid the use of empirical antibiotic treatment as much as possible.

Once a case of diarrhoea has been detected, other measures should be put in place to prevent the spread of infection, either by direct or indirect contact with the patient or their environment, and it is therefore recommended that residents be placed in contact isolation (single room; use of disposable gloves; hand hygiene with soap and water to wash away *C. difficile* spores as these are resistant to alcohols; use of disposable gowns if contact with the patient or their belongings is anticipated). In some care settings, where private rooms may not be available, other actions may be considered, including the use of spatial separation (a minimum distance of 1 metre between beds is recommended) to reduce the possibility of sharing items between the 'isolated' patient and others.

In addition, it is very important to reduce contamination of the resident's room by intensifying cleaning and disinfection measures, especially of objects or surfaces that are touched by hand, with chlorinated products for sanitary use.

4.12. Written protocols are needed to deal with potential outbreaks of HAIs

Outbreaks can be defined as unusual increases in diseases above baseline levels; surveillance and control of outbreaks should be a high priority. Issues to be considered in an outbreak management plan include: development of a case definition, case finding, outbreak analysis, formulation of a transmission hypothesis, design and evaluation of control measures, and reporting to Public Health.

The most common causes of outbreaks are respiratory and gastrointestinal infections. In some cases, a single case may be sufficient to trigger a response of the infection prevention and control programme. Examples of residential outbreaks include: influenza, tuberculosis, meningococcal meningitis, *Legionella* spp. infection, norovirus, salmonellosis, group A streptococcal soft tissue infection, viral hepatitis, scabies and infection with antibiotic resistant pathogens.

4.13. It is recommended that nursing homes that do not have their own pharmacy service establish an agreement with a community or hospital pharmacy in order to receive the necessary pharmaceutical coverage and care and to collaborate in epidemiological surveillance

The new regulation differentiates, as did RDL 16/2012, between homes with more and less than 100 beds for the purpose of establishing pharmaceutical provision. For nursing homes with more than 100 beds, a pharmacy service must be installed, while for homes with less than 100 beds, a variable system is established depending on whether the nursing homes are public or private.

4.14. The development of written recommendations for the prevention of transmission of eye infections and conjunctivitis is recommended

Outbreaks of ocular infection in nursing homes by both bacterial and viral pathogens are well described (14).

Prevention is therefore important to ensure the eye and general health of residents and should basically include measures such as hand hygiene of residents, visitors and caregivers and eyelid washing with clean, warm water or the use of special eyelid cleansing wipes (15, 16).

4.15. Infection prevention and oral health issues

Oral health and hygiene are essential in reducing infections such as aspiration pneumonia (17) but it has also been shown that oral health can significantly affect overall health and is clearly related to the quality of life of older people. Therefore, we believe that oral health programmes should be promoted in nursing homes (18) providing information related to dental care and its importance both to the elderly and to their carers and relatives in order to detect oral diseases and treat them appropriately (19). All this establishes the need for a close relationship between nursing homes and dental professionals (20-24).

5. DATA COLLECTION

Surveillance is important to detect outbreaks, changes in infection rates and other issues requiring infection control intervention (including the need for additional training or education of staff). The components of a monitoring system include a mechanism for data collection, a timetable and procedure for data evaluation, dissemination of results, and

mechanisms for action and follow-up. Monitoring disease patterns over time can provide information on the effectiveness of changes in infection control practices and policies.

Surveillance data can be collected through regular review of medical records, laboratory reports and other records. Monitoring compliance with infection control measures (process indicators such as hand hygiene compliance, catheter care and vaccination rates of staff and residents) is also an important component of infection prevention and control.

The frequency of data review will depend on the size and nature of the centre. Facilities at higher risk (High Risk) of HAI may need to review data at least monthly, while facilities at lower risk could be reviewed on a quarterly (Intermediate Risk) or six-monthly (Low Risk) basis.

Information on trends should be provided to units and employees, and be accompanied by action plans and follow-up.

This data set we advocate can result in an individual's data programme and an institution's data programme. The following are recommendations of its key features.

5.1. Individual monitoring programme: data collection at different points in time

On admission

We consider it necessary to have an individual file for each resident, which includes a complete geriatric assessment on admission, pharmacological treatments, and a social and medical assessment that allows for a complete final assessment of each resident.

Therefore, at the time of admission to a care home, in addition to the Individual Care Plan (ICP) drawn up by the interdisciplinary team of the centre, we believe it is necessary to have the following information in the file:

Checking the current adult vaccination schedule.

Episodes of infection, hospital admission and antibiotic use should be recorded for each individual. For persons with infections that are managed in the nursing home, at least daily recordings should be made of the following:

- Temperature, blood pressure, heart rate and oxygen saturation.
- Presence of bladder catheter.
- Presence of venous catheter.
- Presence of pressure injuries or moisture-associated skin damage.
- Presence of diarrhoea (>3 bowel movements/24 hours).
- Use of antibiotics (1 or more).
- Type of infection.

A sample data collection sheet is tentatively provided **(see Annex 2)**.

Data Collection in Special Situations

After Hospital Admission

There is no data in the literature to support the mandatory systematic search for colonisation by Multi-Resistant (MR) Microorganisms in institutions that care for the elderly. However, we believe it is advisable to record infections caused by MR microorganisms and to record the carrier status of all residents returning from a hospital admission of more than 24 hours **(see Annex 1: Resident Transfer Sheet)**; this pertains to the following microorganisms: Extended-spectrum beta-lactamase (ESBL)-producing Enterobacteriaceae, Carbapenemase-producing Enterobacteriaceae, MR *Pseudomonas aeruginosa*, MR *Acinetobacter baumanii* and MR *Stenotrophomonas maltophilia*. Gram-positive microorganisms should include methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant *Enterococcus* (VRE) and *C. difficile*, although the latter is not genuinely MR.

5.2. Institution's data collection programme

As mentioned above, the collection, examination and evaluation of these data allow the detection of HAI problems and the search for solutions, the effectiveness of which can be recorded.

We understand that this programme cannot be the same in all institutions, because of the inequality of size and resources. The following is a list of parameters and recommendations according to the risk of HAI in nursing homes, which should be available to staff at these facilities **(Table 3)**.

Table 3 List of recommendations for the collection of data from institutions

Parameter	Institution	Description
Hospital admissions	All of them*	Hospital days/total days
Cumulative incidence (CI) of bladder catheterisation	High and medium risk	# of residents with catheter/total # of residents
CI of skin and soft tissue infection (SSTI)	High and medium risk	# of residents with SSTI/ total # of residents
CI of antibiotic treatment (ATB)	All of them*	# residents with ATB/total # of residents
CI of diarrhoea	All of them*	# residents with diarrhoea /total # of residents
Respiratory infection (RI)	All of them*	RI referred to hospital/total RI

High risk: monthly; Medium risk: quarterly; Low risk: six-monthly; CI: cumulative incidence.

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ANNEXES

Annex 1. Resident Transfer Sheet

This form must be filled in for the transfer with the information communicated before or during the transfer.

Surname	Name	Date of birth	Medical history

Referring Centre	Unit to which he/she is derived	Phone

Centre of origin	Contact Name	Phone	E-mail
Nurse/Unit			
Doctor			
Director			
Infection Control			

Does the person* currently have an infection, colonisation OR a positive culture history of a multidrug-resistant organism (MDRO) or other potentially transmissible infectious organism?	Colonisation or history	Active infection or treatment
Methicillin Resistant *Staphylococcus aureus* (MRSA)	☐ Yes	☐ Yes
Vancomycin-Resistant *Enterococcus* (VRE)	☐ Yes	☐ Yes
Clostridioides difficile	☐ Yes	☐ Yes
Multi-resistant *Acinetobacter*	☐ Yes	☐ Yes
Extended-spectrum beta-lactamase (ESBL)-producing Enterobacteriaceae (e.g., *E. coli*, *Klebsiella*, *Proteus*)	☐ Yes	☐ Yes
Carpabenem-resistant *Enterobacteriaceae* (CRE)	☐ Yes	☐ Yes
Multi-resistant *Pseudomonas aeruginosa*	☐ Yes	☐ Yes
Candida auris	☐ Yes	☐ Yes
Others, (e.g. scabies, norovirus, influenza):	☐ Yes	☐ Yes

Does the person currently have any of the following? ☐ (None)

☐ Cough (Start date: ...../...../.....)
☐ Diarrhoea (Start date: ...../...../.....)
☐ Vomiting (Start date: ...../...../.....)
☐ Urinary or faecal incontinence
☐ Open wound requiring healing
☐ Drainage (origin):

☐ Central line/PICC line (Start date: ...../...../.....)
☐ Haemodialysis catheter (Start date: ...../...../.....)
☐ Urinary catheter (Start date: ...../...../.....)
☐ Suprapubic catheter (Start date: ...../...../.....)
☐ Percutaneous gastrostomy (Start date: ...../...../.....)
☐ Tracheostomy

RETURN

Annex 2. Individual Data Collection Sheet

Name of Centre: ..... Date: ...../...../.....

Code	Name	Temp. >38º	Bladder catheter placed	Venous catheter placed	Presence of PU	Diarrhoea (>3 bowel mov.)	Antibiotic sse	Presence of any infection

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Annex 3. Institution's Data Collection Sheet

Cumulative Incidence (CI) and Incidence Density (ID) Calculation

Name of Centre.....

Observation Days .....

Total number of beds .....

Total Number of Residents .....

% Occupancy .....

Total Medical Staff .....

Total Nursing Staff .....

Total Number of Residents catheterised .....

CI Bladder Catheterisation (# Residents Catheterised/Total # Residents .....

ID Catheterisation (1- [CI/(Observation Days x Total Residents)] .....

Total Number of residents with pressure injuries and/or MASD .....

CI pressure and/or moisture injuries (# Residents with Pressure injuries and/or MASD/Total # Residents): .....

ID pressure injuries and/or MASD (1- [CI/(Observation Days x Total Residents)] .....

Total Number of residents on antibiotic treatment .....

CI ATB (# Residents with ATB /Total # Residents): .....

ID ATB (1- [CI/(Observation Days x Total Residents)]: .....

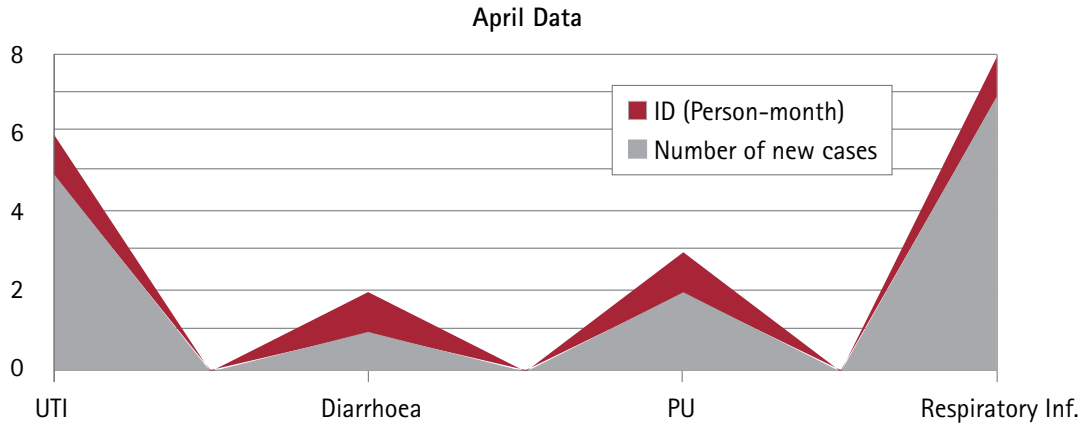
Total Number of residents with diarrhoea .....

CI Diarrhoea (# Residents with Diarrhoea/Total # Residents) .....

ID Diarrhoea (1- [CI/(Observation Days x Total Residents)] .....

Annex 4. Electronic Data Sheet

Institution	XXXX						
Total Number of Residents	100						
Observation Days	30						
Types of care provided	Basics						
	UTI		Diarrhoea		PU		Respiratory
Number of new cases	5		1		2		7
Total number of persons	100		100		100		100
Period	30		30		30		30
CI	0.05		0.01		0.02		0.07
ID	0.00166667		0.00033333		0.00066667		0.002333333
ID (Person-month)	0.99833333		0.99966667		0.99933333		0.997666667



Annex 5. Telephone list of Contacts

We consider it necessary for every nursing home to have a telephone list with contacts of interest, accessible to all employees of the institution.

Institution	Phone	Contact Person
Referral Hospital:		
Pharmacy of the Referral hospital:		
Referral Health Centre:		
Reference Microbiology Laboratory:		
Public Health:		
Social Work:		
Liaison Nurse or Residence Case Manager:		
Reference Community Pharmacy:		