Results of an Italian multi-Long-Term Care Facilities survey on diagnostic, therapeutic, and infection control topics: state of the art and future perspective

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Summary

Background and Aims: current trends in the world's demographic structure indicate increasing requirements for chronic and Long-Term Care Facilities (LTCFs). As the above settings may act as reservoirs for Multidrug-Resistant Organisms (MDROs), it is essential to acquire information about diagnostic, therapeutic, and infection control practices, aiming to optimize strategies for the near future.

Materials and Methods: the annual survey form for assessment of the MDRO management in LTCFs and Residential Homes (RHs) for non-self-sufficient elderly people, promoted by the Centers for Disease Control (CDC), and adapted by the version of the American National Healthcare Safety Network, was sent to LTCFs healthcare operators by the AMCLI GLISTer Working Group. Topics considered were interactions with clinical microbiology laboratories, infection prevention/control and antibiotic stewardship practices, and electronic medical records data availability.

Results and Conclusions: sixteen structures, mostly from 120 to 280 beds, took part in the survey. We registered that i) MDRO colonization screening is usually not adopted in Italian LTCFs for new admissions (14; 87,5%) at present, and ii) microbiological results are usually provided by an external laboratory service. Furthermore, infection control interventions are regularly adopted, and antibiotic prescriptions are registered only in 62,5% and 75% of structures, respectively. About 70% of facilities do not have a strategy for antibiotic use optimization. Planning of 1st/2nd/3rd level MDRO surveillance programs, enhanced training activities, and improved antibiotic consumption control, whether for prophylaxis, empirical, and targeted therapy, appears of paramount importance in the complex reality of LTCFs.

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Introduction

The emergence of Multidrug-Resistant Organisms (MDROs) is a major public health concern [6], and their spread in elderly healthcare services, such as Long-Term Care Facilities (LTCFs), Nursing Homes (NHs), and Residential Homes (RHs), represents an urgent public health threat demanding immediate action [9]. Moreover, it is expected that the population aged from 65 to 79 years will rise to about 15% in 2050 (https://www.oecd.org/els/healthsystems/ 47884543.pdf), and therefore, current trends in the world's demographic structure indicate increasing requirements for long-term care settings. The prevalence of MDROs in LTCFs varies between different continents: Asia reported the highest prevalence of Extended-Spectrum ß-Lactamase (ESBL)-producing *Enterobacterales* (71,6%), Carbapenem-Resistant *Enterobacterales* (CRE) (6,9%) and Methicillin-Resistant *Staphylococcus aureus* (MRSA) (25,6%) and North America the highest prevalence to MDR *Pseudomonas aeruginosa* (5,4%), MDR *Acinetobacter baumannii* (15,0%), Vancomycin-Resistant *Enterococcus* spp. (VRE) (4,0%) and *Clostridioides difficile* (26,1%) [9]. Furthermore, MDRO prevalence has experienced changes over time. Antimicrobial and diagnostic stewardship programs are important factors for reducing colonization with MDROs in older adults with co-morbidities and at increased risk of acquiring skin, soft tissue, respiratory, urinary tract, and gastrointestinal infections [9].

During January-February 2023, the AMCLI GLISTer Working Group proposed a survey to assess the "state of the art" of diagnostic and infection control practices in Italian LTCFs. The survey was performed to determine which specific diagnostic, therapeutic, and/or surveillance-related weak points could be improved, optimizing an LTCF and RH-tailored "strategic infection control plan."

Materials and Methods

Long-Term Care Facility survey

The annual survey form for the assessment of the management of MDROs in LTCFs and RHs for non-self-sufficient elderly people, promoted by the CDC (https://www.cdc.gov/nhsn/forms/57.137_LTCFSurv_BLANK.pdf), and adapted by the version of the American National Healthcare Safety Network, was used.

The topics considered were: i) facility microbiology laboratory practices, ii) infection prevention and control practices, iii) antibiotic stewardship practices, and iv) use of the electronic health record.

Results

Type of structure, number of beds, and primary services offered

We obtained answers from 16 Italian facilities located in Northern Italy, of which the majority (75%) were public. Bed sizes were from 90 to 1500, with most of them (11 out of 16) ranging from 120 to 280 beds (Figure 1).

In terms of primary services, all facilities involved in the investigation offered long-term general nursing (n=16; 100%), and to minor extent they were able to manage long-term dementia (n=6; 37,5%), skilled nursing/short-term (sub-acute) rehabilitation (n=4; 25%), hospice (n=3; 18,8%), palliative care (n=2; 12,5%), long-term psychiatric (n=1; 6,3%) and/or assisted ventilation care (n=1; 6,3%) or other services (n=1; 6,3%).

Facility microbiology laboratory practices

At the question: **"**Does your facility have its own laboratory that performs microbiology/antimicrobial susceptibility testing? If the answer is no, where is your facility's antimicrobial susceptibility testing performed?", all LTCFs/RHs (100%) answered the question, highlighting that in almost all cases (15/16; 93,8%) an internal clinical microbiology laboratory was not present.

Therefore, except for one facility, pathogen species identification and antimicrobial susceptibility reporting for both suspected infections and/or screening of colonization were performed: i) by an affiliated medical center within the same health care setting (10/14; 66,7%), ii) a medical center, contracted locally (3/14; 20%) or iii) a commercial referral laboratory (2/14; 13,3%).

In this context, an organized workflow between an LTCF and its referral clinical microbiology laboratory appears to be essential—in terms of sample shipping time and "time for treatment" reports—to promote and improve adherence to the best practices of targeted therapy in LTCF settings.

Moreover, as an important risk factor for MDRO colonization is a resident's previous hospitalization or medical care, another submitted question, to which all 16 LTCFs answered, was: "Does the Facility screen new admissions for any MDRO, and if yes, for

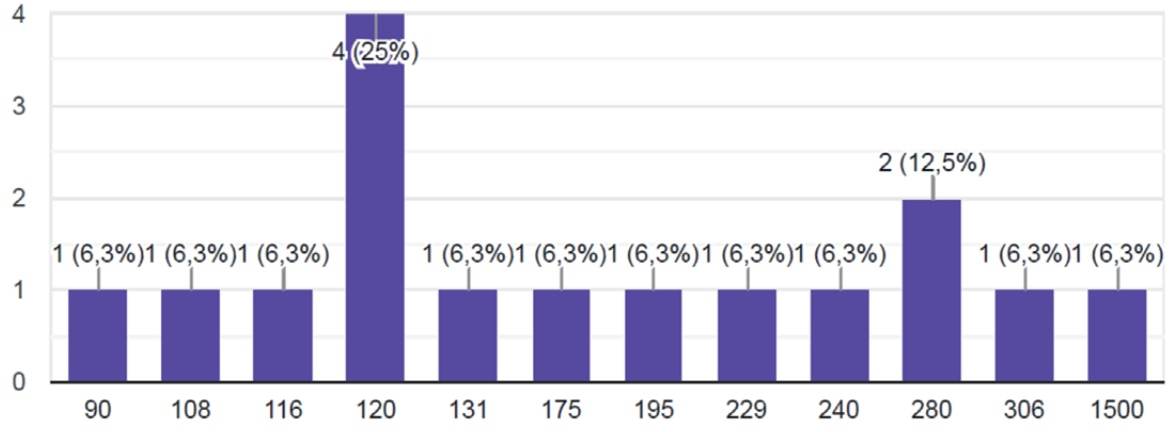

Figure 1. Number of beds in the facilities involved in the survey.

which types of MDROs does the facility screen new admissions?"

We found that this practice is usually not adopted in most Italian facilities (14; 87,5%), while in the remaining two cases (12,5%), the screening is done upon LTCF admission i) in one case only for CRE and ii) in the other case for all the critical healthcare-associated MDROs, including MRSA, VRE, and CRE. Furthermore, asking about the specimen types sent for screening, it was found that both urine and skin lesion/rectal swabs were correctly reported as useful for VRE screening, while only skin lesion swabs underwent MRSA screening. This practice could be improved, as there is evidence that multi-site screening is the optimal strategy for minimizing MRSA exposure within a healthcare facility, and a combination of nasal and throat cultures can provide a practical approach in low-resource settings compared to nasal sampling alone [1]. Besides, while rectal swabs were analyzed for CRE, urine, and skin lesions, swabs were usually investigated for *Acinetobacter spp.* and other GN-MDR organisms. Worryingly, no importance was given to sputum samples for Carbapenem-Resistant *A. baumannii* (CRAB) screening. Universal screening for MRSA and other MDROs at admission in an LTCF is not routinely recommended as a standard procedure; however, a targeted screening based on the evaluation of the patient's risk factors may be useful [11].

Concerning the primary testing method for *Clostridioides difficile*, it is used most often by the facility's laboratory or the outside laboratory where testing is performed (16/16; 100% of the answers). As shown in Figure 2, nearly half of the facilities (7/16; 43,8%) reported that an Enzyme Immunoassay (EIA) for toxins was used, whereas a GDH-NAAT two-step algorithm was applied in 6/16 (37,5%) cases. Overall, it appears that cases of diarrhea and/or suspected *C. difficile* infection are promptly investigated.

We inferred from the answers to the question "Does the laboratory provide a report summarizing the percentage of antibiotic resistance seen in common organisms identified in cultures sent from your facility?", that the majority of the LTCFs (10/16; 62,5%) usually get such epidemiological reports, although yearly in few (3/10; 30%), and every three or more years in the majority of cases (7/10; 70%).

Referred to this subject, the GLISTer Working Group recommends the possibility of having cumulative antibiograms (95% confidence interval) at least annually, with reports including the main MDR phenotypes (MRSA, VRE, ESBL, carbapenemase producers) and using at least 30 isolates/species [2]. Moreover, it could even be useful to aggregate isolates from different LTCFs of the same area and/or all specimen types and/or different years from the same LTCF in order to reach the threshold number of isolates. Otherwise (in case of ≤30 MDR), a description and table showing MDR numbers instead of resistance percentages could be released.

It is important to assess the real circulation of MDROs in the LTCF/territorial area, with both therapeutic and epidemiological purposes [7].

Infection control and prevention practices

From the answers to the question regarding how many total staff hours per week are usually spent for infection prevention and control activities, we found that only in 10/16 (62,5%) facilities this practice was regularly applied, and mainly (6/10; 60% of cases) for a time of five to >17 hours/week, and less frequently (4/10; 40% of cases) for two hours/week. Furthermore, while an active surveillance activity was not routinely performed in 6/16 (37,5%) Facilities, MDRO screening activity was performed for almost one hour and for more than two hours/week in 3/16 (12,5%) and 7/16 (43,75%) cases, respectively (Figure 3).

Moreover, even though active surveillance is the only infection prevention and control practice considered in 1/10 LTCFs, in 9/10 cases, other activities are included (for at least one hour/week in 4/10 facilities and from 2 to ≥30 hours/week in the remaining 5/10). Important aspects of infection control are represented by hand hygiene promotion and training of nurses/clinical staff on healthcare-associated infection prevention and management, as registered within the HALT-1/-2 and HALT-3 studies (European prevalence study on healthcare-associated infections and the use of antibiotics in non-hospital social and healthcare facilities) [5,8].

In healthcare facilities, person-to-person transmission by direct/indirect contact constitutes the major route of transmission and dissemination of antibiotic-resistant strains [4,10], and therefore, it was of interest to know the usage policies of gowns/gloves for care of MDRO colonized or infected residents.

It seems that particular attention is usually paid to CRE, MRSA, VRE, and ESBL colonized or infected residents, even if in a small proportion of structures (4/16; 25%), the presence of an MRSA/VRE/CRE active infection only intensifies risk management, as shown in Figure 4.

The present survey revealed that when a resident colonized or infected with MDROs is transferred to another structure, at the time of transfer, this status is communicated by 13/16 (81,3%)

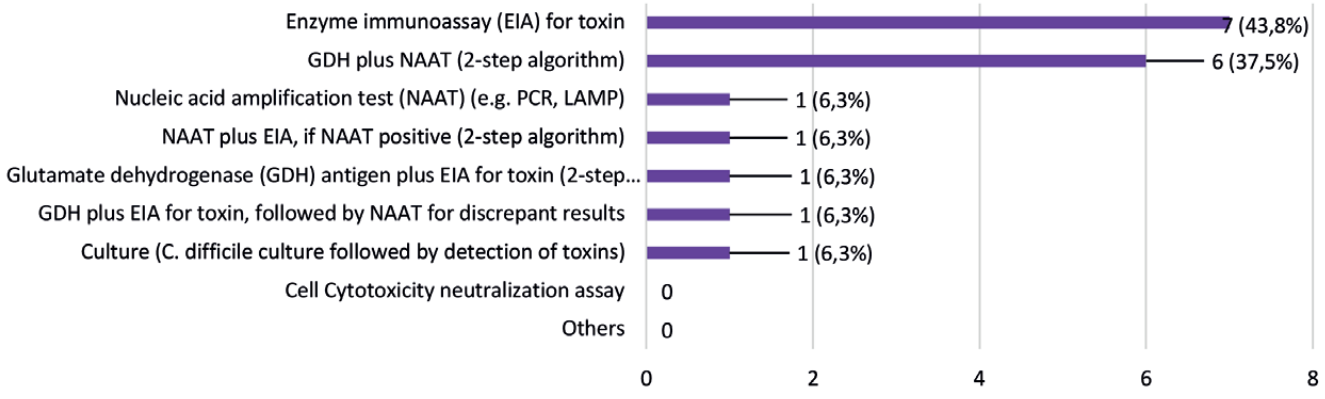

Figure 2. Primary diagnostic methods for *Clostridioides difficile*.

facilities to the receiving organization. Conversely, at the question "Among residents with an MDRO admitted from other healthcare facilities, what percentage of times does your facility receive information from the transferring facility (LTCF, hospital, other healthcare facility, *etc.*) about the resident's MDRO status?" only in 7/16 (43,8%) cases the sending service provided this important information, as shown in Figure 5. This is of concern, given the increasing prevalence of CPE in healthcare facilities across Europe [12]. Moreover, these findings highlight that patients who are transferred from the LTCF to the community can potentially transmit MDROs to community healthcare settings [11].

Crucial steps involved in the containment of the infections spread among LTCF residents are represented by i) MDRO screening on admission, ii) management of patients with rectal colonization by MDROs (ideally, patients should be isolated until screening results are available to limit the spread of MDROs, although this may be difficult if single *en-suite* rooms are in short supply), iii) management of patients at high risk of MDRO infections, iv) management of MDRO transmission by staff, v) implementation of antimicrobial stewardship measures. This last point was included as the object of the survey [11].

Antibiotic management practices

In 31,3% of facilities, the Medical Director (MD) is responsible for implementing activities to improve the use of antimicrobials. The MD is also responsible for evaluating outcomes and optimizing antibiotic use, sometimes together with the pharmacist and other healthcare professionals (in the remaining 68,8% of cases, this role is not precisely identified).

Seventy-five percent of structures register antibiotic prescriptions in the medical record, but only in 50% of cases are treatment recommendations for common infections (to assist with antimicrobial decision-making) provided in agreement with local antibiotic-susceptibility data or national guidelines.

A formal procedure for performing follow-up assessment, 2-3 days after starting a new administration of antimicrobials, to determine whether the antimicrobial is still indicated and appropriate (*e.g.* antibiotic time-out), and a formal procedure for reviewing courses of antimicrobial therapy and communicating with prescribers on antimicrobial selection, dosing or duration of therapy (*i.e.* audit and feedback), are used only in 25% and 12,5% of structures, respectively.

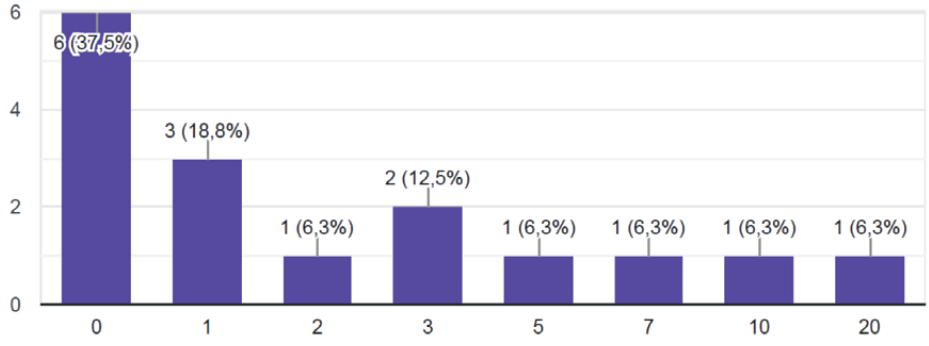

Figure 3. Total staff hours per week are usually spent on active surveillance activity.

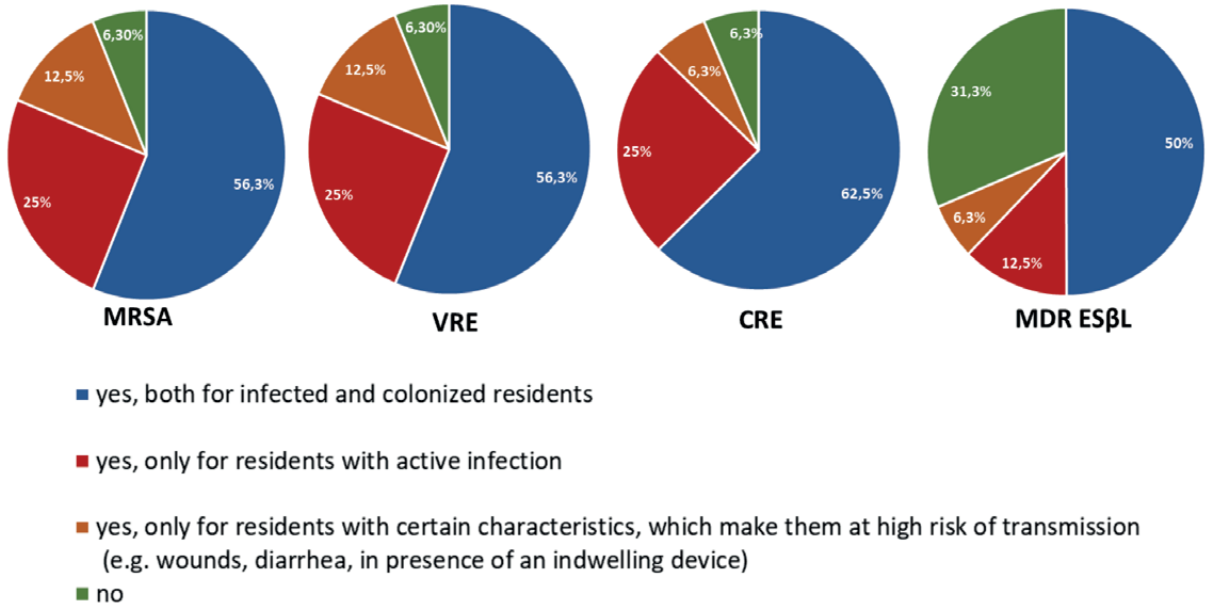

Figure 4. Preferential use of gowns/gloves for the care of Multidrug-Resistant Organism (MDROs) infected or colonized residents.

Of note, only 37,5% of LTCFs have a system (pharmacy service, electronic medical record, or other not further specified systems) for tracking antimicrobial use (*e.g.*, half-yearly report on the number of prescriptions, number of days of treatment, etc.).

Education to clinicians and other facility staff on improving antibiotic use is annually provided in 31,3% of facilities, and a written statement from leadership that supports efforts to improve antimicrobial use is present in only 43,8% of cases. Leadership reviews data on antimicrobial use and resistance in 12,5% of structures, and data are discussed with antimicrobial stewardship experts (*e.g.*, consultant pharmacist trained in antimicrobial stewardship, stewardship team at the referral hospital, external infectious disease/stewardship consultant) in 43,8% of cases only.

Use of the electronic health record

The possibility of accessing information through IT extrapolation of data from the electronic medical record is mainly concerned with the subjects shown in Figure 6.

Conclusions

This study surveyed the application of specific policies aimed at the identification of potential multi-sectoral interventions in Italian LTCFs to reduce MDRO spread among non-self-sufficient elderly people.

It is noteworthy that only the more complex LTCFs, which are structurally closer to hospitals and have greater resources, usually carry out MDRO surveillance screening at admission. However, isolation and containment procedures are almost always applied in case of resident colonization or confirmed infection by MRSA, VRE, and CRE.

In a quarter of the structures, it is uncommon to register antibiotic prescriptions in the medical record, and 50% of the LTCFs provide clinicians with their own therapy recommendations. About 70% of LTCFs do not have leadership that supports efforts to improve antimicrobial use, and follow-up procedures for reviewing antimicrobial therapy are usually absent. In the absence of specific procedures and feedback, antimicrobial therapy is entirely managed by clinicians, and only 31% of LTCFs

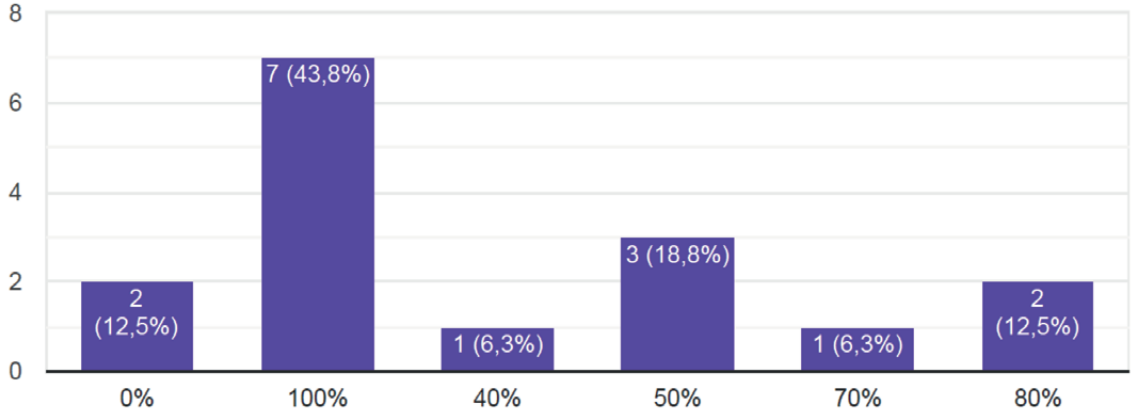

Figure 5. Communications of a resident Multidrug-Resistant Organism (MDRO) colonized or infected status from the previous setting.

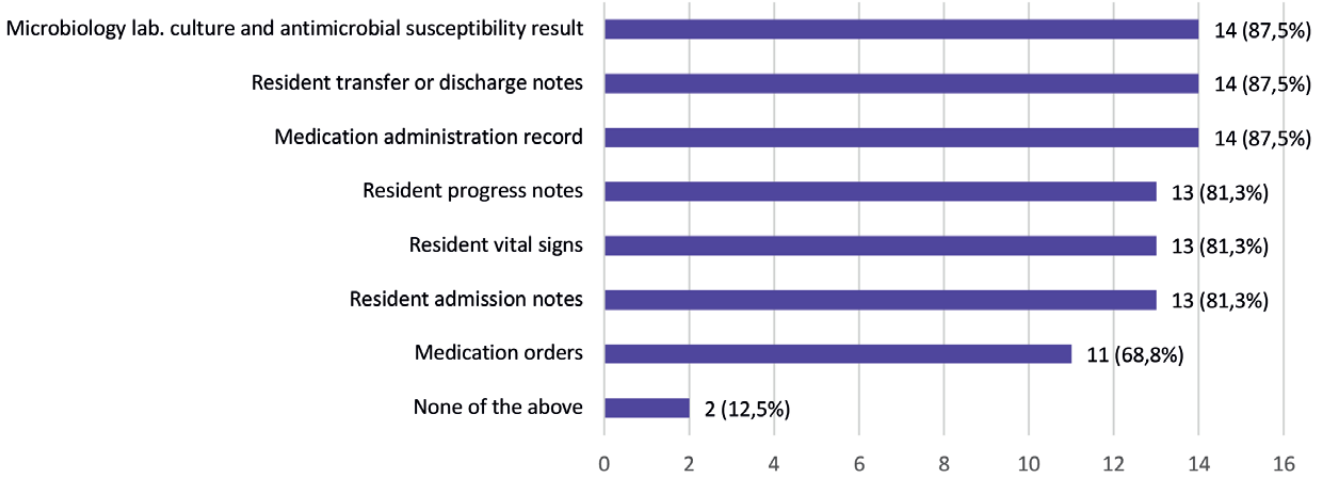

Figure 6. Data available by electronic medical records.

promote training activities for medical and healthcare personnel yearly.

The CDC recommends that all NHs take steps to improve antibiotic prescribing practices and outline practical ways to initiate or expand antibiotic stewardship activities in NHs (https://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html). The extension of diagnostic requests to all cases of suspected infection, with useful return in terms of an annual epidemiological report able to guide therapeutic choices, appears to be an obligatory step to proper resident management. In this regard, the introduction of specific biomarkers, able to give better evidence of infection status in case of cognitive impairment or nonspecific symptomatology, could be implemented [3]. Adherence to 1st/2nd/3rd level surveillance programs, as suggested by recommendations [11] in *ad hoc* times, is also necessary to avoid MDRO spread. The alignment of LTCF staff training activities with the standards of acute care hospitals is also required due to the high prevalence of Italian MDRO circulation in various LTCFs. A better use tracking of antimicrobials by monitoring prophylaxis, empiric or targeted therapies, also in alignment with the World Health Organization (WHO) AWaRe category guidelines (https://www.who.int/publications/i/item/WHO-MHP-HPS-EML-2022.02), is urgently needed. At present, a strategic plan tailored to LTCFs depends on "to what extent" diagnostic, therapeutic, surveillance and training programs *ad hoc,* could be financially and organically supported. An Italian "Expert group for LTCFs" with professionals working (partially) in/for LTCFs tasked with the development of infection prevention and control guidelines could, therefore, be established.

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