

7

Antimicrobial resistance in long-term care facilities

This chapter analyses the complex threat posed by antimicrobial resistance (AMR) in long-term care facilities (LTCFs). After reporting on the latest data and trends on AMR in LTCFs, it presents findings from an OECD survey on policies in place across up to 34 European Union (EU) and European Economic Area (EEA) members and OECD countries. Results from the survey identify a number of gaps, particularly related to current surveillance systems and policies to promote prudent use of antibiotics and prevent infections. Finally, the chapter concludes by making the case for more piloting of policy actions specifically designed and adapted to LTCFs.

Key findings

- Antimicrobial resistance (AMR) in long-term care facilities (LTCFs) is a complex threat not only to residents and staff of LTCFs but also to broader communities. When staff, visitors and residents move in and out of LTCFs, so do organisms, including resistant pathogens.
- Residents of LTCFs are at a higher risk of healthcare-associated infections (HAIs) compared to community-dwelling older adults.
 - On average across OECD countries for which point prevalence survey (PPS) data are available, in 2016-18, about 3.8% of residents in participating LTCFs had an HAI.
 - On average across OECD countries for which data are available, in 2016-17, almost one in three isolates from HAIs among LTCF residents were resistant to first-line antimicrobial treatments.
 - LTCF residents in Australia and England (United Kingdom) were two to four times more likely than community-dwelling older adults to have resistant infections or isolates.
- Many residents of LTCFs receive multiple courses of antibiotics each year.
 - On average across OECD countries for which PPS data are available, in 2016-17, around 5% of LTCF residents had at least one systemic antibiotic prescription on survey dates.
 - Based on an analysis of period prevalence estimates from nine countries, between 1985 and 2017, 62% of residents of LTCFs used at least one antibiotic over a period of 12 months.
 - Despite it being crucial to ensure that antibiotics are used wisely, up to one in four antibiotic prescriptions in LTCFs are unnecessary or inappropriate. Moreover, in Europe, between 54% and 96% of antibiotic prescriptions in LTCFs are given without laboratory or diagnostic testing, not always in alignment with evidence-based guidelines.
- Many countries have legislation and policies to tackle AMR in LTCFs but there are important gaps in the effective use of antimicrobial stewardship programmes (ASPs) and infection prevention and control (IPC) practices.
 - Just over half of EU/EEA and OECD countries (17 out of 33) report having a national action plan on AMR that specifically references LTCFs.
 - In most countries, there are no guidelines, protocols or requirements for the adoption of ASP in LTCFs, with only 3 out of 20 countries having guidelines, protocols or requirements for the adoption of budgets dedicated to ASP in LTCFs.
 - Four in 5 countries (21 out of 26) report having guidelines, protocols or requirements for the adoption of IPC programmes or protocols in LTCFs, but only 12 out of 25 countries report having a process of surveillance/audit of IPC policies in LTCFs.
- Data on antibiotic use and AMR in LTCFs can i) help guide the development of lists of antibiotics that should be preserved, ii) enable benchmarking, auditing and goal setting, and iii) be used to assess the impact of policy actions to tackle inappropriate antibiotic use as well as AMR in LTCFs. Yet, data on antibiotic consumption and AMR in LTCFs are not yet widely available and routine surveillance is still limited in most countries.
 - Just over a third of countries (9 out of 25) conduct surveillance of antibiotic consumption in LTCFs, and only 32% (8 out of 25 countries) conduct surveillance of AMR in LTCFs.
 - About 40% (9 out of 23 countries) conduct surveillance of HAIs and 50% (12 out of 24 countries) have surveillance of multidrug-resistant organisms.

- Fewer than 1 in 5 (4 out of 23 countries) report having surveillance of indicators of ASP and 22% (6 out of 23 countries) have surveillance of indicators of IPC in LTCFs.
- Moreover, existing data suffer from important limitations, such as the lack of a standard unit of measurement for antibiotic use, and a heavy reliance on PSSs, which suffer from limitations, including seasonal variations and cross-country differences in sampling.
- Tackling AMR in LTCFs is a key part of addressing the threat of AMR more broadly, but responses to this challenge must acknowledge that LTCFs have different needs and face different risks compared to acute care hospitals. It is positive that 28 countries (out of 28) report that they plan to include references to long-term care (LTC) in their next national action plan on AMR, making it clear that AMR and inappropriate antibiotic use in LTCFs require targeted policy actions. Policy options for countries to consider include:
 - Setting up routine surveillance systems that can collect and report data on antibiotic use and AMR in LTCFs. Routine surveillance is essential to establish a baseline situation, design policies that are fit for LTCFs, and monitor and evaluate the impact of those policies.
 - Promoting the design, implementation and effective use of ASPs that are fit for LTCFs, including more integration with prescribers (e.g. general practitioners), better feedback on antibiotic use and AMR profiles, regular training and a budget dedicated to ASP.
 - Incentivising adoption and compliance with IPC practices that are tailored to LTCFs, emphasising the need for budgets specifically earmarked for IPC, creation of IPC committees and adoption of procedures for surveillance and auditing of IPC processes in LTCFs.
- Many countries (e.g. Belgium, France, Greece, Ireland and Portugal) do not mandate, incentivise or monitor the adoption of ASP and IPC in LTCFs. While guidelines and centralised policy advice are helpful, these may be insufficient to ensure change at scale. Many LTCFs face enormous challenges, from staff shortages to limited financial resources, to significant and complex demands from their residents. Financial strategies targeting healthcare providers to promote the prudent use of antibiotics have been shown to improve the appropriateness of antibiotic prescribing in various healthcare settings and a combination of well-funded mandates and financial incentives may be a way forward.
- More work is needed to understand what policies are most effective in what contexts (e.g. which financial strategies are most effective in LTCFs) and countries seeking to improve antibiotic consumption and minimise the threat of AMR in LTCFs should make greater use of pilot projects and experimentation, coupled with monitoring and evaluation.

Why a special focus on AMR in LTCFs?

Many factors come together to make AMR in LTCFs an especially challenging threat, not only to residents and staff of LTCFs but also to broader communities in which these facilities are located.

First, the majority of LTCF residents are older (i.e. aged 65 years and over) and frail, and many have multiple comorbidities, often suffering from incontinence, disorientation, malnourishment, limited mobility and pressure ulcers. Caring for residents with multiple comorbidities can require the use of invasive devices such as gastronomy feeding tubes and indwelling urinary catheters. Frailty, comorbidities and use of invasive devices are all factors that make residents of LTCFs more susceptible to HAIs, including from resistant organisms, compared to older people living in the community (Bonomo, 2000^[1]; Moyo et al., 2020^[2]; Tandan et al., 2018^[3]; Nicolle, 2001^[4]). Box 7.1 provides an overview of the definition of LTC used in this report, the types of LTCFs included, and how the definition and scope of the paper affect the interpretation of the key findings.

Second, while many infections are preventable, IPC practices are more difficult to implement effectively in LTCFs than in acute care hospitals. Most IPC policies are designed for closed systems, such as hospital wards in acute care hospitals, but LTCFs are different from acute care hospitals in important ways that require IPC programmes to be modified and tailored (Marra et al., 2018^[5]; Oberjé, Tanke and Jeurissen, 2016^[6]). Residents of LTCFs are encouraged to socialise and share communal spaces as a way to promote good mental health and well-being (Mody et al., 2015^[7]). Some residents of LTCFs have cognitive impairments; they may suffer from disorientation, wander and be less willing to use personal protective equipment (Auditor General of Ontario, 2009^[8]). Stays at LTCFs are also typically much longer than stays in acute care hospitals. To add to these challenges, LTCFs tend to have more limited budgets, often have lower staff-to-resident ratios and fewer staff qualified in IPC compared to acute care hospitals (Stone et al., 2018^[9]). Certain IPC measures, such as isolation, can be difficult to implement in LTCFs and may lead to depressive symptoms and reduced quality of life among residents (Loeb et al., 2001^[10]; Schora et al., 2014^[11]) and may be ineffective if not well designed (e.g. targeted at high-risk situations).

Third, because LTCF residents are at a higher risk of HAIs, antibiotics are frequently prescribed to residents, not only to treat but also often to prevent, infections. Many residents of LTCFs receive multiple courses of antibiotics each year (Stuart, Lim and Kong, 2014^[12]; Nicolle et al., 2000^[13]). AMR evolves naturally because of antibiotic use and the more antibiotics are used, the less effective they become (OECD, 2018^[14]). It is thus crucial to ensure that antibiotics are used wisely. Yet, up to one in four antibiotic prescriptions in LTCFs are unnecessary or inappropriate in terms of not only the duration and choice of therapy but also the need for therapy in the first place (Furuno and Mody, 2020^[15]; Patterson et al., 2019^[16]). In Europe, between 54% and 96% of antibiotic prescriptions in LTCFs are given without laboratory or diagnostic testing (Latour et al., 2012^[17]; Szabó and Böröcz, 2014^[18]). Antibiotics are commonly used in LTCFs for asymptomatic urinary tract infections, even though randomised controlled trials suggest that this offers no benefit and may promote AMR (Zabarsky, Sethi and Donskey, 2008^[19]). Inappropriate use of antibiotics is associated with high rates of multidrug-resistant organisms recovered in LTCFs, rates which are comparable to those in acute care hospitals (Bonomo, 2000^[1]; Nicolle, 2014^[20]; Cassone and Mody, 2015^[21]; Suetens et al., 2018^[22]).

Fourth, due to the greater propensity for HAIs among LTCF residents, challenges in implementing good IPC practices and high rates of inappropriate antibiotic use, residents of LTCFs are more likely to be infected with resistant pathogens, including multidrug-resistant organisms, compared to community-dwelling older adults (Cassone and Mody, 2015^[21]). For example, in a large retrospective cohort study of individuals aged 70 years and older in England (United Kingdom), residents of LTCFs were over four times more likely than community-dwelling older adults to have laboratory-confirmed resistant *Escherichia coli* or *Klebsiella* urinary tract infections (Rosello et al., 2017^[23]). In another study of community-dwelling older adults and LTCF residents, aged 65 years and older, who visited emergency departments and outpatient clinics in Australia, methicillin resistance among *Staphylococcus aureus* isolates from LTCF residents was more than double than those from community-dwelling adults (Xie et al., 2012^[24]).

Box 7.1. LTCFs: Definitions, scope and implications

What is long-term care or LTC?

While the exact definition of LTC does differ from country to country, its main goal can be defined as supporting individuals who have a degree of long-term functional or cognitive disability to live as independently and safely as possible (OECD/Eurostat/WHO, 2017^[25]). This type of care can be provided at home (e.g. home care), in the community (e.g. day care) and in LTCFs. While people of any age may require LTC, most care recipients are aged 65 years and older.

What types of LTCFs are included in this chapter?

Residential homes, general nursing homes and mixed LTCFs that mainly provide care for older adults are included in this chapter, under the umbrella of LTCFs.

- *Residential homes* are also known as personal care homes, assisted living facilities, aged care facilities or care homes. Residents of these facilities are unable to live independently and typically require help with (instrumental) activities of daily living such as personal care, housekeeping and meal preparation.
- *General nursing homes* are facilities that care for older people with severe illness or injuries, requiring skilled nursing care 24 hours a day. They may also include nursing homes specialised in a specific type of care such as physical impairment, dementia, psychiatric illness, rehabilitation, intensive or palliative care.
- *Mixed LTCFs* are a combination of residential homes and general nursing homes. Facilities for the mentally and physically disabled, rehabilitation centres, day care centres and palliative care centres are excluded, as are acute care hospitals, primary, community or outpatient healthcare settings.

Implications of definitions and scope on the interpretation of findings in this chapter

There are cross-country differences in the types of services provided by LTCFs and the individual needs that they seek to meet. While these differences may help explain differences in the prevalence of AMR in LTCFs, it is challenging to capture these differences empirically. Moreover, these differences may also lead to variations in measuring antibiotic use in different countries (van Buul et al., 2020^[26]). Further research is needed to characterise the provision of care in LTCFs and how this provision relates to antibiotic use and AMR in LTCFs.

Source: OECD/Eurostat/WHO (2017^[25]), *A System of Health Accounts 2011: Revised edition*, <https://doi.org/10.1787/9789264270985-en>.

Fifth, and finally, surveillance and monitoring of antibiotic use and AMR in LTCFs are limited. Without accurate, timely and detailed data, many policy options are not available or not effective. Data on antibiotic use and AMR in LTCFs can help guide the development of lists of antibiotics that should be preserved, they can enable benchmarking, auditing and goal setting, and they can be used to assess the impact of policy actions to tackle inappropriate antibiotic use as well as AMR in LTCFs. Despite this, data on antibiotic consumption and AMR in LTCFs are not yet widely available and routine surveillance is still limited in most countries (Haenen et al., 2019^[27]).

Inappropriate antibiotic use and AMR in LTCFs are not just a problem for LTCFs, as they can have negative spill-overs into the broader community, putting wider populations at risk of AMR. When staff, visitors and residents move in and out of LTCFs, so do organisms, including resistant pathogens. As a result, AMR in

LTCFs is a threat to not only LTCF residents but also to local communities in which facilities are located. Movement of residents between LTCFs and acute care hospitals is especially important, with one study conducted in the United States finding that in a 15-month period, 4.4 million admissions to LTCFs came from acute care hospitals and 2.1 million discharges from LTCFs were to acute care hospitals (Kahvecioglu et al., 2014^[28]). Moreover, there are also opportunities for LTCF staff to spread organisms as they often work at multiple sites (van den Dool et al., 2016^[29]). LTCFs are thus important reservoirs of AMR and multidrug-resistant organisms (Augustine and Bonomo, 2011^[30]; Nucleo et al., 2018^[31]).

Tackling AMR and inappropriate antibiotic use in LTCFs is a key part of addressing the threat of AMR more broadly. Crucially, public responses to this challenge must take into account the specificities of LTCFs, acknowledging that these facilities have different needs and face different risks compared to acute care hospitals. This chapter provides an overview of trends in AMR and the use of antibiotics in LTCFs in OECD countries, presents the results of a new survey on country actions to address AMR and inappropriate antibiotic use in LTCFs, and proposes strategies that countries may adopt to tackle the threat of AMR in LTCFs.

Trends in antibiotic consumption and resistance in LTCFs

In the last decades, it has become increasingly clear that AMR in LTCFs is an area of concern. Studies going back to the late 1980s explored the appropriateness of antibiotic therapy in LTCFs and the potential for the emergence of resistant strains and the spread of infections from LTCFs to other healthcare settings (Jones et al., 1987^[32]; Warren et al., 1991^[33]; Zervos, 1987^[34]). Since then, there have been multiple studies and surveys focusing on LTCFs seeking to quantify antibiotic use, appropriateness of antibiotic use and AMR. Chief amongst these surveys are the multiple point prevalence surveys conducted at the national and cross-country levels (e.g. by the European Centre for Disease Prevention and Control, ECDC).

Notwithstanding this long history of previous work, benchmarking and assessing trends in antibiotic use and AMR in LTCFs continues to present challenges due to a lack of a standard unit of measurement for antibiotic use (Fulchini et al., 2019^[35]) and an aggregate measure of AMR. For example, metrics used in different studies include defined daily doses per 1 000 resident days (Marra et al., 2017^[36]), the percentage of LTCF residents nationally that received at least one antibiotic in a 12-month period (Thornley et al., 2019^[37]) and days of therapy per 100 regimens (Peron et al., 2013^[38]). The variables monitored in these studies as well as the units of measurement differ so much that comparisons across studies are very difficult.

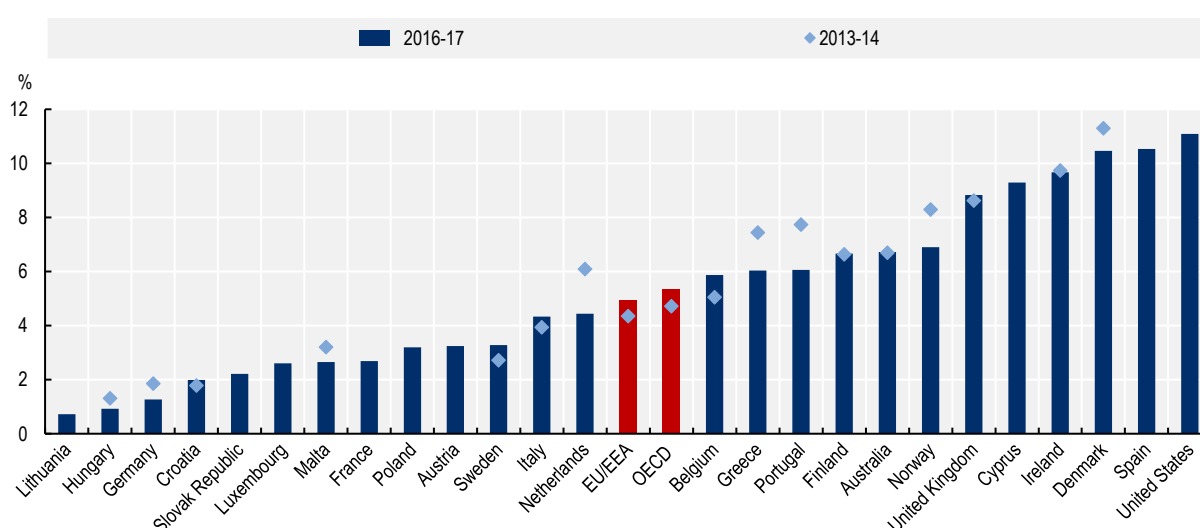
Moreover, most country-level data on antibiotic use and AMR in LTCFs are collected through PPSs but these may not provide a true representation of infection prevalence or antibiotic use for a number of reasons. For example, PPSs can be affected by seasonal variations, with more infections being reported in colder months compared to warmer months (Lee et al., 2019^[39]). Like any other survey, participation may be lower in some subgroups (e.g. countries), which may affect the representativeness of results. The ECDC, the United States Centers for Disease Control and Prevention (CDC), the Australian Commission on Safety and Quality in Health Care and many other governmental agencies in OECD countries, have conducted PPSs in LTCFs. Across these different studies, and even within each study, the average age of LTCF residents surveyed varied widely. In participating LTCFs in the EU/EEA, residents aged 85 years and older ranged from 12% in Lithuania to over 60% in France (ECDC, 2014^[40]; Suetens et al., 2018^[22]). In Australia, 59.5% of residents were aged 85 years and older (ACSQHC, 2019^[41]). There is also variation in other factors relevant to antibiotic use and AMR, such as the use of urinary catheters and recent surgery (Suetens et al., 2018^[22]). Differences in these and other factors can naturally lead to differences in the prevalence of infections, consumption of antibiotics and AMR proportions. The trends presented in this section should thus be interpreted with caution.

Trends in antibiotic consumption in LTCFs

On average across OECD countries for which PPS data are available (specifically Australia, England [United Kingdom], the United States and OECD countries in the EU/EEA), in 2016-17, around 5% of LTCF residents had at least 1 systemic antibiotic prescription on survey dates, ranging from 0.7% in Lithuania to 10.5% in Denmark and Spain (Figure 7.1). In 2013 (in Australia and OECD countries in the EU/EEA), a cross-country average of 4.7% of LTCF residents had at least one systemic antibiotic prescription on survey dates, ranging from 1.3% in Hungary to 11.3% in Denmark.

Figure 7.1. Antibiotic prescriptions in LTCFs in EU/EEA and OECD countries, in 2013-14 and 2016-17 (or closest years)

Percentage of residents with at least one systemic antibiotic prescription on survey dates (see note)



Note: Australian surveys were held in 2017 and 2018, and the US survey was from 2013-14. In the United Kingdom, England did not participate in the 2016-17 survey and Scotland did not participate in the 2013 survey. A PPS for England (United Kingdom) conducted at the end of 2017 has reported that 6.3% of LTCF residents on the survey date were on at least one antibiotic (Thornley et al., 2019^[37]); these data are not included in the figure as it was not possible to determine comparability with the 2016-17 ECDC survey. In 2013, within-country data representativeness was poor or very poor in Croatia, England (United Kingdom), Finland, Greece, Malta, the Netherlands, Norway and the United States.

Source: Ricchizzi, E. et al. (2018^[42]), "Antimicrobial use in European long-term care facilities: Results from the third point prevalence survey of healthcare-associated infections and antimicrobial use, 2016 to 2017", <https://doi.org/10.2807/1560-7917.ES.2018.23.46.1800394>; ECDC (2014^[40]), *Point Prevalence Survey of Healthcare-associated Infections and Antimicrobial Use in European Long-term Care Facilities April to May 2013*, <https://doi.org/10.2900/24172>; Thompson, N. et al. (2016^[43]), "Prevalence of antimicrobial use and opportunities to improve prescribing practices in U.S. nursing homes", <https://doi.org/10.1016/j.jamda.2016.08.013>; ACSQHC (2019^[41]), *2018 Aged Care National Antimicrobial Prescribing Survey Report*, Australian Commission on Safety and Quality in Health Care.

StatLink  <https://stat.link/ou24be>

The average EU/EEA prevalence of antibiotics was 4.9%, similar to that reported in previous similar surveys that report data on HAIs in LTCFs from 2010 (4.3%) and 2013 (4.4%) (Ricchizzi et al., 2018^[42]). As in previous ECDC surveys, approximately one-third of all antibiotic prescriptions were for prophylactic use (Ricchizzi et al., 2018^[42]). In the 2018 Australian PPS, 6.7% of residents in participating LTCFs were prescribed an oral antibiotic on the day of the survey, the same rate as the previous 2017 survey and 27% of all antibiotics were for prophylactic use (ACSQHC, 2019^[41]). The latest Aged Care National Antimicrobial Prescribing Survey, from 2019, found prolonged prophylaxis for conditions where this is not recommended by guidelines, an issue of concern, which was thought to require urgent attention (ACSQHC, 2021^[44]). In the United States, 11.1% of residents in participating LTCFs received at least one antibiotic on the survey

date (Thompson et al., 2016^[43]). In England (United Kingdom), in 2017, about 6.3% of LTCF residents on the survey date were on at least one antibiotic (Thornley et al., 2019^[37]).

According to an analysis by Raban et al. (2021^[45]) of 19 period prevalence estimates from 9 countries (including Australia, the United Kingdom, the United States and EU/EEA countries) between 1985 and 2017, the percentage of residents of LTCFs that used at least one antibiotic over a period of 12 months ranged from 45% to 79%, with a pooled estimate of 62%. Box 7.2 briefly discusses how the COVID-19 pandemic has affected antibiotic use in LTCFs and how consumption may change in the longer term.

Box 7.2. The impact of the COVID-19 pandemic on antibiotic use in LTCFs

Overall, antibiotic use in LTCFs seems to have decreased during the COVID-19 pandemic but consumption may rebound as countries move towards “living with the virus”

During the first wave of COVID-19, there was significant uncertainty and there was a surge in the use of antibiotics to treat COVID-19 patients (Beović et al., 2018^[46]; Pelfrene, Botgros and Cavaleri, 2021^[47]). Around three in every four COVID-19 patients were given antibiotics (Langford et al., 2021^[48]; Rawson et al., 2020^[49]), yet only around 4% of COVID-19 patients actually had a bacterial coinfection (Strathdee, Davies and Marcelin, 2020^[50]). On the other hand, a higher proportion of around 14% of COVID-19 patients did acquire nosocomial infections, especially those patients requiring intensive care (Strathdee, Davies and Marcelin, 2020^[50]), and these types of infections tended to be multidrug resistant (Khurana et al., 2021^[51]).

A study of antibiotic use data from 1944 LTCFs in the United States noted a 16% reduction in overall antibiotic use between January and June 2020 – compared to the 9% seasonal decrease observed in 2019 – and a 4% reduction in October 2020 compared to October 2019 (Gouin et al., 2021^[52]). However, there was an overall increase in antibiotics commonly used for respiratory tract infections (Gouin et al., 2021^[52]). The authors posited that the reduction in antibiotic use in LTCF might have been attributable to changes in the resident population during the pandemic and lower rates of elective procedures, which may have affected rates of short-stay residents who require skilled nursing care after discharge and typically use more antibiotics. Increased use of IPC measures (e.g. physical distancing, mask use) in the second and subsequent waves of the pandemic may have also led to the lower transmission of bacterial infections and consequently lower antibiotic use in LTCFs.

Apparent reductions in antibiotic use during the pandemic could be reversed as countries move towards “living with the virus” and as non-pharmaceutical interventions are relaxed or even abandoned altogether. Moreover, the impact of post-COVID-19 condition (colloquially known as long COVID), with its associated risks of loss of longitudinal function and cognitive decline on the already weakened immune systems of LTCF residents, remains unclear.

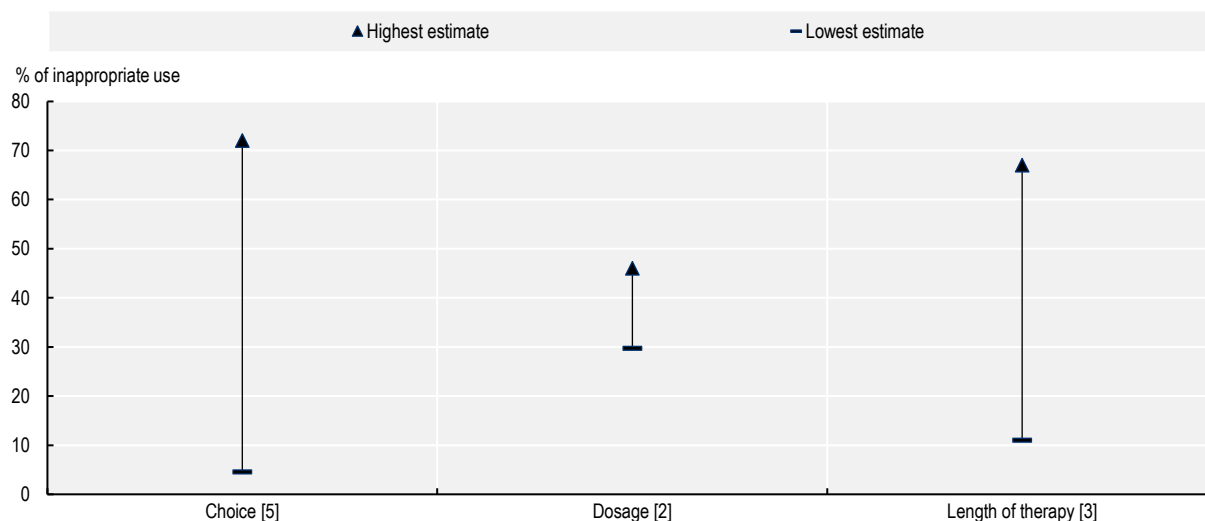
Source: Beović, B. et al. (2018^[46]), *Antibiotic Prescribing in Long-term Care Facilities for the Elderly*, https://www.euro.who.int/_data/assets/pdf_file/0004/386419/evipnet-euro-slovenia-no3-eng.pdf (accessed on 29 October 2020); Pelfrene, E., R. Botgros and M. Cavaleri (2021^[47]), “Antimicrobial multidrug resistance in the era of COVID-19: A forgotten plight?”, <https://doi.org/10.1186/S13756-021-00893-Z>; Rawson, T. et al. (2020^[49]), “Bacterial and fungal coinfection in individuals with coronavirus: A rapid review to support COVID-19 antimicrobial prescribing”, <https://doi.org/10.1093/CID/CIAA530>; Langford, B. et al. (2021^[48]), “Antibiotic prescribing in patients with COVID-19: Rapid review and meta-analysis”, <https://doi.org/10.1016/J.CMI.2020.12.018>; Strathdee, S., S. Davies and J. Marcelin (2020^[50]), “Confronting antimicrobial resistance beyond the COVID-19 pandemic and the 2020 US election”, [https://doi.org/10.1016/S0140-6736\(20\)32063-8](https://doi.org/10.1016/S0140-6736(20)32063-8); Khurana, S. et al. (2021^[51]), “Profile of co-infections & secondary infections in COVID-19 patients at a dedicated COVID-19 facility of a tertiary care Indian hospital: Implication on antimicrobial resistance”, <https://doi.org/10.1016/J.JMMB.2020.10.014>; Gouin, K. et al. (2021^[52]), “Trends in prescribing of antibiotics and drugs investigated for coronavirus disease 2019 (COVID-19) treatment in US nursing home residents during the COVID-19 pandemic”, <https://doi.org/10.1093/cid/ciab225>.

The appropriateness of antibiotic prescribing in LTCFs

Estimates vary, but a significant share (up to 75%) of antibiotic prescriptions in LTCFs are considered unnecessary or inappropriate, as seen in Figure 7.2 (Loeb, 2003^[53]; Morrill et al., 2016^[54]; Beović et al., 2018^[46]; Furuno and Mody, 2020^[15]; Patterson et al., 2019^[16]). Antibiotics can be inappropriate based on their indication, choice, dosage and length of therapy.

Figure 7.2. A significant share of antibiotic prescriptions in LTCFs are considered inappropriate

Estimated proportion of inappropriate antibiotic prescriptions by choice, duration and length of therapy



Note: Where indicated, criteria for inappropriate use: Loeb, McGeer, CDC FDA Guidelines, Consensus criteria, literature and patient chart reviews. Numbers in square brackets indicate the number of studies used to determine the range of inappropriate use. Assessing the appropriateness of antibiotic prescribing in LTCFs is not without challenges. Guideline-based criteria such as the McGeer criteria are widely used but they were developed for infection surveillance purposes and are highly specific rather than sensitive (McGeer et al., 1991^[55]; van Buul et al., 2015^[56]). In addition, resident chart reviews may be unreliable because residents often receive antibiotics without any documented signs or symptoms of infection (ACSQHC, 2019^[41]). This lack of documentation hinders efforts to assess the appropriateness of antibiotic use in LTCFs.

Source: OECD analysis based on Loeb (2003^[53]), "Risk factors for resistance to antimicrobial agents among nursing home residents", <https://doi.org/10.1093/aje/kwf173>; Morrill et al. (2016^[54]), "Antimicrobial stewardship in long-term care facilities: A call to action", <http://doi.org/10.1016/j.jamda.2015.11.013>; Noević et al. (2018^[46]) "Antibiotic Prescribing in Long-term Care Facilities for the Elderly", https://www.euro.who.int/_data/assets/pdf_file/0004/386419/evipnet-euro-slovenia-no3-eng.pdf; Furuno and Mody (2020^[15]), "Several roads lead to Rome: Operationalizing antibiotic stewardship programs in nursing homes", <http://doi.org/10.1111/jgs.16279>; Patterson et al. (2019^[16]) "Evidence of a care home effect on antibiotic prescribing for those that transition into a care home: A national data linkage study", <http://doi.org/10.1017/s0950268818003382>.

StatLink  <https://stat.link/y5ikxs>

Inappropriate initiation of antibiotics occurs when antibiotic therapy was not indicated for the clinical condition being treated, as when prescribing antibiotics for a viral infection or for an asymptomatic urinary tract infection (Morrill et al., 2016^[54]). Inappropriate choice of antibiotics occurs when an antibiotic is inappropriate for the infection indicated. For example, quinolones are the highest priority antibiotics recommended only in the case of resistance, or for serious infections, yet they are commonly used to treat uncomplicated urinary tract infections (Bergman, Schjøtt and Blix, 2011^[57]). Incorrect dosage of antibiotics, and prolonged or inadequate length of therapy, also constitute inappropriate use. In LTCFs, prolonged use of antibiotics is far more prevalent than inadequate length of therapy and is often contrary to guideline recommendations (ACSQHC, 2019^[41]). An example is a high rate and prolonged use of prophylactic

antibiotics for urinary tract infections in LTCFs, which inevitably selects for resistant organisms (Daneman et al., 2011^[58]; Stuart, Lim and Kong, 2014^[12]; Lee et al., 2012^[59]). Factors associated with inappropriate prescribing in LTCFs are discussed in Box 7.3.

One unintended consequence of high rates of antibiotic use in LTCFs is infection with *Clostridioides difficile* (Jump and Donskey, 2014^[60]). Residents of LTCFs who receive inappropriate antibiotics may be eight times more likely to develop a *C. difficile* infection compared to those who receive appropriate therapy (Rotjanapan, Dosa and Thomas, 2011^[61]). These infections are associated with extended hospital stays, increased costs and further use of antibiotics (Guerrero et al., 2011^[62]; Chopra and Goldstein, 2015^[63]), potentially leading to a vicious cycle.

Box 7.3. Factors associated with inappropriate use of antibiotics in LTCFs

Unnecessary and inappropriate use of antibiotics in LTCFs have been associated with a combination of factors, from factors related to residents and their relatives to factors related to prescribers, facilities, healthcare systems and countries.

Resident factors

In the elderly, typical signs and symptoms of infection are often absent or diminished, and cognitive impairment among residents may reduce their ability to communicate symptoms (Furuno and Mody, 2020^[15]; Hedin et al., 2002^[64]). This may lead to diagnostic uncertainty for prescribing physicians and impedes effective empirical diagnosis (Cassone and Mody, 2015^[21]). Residents and their family members may also request antibiotics, against the advice of their healthcare practitioners (Kistler et al., 2013^[65]).

Prescriber factors

Some physicians may be more likely to prescribe certain antibiotics, and for longer periods (seven days or longer) even though most common infections can be treated with antibiotic courses of seven or fewer days (Daneman et al., 2013^[66]). Perceived risks such as fear of treatment failure and the emergence of secondary infection, particularly in older chronic patients, may also contribute to inappropriate prescribing (Vazquez-Lago et al., 2011^[67]).

Long-term care facility factors

Fragmented access to visiting medical staff, lack of continuity of care for LTCF residents, high staff turnover, limited access to microbiological labs and rapid diagnostic testing, lack of onsite pharmacists and reliance on nursing staff to communicate resident symptoms, are all LTCF factors that contribute to inappropriate prescribing (ECDC, 2014^[40]; Lim et al., 2014^[68]; Nicolle et al., 2000^[13]).

Healthcare system factors

Healthcare system and wider organisational characteristics, from poor continuity of care to limited access to resident files, may also contribute to the inappropriate use of antibiotics (Lim et al., 2014^[68]). Residents of LTCFs often visit other healthcare facilities, such as the emergency room in acute care hospitals and outpatient clinics in the community. Physicians at these healthcare facilities may be unfamiliar with the specific needs and history of residents and are more likely to prescribe antibiotics inappropriately compared to prescriptions written by the residents' usual physicians (Pulia et al., 2018^[69]).

Country-level factors

The inappropriate use of antibiotics in LTCFs varies across countries. Some countries may lack data on local resistance patterns, or LTCF-specific guidelines, which may help to reduce inappropriate antibiotic use (Dyar, Pagani and Pulcini, 2015^[70]; Tandan et al., 2018^[3]). In the United States, fear of litigation may lead to the practice of defensive medicine and contribute to the inappropriate use of antibiotics (Fleming et al., 2015^[71]).

Source: Furuno, J. and L. Mody (2020^[15]), "Several roads lead to Rome: Operationalizing antibiotic stewardship programs in nursing homes", <https://doi.org/10.1111/jgs.16279>; Hedin, K. et al. (2002^[64]), "Asymptomatic bacteriuria in a population of elderly in municipal institutional care", <https://doi.org/10.1080/028134302760234627>; Cassone, M. and L. Mody (2015^[21]), "Colonization with multidrug-resistant organisms in nursing homes: Scope, importance, and management", <https://doi.org/10.1007/s13670-015-0120-2>; Kistler, C. et al. (2013^[65]), "Challenges of antibiotic prescribing for assisted living residents: Perspectives of providers, staff, residents, and family members", <https://doi.org/10.1111/jgs.12159>; Daneman, N. et al. (2013^[66]), "Prolonged antibiotic treatment in long-term care", <https://doi.org/10.1001/jamainternmed.2013.3029>; Vazquez-Lago, J. et al. (2011^[67]), "Attitudes of primary care physicians to the prescribing of antibiotics and antimicrobial resistance: A qualitative study from Spain", <https://doi.org/10.1093/fampra/cmr084>; (ECDC, 2014^[40]); Lim, C. et al. (2014^[68]), "Antimicrobial stewardship in residential aged care facilities: Need and readiness assessment", <https://doi.org/10.1186/1471-2334-14-410>; Nicolle, L. et al. (2000^[13]), "Antimicrobial use in long-term-care facilities", <https://doi.org/10.1086/501798>; Pulia, M. et al. (2018^[69]), "Comparing appropriateness of antibiotics for nursing home residents by setting of prescription initiation: A cross-sectional analysis", <https://doi.org/10.1186/s13756-018-0364-7>; Dyar, O., L. Pagani and C. Pulcini (2015^[70]), "Strategies and challenges of antimicrobial stewardship in long-term care facilities", <https://doi.org/10.1016/j.cmi.2014.09.005>; Tandan, M. et al. (2018^[3]), "Antimicrobial prescribing and infections in long-term care facilities (LTCF): A multilevel analysis of the HALT 2016 study, Ireland, 2017", <https://doi.org/10.2807/1560-7917.ES.2018.23.46.1800278>; Fleming, A. et al. (2015^[71]), "Antibiotic prescribing in long-term care facilities: A meta-synthesis of qualitative research", <https://doi.org/10.1007/s40266-015-0252-2>.

Empirical antibiotic prescribing and prophylactic use in LTCFs

Between 54% and 96% of antibiotic prescriptions in LTCFs are estimated to be empirical, meaning they are prescribed based on prescriber experience and patient signs and symptoms, often while waiting for confirmation of results from laboratory testing (Latour et al., 2012^[17]; Szabó and Böröcz, 2014^[18]). This type of prescribing may be appropriate in certain clinical situations but there are a number of risks with empirical therapies and it is important to ensure therapies are in line with evidence-based guidelines on diagnosis and treatment. Drawbacks of empirical therapies include therapy lasting longer than necessary (Boivin et al., 2013^[72]; Dyar, Pagani and Pulcini, 2015^[70]), treatment failure due to prescribers using experience rather than antibiograms (Hughes et al., 2016^[73]) and frequent use of broad-spectrum antibiotics (Cassone and Mody, 2015^[21]).

The use of antibiotics for prophylaxis in LTCFs is common, especially for urinary tract infections. As previously mentioned, approximately one in three antibiotic prescriptions are for prophylactic use in EU/EEA countries and Australia (ACSQHC, 2019^[41]; HALT Study Group, 2018^[74]). Prophylactic use can have benefits, for example reducing recurrent urinary tract infections in female residents of LTCFs, yet it is also associated with higher proportions of resistant bacteria isolated in urine and faeces from residents (HALT Study Group, 2018^[74]).

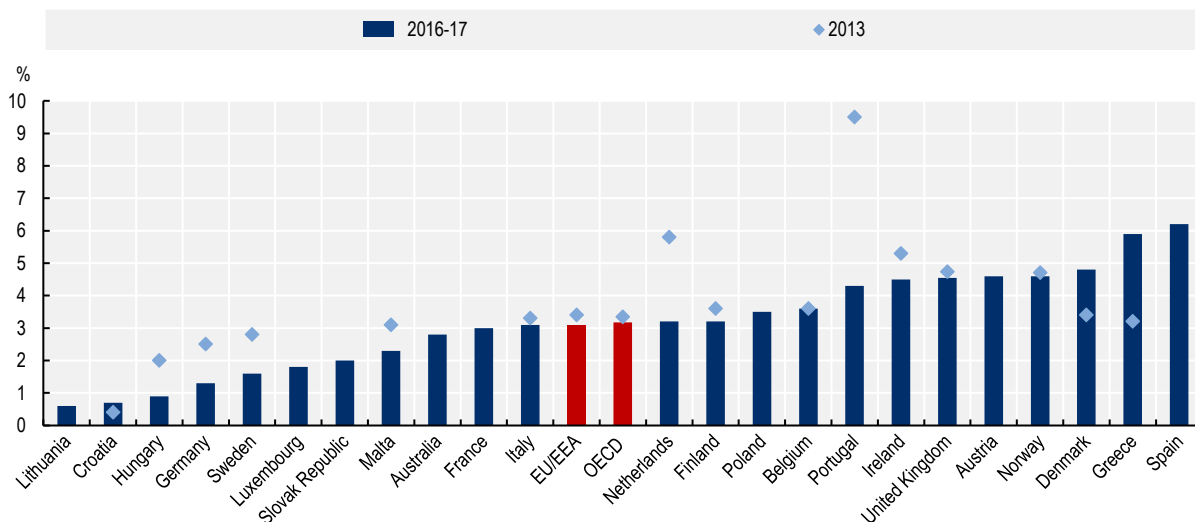
Trends in antibiotic resistance in LTCFs

On average across OECD countries for which PPS data on AMR are available (specifically Australia, England [United Kingdom] and OECD countries in the EU/EEA), in 2016-17 (2018 in Australia) about 3.8% of residents in participating LTCFs had an HAI on the days the surveys were conducted (Figure 7.3). In 2013, the average was 3.3% (excluding Australia). The percentages of residents of LTCFs with an HAI on the days of the surveys ranged from 0.9% in Lithuania to 8.5% in Spain in 2016-17 (it is worth noting that Lithuania had one of the lowest shares of participants over the age of 85).


The average EU/EEA rate of HAIs among LTCF residents was 1.02 infections per infected resident and 1.2 infections per infected resident in Australia (ECDC, 2014^[40]; Suetens et al., 2018^[22]; ACSQHC, 2019^[41]). Most infections were associated with the LTCF where the survey was conducted (84.7% in the EU/EEA and 80.1% in Australia). Annual estimates from the EU/EEA indicate that acute care hospitals and LTCFs have a similar prevalence of HAIs (Suetens et al., 2018^[22]).

Figure 7.3. HAIs among LTCF residents in participating EU/EEA and OECD countries, in 2013 and 2016-17 (or closest year)

Percentage of residents surveyed in point prevalence surveys with at least one infection on survey dates (see note)



Note: Australian PPS was held in 2017, while ECDC PPS were held in 2013 and 2016-17. In the United Kingdom, England did not participate in the 2016-17 survey and Scotland did not participate in the 2013 survey. In 2016-17, within-country data representativeness was poor in Austria, Croatia, Cyprus, Greece, Luxembourg, Malta and Poland. In 2013, within-country data representativeness was poor or very poor in Croatia, England (United Kingdom), Finland, Greece, Malta, the Netherlands and Norway. Differences in infections across countries should be interpreted with caution due to differences in sampling (e.g. age of participants). Only HAIs associated with residents' own facilities are shown. Source: ECDC (2014^[40]), *Point Prevalence Survey of Healthcare-associated Infections and Antimicrobial Use in European Long-term Care Facilities April to May 2013*, <https://doi.org/10.2900/24172>; Suetens, C. et al. (2018^[22]), "Prevalence of healthcare-associated infections, estimated incidence and composite antimicrobial resistance index in acute care hospitals and long-term care facilities: Results from two European point prevalence surveys, 2016 to 2017", <https://doi.org/10.2807/1560-7917.ES.2018.23.46.1800516>; ACSQHC (2019^[41]), *2018 Aged Care National Antimicrobial Prescribing Survey Report*, Australian Commission on Safety and Quality in Health Care.

StatLink  <https://stat.link/f6mdgs>

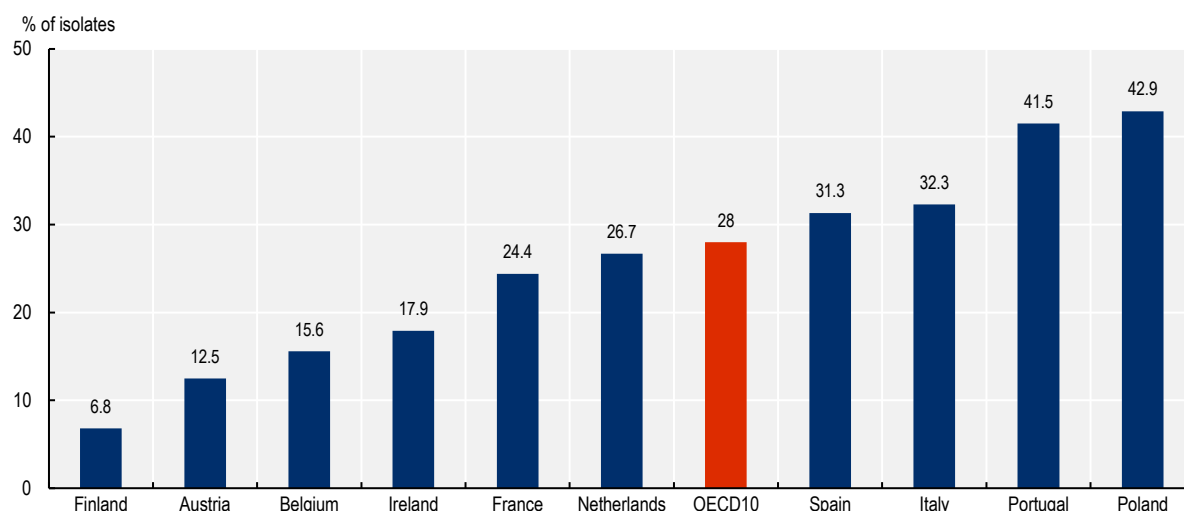
Resistance to first-line antibiotic treatments in LTCFs is high

On average across OECD countries for which the ECDC Composite Index of AMR is available, in 2016-17, almost one in three isolates from HAIs among LTCF residents were resistant to first-line antibiotic treatments (Figure 7.4). The percentages of isolates resistant to first-level AMR markers in HAIs from LTCF residents ranged from 6.8% in Finland to 42.9% in Poland (Suetens et al., 2018^[22]). As with the prevalence of HAIs, an analysis of the ECDC Composite Index of AMR shows that LTCFs and acute care hospitals have similar levels of AMR. The ECDC Composite Index of AMR – a drug resistance index – is the percentage of isolates from HAIs that are resistant to first-level AMR markers.¹ A drug resistance index is a composite measure that combines the ability of antibiotics to treat infections with the extent of their use in clinical practice. A drug resistance index can be interpreted as the probability of inadequate treatment given observed drug use (Laxminarayan and Klugman, 2011^[75]; Hughes et al., 2016^[73]). While limitations with PPSs (e.g. country representativeness and low testing frequency in LTCFs) should be considered, these high proportions of AMR in LTCFs are a cause for concern.

Resistance to first-line antibiotics means that second- and third-line antibiotics are increasingly needed and used. The more antibiotics are used, the more selective pressure on common pathogens there is, potentially leading to the emergence of resistant organisms (Capitano and Nicolau, 2003^[76]; Cassone and Mody, 2015^[21]) and growing resistance to second- and third-line treatments. For example, in the United States, rising numbers of carbapenem-resistant *K. pneumoniae* isolates are being found in LTCFs (Braykov et al., 2013^[77]). In a period of 11 years, the percentage of *K. pneumoniae* isolates resistant to carbapenems and third-generation cephalosporins increased from 5.3% to 11.5% (Braykov et al., 2013^[77]). An Italian study of urine cultures from LTCF residents found a prevalence of carbapenem-resistant *Enterobacteriaceae* among LTCF residents of 20% (Marinosci et al., 2013^[78]). Moreover, the prevalence of carbapenem-resistant *Enterobacteriaceae* may be underestimated because of the heterogeneous expression of resistance (El-Halfawy and Valvano, 2015^[79]), which makes it difficult to detect this pathogen during routine cultures (Hajoggrundmannrivmnl et al., 2010^[80]; Van Dulm et al., 2019^[81]).


Figure 7.4. ECDC Composite Index of AMR in isolates from HAs among LTCF residents in participating OECD countries, 2016-17

The ECDC Composite Index is the percentage of isolates resistant to first-level AMR markers in HAs



Note: The percentage of resistance was not calculated if less than ten isolates were reported.

Source: Suetens, C. et al. (2018^[22]), "Prevalence of healthcare-associated infections, estimated incidence and composite antimicrobial resistance index in acute care hospitals and long-term care facilities: Results from two European point prevalence surveys, 2016 to 2017", <https://doi.org/10.2807/1560-7917.ES.2018.23.46.1800516>.

StatLink  <https://stat.link/vhl8wd>

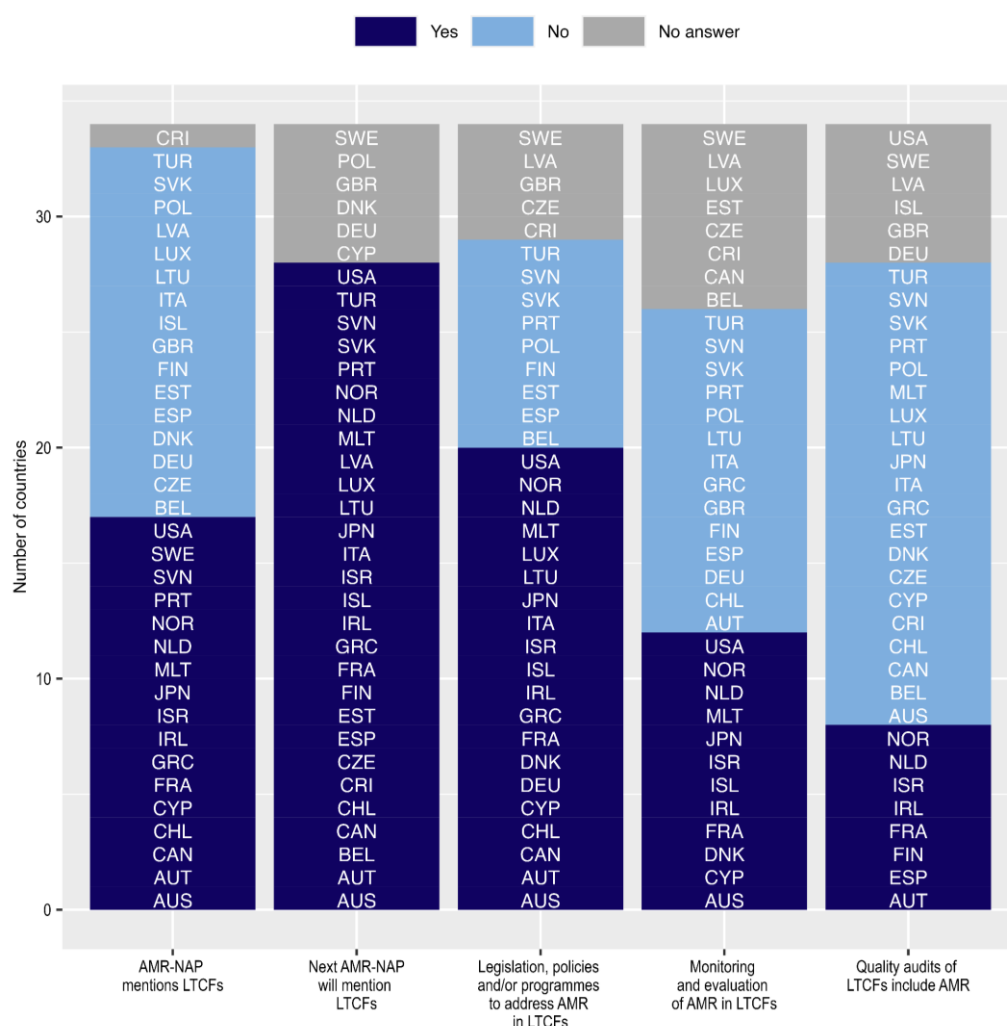
Country responses to AMR in LTCFs

Many countries have legislation and policies to tackle AMR in LTCFs but fewer countries have a process to audit the quality of care in LTCFs that includes ASP and IPC indicators. According to a new OECD survey (see Box 7.4 for more details), just over half of reporting² EU/EEA and OECD countries (52%; 17 out of 33 countries) report having a national action plan on AMR that specifically references LTCFs, while 28 countries (out of 28 reporting countries) report planning to include references to LTC in their next national action plan on AMR (Figure 7.5). A higher number of countries (69%; 20 out of 29 reporting countries) report having legislation, policies and/or programmes aimed at addressing AMR in LTCFs, beyond national action plans. Around half (46%; 12 out of 26 reporting countries) have monitoring and evaluation plans focusing specifically on LTCFs.

Box 7.4. OECD Survey on Antibacterial Resistance in LTCFs, 2021-22

Based on a rapid review of surveys of AMR in LTCFs (including, for example, the ECDC's PPS), the OECD designed a new Survey on Antibacterial Resistance in Long-Term Care Facilities for circulation to EU/EEA and OECD countries. The survey focused on actions by central governments related to antibacterial resistance in LTCFs, with sections specifically on ASP in LTCFs, IPC in LTCFs, surveillance in LTCFs, the impact of COVID-19 on addressing AMR in LTCFs, challenges that countries face in tackling AMR in LTCFs, and finally data and indicators. The survey instrument was reviewed by experts at the ECDC and the World Health Organization and piloted by representatives from two countries. The questionnaire was sent to countries in October 2021 and responses were accepted until September 2022. A total of 34 countries, including both EU/EEA and OECD countries, participated in the survey. More details on participation in the survey are provided in Annex 7.A.

Figure 7.5. Overview of policies and legislation from central governments to tackle AMR in LTCFs in the EU/EEA and OECD, 2021-22



Note: AMR-NAP – National Action Plan on Antimicrobial Resistance; LTCFs – long-term care facilities; AMR – antimicrobial resistance.
Source: Analysis of OECD Survey on Antibacterial Resistance in LTCFs (2021-22).

A third of countries (32%; 9 out of 28 reporting countries) report having a process to audit the quality of care provided in LTCFs that includes indicators related to ASP or IPC. In France, the national missions co-ordinated by Public Health France develop national audit tools, with associated IPC indicators. These audit tools are made available to ASP and IPC regional centres and teams that may provide expert support to LTCFs using data and digital tools to drive quality improvements. Among the indicators of IPC and ASP included in the audit process are indicators of hand hygiene, as well as faecal and respiratory transmission. Proxy indicators on the appropriateness of antibiotic prescribing have been developed and will be collected at the national level in the near future. No incentives (e.g. pay for performance, certification) are currently attached to auditing or monitoring activities but this is a topic under discussion.

In Ireland, as part of its statutory responsibility for setting standards for health and social services, the Health Information and Quality Authority monitors the quality of care provided in LTCFs and is currently developing an inpatient survey for LTCFs. National standards for IPC in community services published by the Health Information and Quality Authority in 2018 are applicable to LTCFs. The Medicines Management Programme and the Antimicrobial Resistance and Infection Control team in the Health Service Executive have developed a preferred antibiotics initiative referred to as the Green/Red antibiotic list. Antimicrobial guidelines for community prescribers recommend the preferred use of “green” agents, which are effective, have fewer side effects and are less likely to lead to resistant infections than “red” agents. Red-green reports are sent to all general practitioners on a quarterly basis including to LTCFs that are serviced by these general practitioners. No incentives are currently in use.

In Lithuania, the National Public Health Centre performs periodic external audits (inspections), assessing compliance with different national hygiene regulations. In Finland, local municipalities make audit visits to private LTCFs from which they purchase services, and regional authorities perform random audits. In Israel, the audit process includes hand hygiene, environmental cleaning and isolation measures for patients infected or colonised with multidrug-resistant organisms. Portugal reports not having a process to audit the quality of care provided in LTCFs that includes indicators related to ASP or IPC, but the Directorate General of Health monitors standard basic precautions such as hand hygiene and glove use. Both Belgium and Greece are developing systems to audit the quality of care in LTCFs. In Greece, the National Agency for Quality Assurance in Health has established indicators for patient safety that include staffing levels, skills and training for LTCF workers but this has not yet been operationalised.

Addressing AMR in LTCFs is not without challenge, with many countries reporting a number of hurdles to the design, adoption and effectiveness of policy actions related to AMR in LTCFs (Box 7.5).

Box 7.5. Countries face challenges in tackling AMR in LTCFs

Countries report significant challenges in addressing AMR in LTCFs, from staff shortages to limited financial resources, to significant and complex demands from LTCF residents.

Scarcity of LTCF-specific surveillance data

Countries report a lack of LTCF-specific surveillance data on infections, antibiotic use and AMR in LTCFs. In Canada, Italy and Portugal, central-level surveillance data are needed to assist in developing recommendations and guidelines for LTCFs. In Ireland, feedback mechanisms for antibiotic use and an AMR surveillance system in LTCFs are needed.

Communication between providers in LTCFs and other healthcare settings

Multiple prescribers and inadequate communication among healthcare workers in LTCFs create a fragmented model for healthcare delivery that contributes to inappropriate antibiotic prescribing and hinders the implementation of ASP and IPC. In France, there are multiple prescribers in LTCFs and, in

Germany, a lack of communication between LTCF staff and general practitioners and specialists hinders the effectiveness of ASPs. In Slovenia, better dissemination of data from LTCFs and collaboration are required and, in Canada, improved communication protocols are needed within provincial health networks. In Italy, information from LTCFs is not shared with the central level and, in Israel, computer systems in LTCFs do not interface with systems in acute care hospitals.

Staffing shortages and insufficient training of long-term care staff

Widely reported staff shortages and insufficiently trained LTCF staff are important barriers to the implementation of ASP and IPC in LTCFs. In Austria, Belgium, Israel, Italy, Japan, Malta, Portugal and Slovenia, LTCFs are understaffed and lack staff trained in ASP and IPC. In Lithuania, there is a shortage of medical staff in LTCFs.

Challenges related to infrastructure

In some countries, LTCFs are ageing structures with outdated infrastructure, layouts with long corridors far from nursing stations, multi-occupancy rooms and a majority do not have access to microbiological laboratories. In Malta, there is no screening before antibiotics are prescribed in LTCFs. In Slovenia, general practitioners working in LTCFs often prescribe antibiotics empirically which leads to unnecessary use. In Ireland, there is a need to integrate ASP as part of routine medication management. In Ireland and Israel, many LTCFs have multi-occupancy rooms in public LTCFs, making IPC practices challenging.

Lack of guidelines and resource constraints

Italy reports a lack of LTCF-specific guidelines to diagnose and treat common infections and in Austria, Belgium and Malta, budget constraints are a barrier to implementing ASPs and IPC. Many countries do not mandate, incentivise or monitor the adoption of ASPs and IPC in LTCFs. For example, in Belgium, France, Greece, Ireland and Portugal, there are no incentives or mandates to ensure compliance or adoption of ASPs or IPC measures in LTCFs.

Antimicrobial stewardship programmes (ASPs) in LTCFs

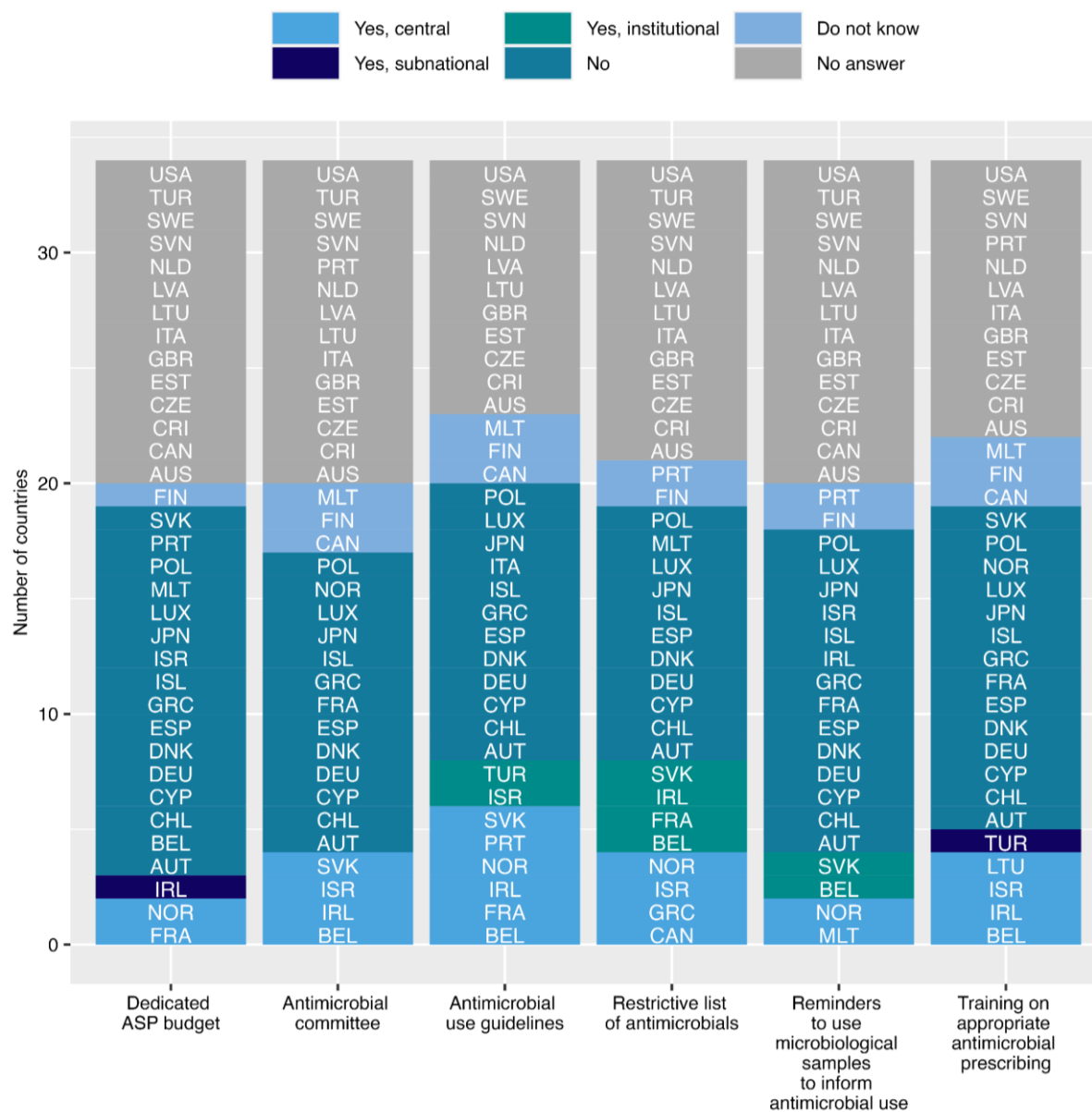
In most EU/EEA and OECD countries, there are no guidelines, protocols or requirements for the adoption of ASPs in LTCFs (Figure 7.6). Only 15% (3 out of 20 reporting countries) report having guidelines, protocols or requirements for the adoption of budgets dedicated to ASPs in LTCFs. Twenty percent (4 out of 20 reporting countries) report having guidelines, protocols or requirements for the adoption of antimicrobial committees in LTCFs. Thirty-five percent of countries (8 out of 23 reporting countries) report having written guidelines on the appropriate use of antibiotics in LTCFs, but only 9% (2 out of 22 countries) have guidelines on the appropriate use of antibiotics for residents with cognitive impairments or advanced dementia. Most guidelines are adopted at the level of central governments.

About 38% (8 out of 21 reporting countries) report having guidelines, protocols or requirements for the adoption of restrictive lists of antimicrobials to be prescribed in LTCFs and 20% (4 out of 20 reporting countries) have guidelines, protocols or requirements for the adoption of a system to remind healthcare workers to request microbiological samples before prescribing antibiotics in LTCFs. Finally, almost 1 in 5 countries (5 out of 22 reporting countries) report having guidelines, protocols or requirements for the provision of regular training on appropriate antibiotic prescribing in LTCFs.

Among the majority of EU/EEA and OECD countries, the adoption of ASP protocols and programmes in LTCFs varies at the subnational level and is typically not mandatory nor incentivised. In Canada, where healthcare policy is decentralised, ASP guidelines, protocols or requirements for LTCFs may exist at the provincial or territorial level (these subnational actions are not necessarily known to the central

government). In Ontario, for example, Public Health Ontario produces resources to promote and support ASPs as an effective strategy for limiting inappropriate antibiotic use, while improving antibiotic therapy and clinical outcomes for residents in LTCFs. Similarly, in Italy, regional or local initiatives may exist but information is not always shared with the central government. In Belgium, a minority of LTCFs have ASP elements in place. In Ireland, there are no incentives to adopt ASP components in LTCFs. Norway generally has policies related to ASP at the federal level but, as LTCFs are run by municipalities, federal agencies can only send reminders and information.

Figure 7.6. Overview of key country actions related to ASP in LTCFs in the EU/EEA and OECD, 2021-22



Note: ASP – antimicrobial stewardship programme.

Source: Analysis of OECD Survey on Antibacterial Resistance in LTCFs (2021-22).

Written therapeutic antibiotic guidelines for the treatment of specific infections adopted in about half of reporting countries

Almost half (11 out of 23 reporting countries) report having written guidelines for the treatment of respiratory and urinary tract infections in LTCFs and 50% (11 out of 22 reporting countries) have guidelines for the treatment of wound and soft tissue infections in LTCFs. In France, there are no national LTCF-specific guidelines on antibiotic use or prescribing, but regional health authorities are free to develop regional guidance and/or tools. In Finland, national therapeutic antimicrobial guidelines for most common infections include sections for the elderly and LTC. Other guidelines are local and regional. In Greece, elements exist at the central level but they are not mandatory. In Poland, therapeutic guidelines prepared within the National Programme for Antibiotic Protection in 2012-20 include guidelines for respiratory tract infections, wound and skin infections, preoperative prophylaxis, urinary tract infections, *C. difficile* and orthopaedic infections. The guidelines cover therapies in the community, hospitals and LTCFs.

In Spain, the National Treatment Guideline for Antimicrobial Use in Infectious Diseases includes recommendations to manage infections in LTCFs. In Malta, in most cases, general practitioners do not screen residents before starting antimicrobials. In Denmark, ASP policies and guidelines are not targeted to LTCFs because LTCF residents are under the care of a general practitioner, who is responsible for all antibiotic prescriptions in LTCFs and the community.

Very limited use of monitoring of and feedback on antibiotic consumption

Only 14% (3 out of 21 countries) report having data available on an annual consumption of antimicrobials by antimicrobial class in LTCFs, or subnational AMR summaries available in LTCFs and local primary care practices. About 1 in 4 countries (5 out of 21 countries) provide feedback to local general practitioners on antibiotic consumption in LTCFs.

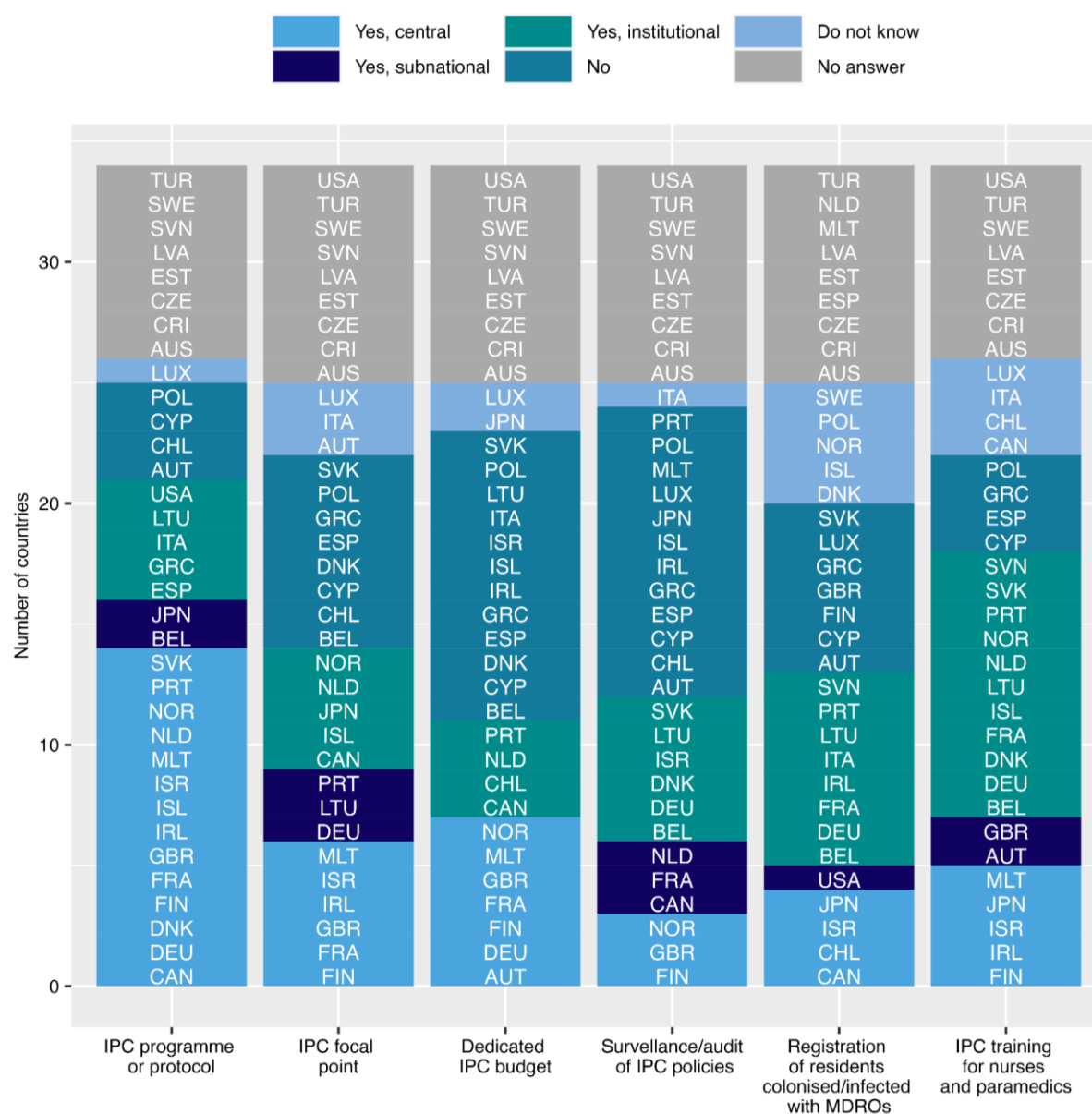
In Australia, for example, surveillance of antibiotic consumption and appropriateness of use is conducted nationally through the National Antimicrobial Utilisation Surveillance Program and National Antimicrobial Prescribing Survey (NAPS, which includes an aged care module). Aged Care NAPS is a standardised surveillance tool that Australian LTCFs have used annually since 2015 to monitor the prevalence of infections and antibiotic use, provide feedback to clinicians and administrators, and measure the effectiveness of IPC measures and ASPs. Participation in Aged Care NAPS is mandatory for LTCFs in Victoria and voluntary for other jurisdictions. Incentives for participation in these surveillance activities include access to antibiograms and benchmarking reports. Both ASPs and IPC practices in LTCFs are supported at the national level by the Aged Care Quality Standards but they are implemented at the LTCF level. In Denmark, while the country has a detailed surveillance system for antibiotic consumption, antibiotic use in LTCFs is not routinely monitored. The Danish Health Data Authority has published disaggregated antibiotic use data at the LTCF level and is developing a system for regular monitoring in co-operation with the *Statens Serum Institut*.

Infection prevention and control in LTCFs

In most EU/EEA and OECD countries, in contrast to the adoption of ASPs, there are guidelines, protocols or requirements for the adoption of IPC practices in LTCFs (Figure 7.7). Four in 5 countries (21 out of 26 reporting countries) report having guidelines, protocols or requirements for the adoption of IPC programmes or protocols in LTCFs. Over half (14 out of 25 reporting countries) report having guidelines, protocols or requirements for the adoption of IPC focal points in LTCFs and 44% (11 out of 25 reporting countries) have guidelines, protocols or requirements for the adoption of a budget dedicated to IPC in LTCFs. Fifty-two percent (13 out of 25 reporting countries) of countries require LTCFs to register residents infected or colonised with multidrug-resistant organisms. Close to half (12 out of 25 reporting countries) report having a process of surveillance/audit of IPC policies in LTCFs. With respect to requirements or

guidelines for the adoption of educational IPC elements in LTCFs, 69% (18 out of 26 reporting countries) provide regular training for nursing and paramedical staff and 48% (12 out of 25 reporting countries) provide training for general practitioners working in LTCFs.

Figure 7.7. Overview of key country actions related to infection prevention and control in LTCFs in the EU/EEA and OECD, 2021-22



Note: IPC – infection prevention and control; MDROs: multidrug-resistant organisms.
Source: Analysis of OECD Survey on Antibacterial Resistance in LTCFs (2021-22).

In Japan, IPC committees, guidelines and regular training on IPC are mandatory in LTCFs and have been implemented nationwide at the subnational and LTCF levels. In addition, budgets dedicated to IPC in LTCFs exist at the subnational level. In Canada, an IPC programme, a budget dedicated to IPC in LTCFs, and guidelines on influenza vaccination, which include references to LTCF staff, exist at the central level. At the subnational level, provinces and territories regulate IPC in LTCFs through legislation and policies, but variations

and gaps exist in oversight of IPC and quality of care. In Chile, regulations are developed at the central level. In Israel, there is a national system to report LTCF residents colonised by *carbapenemase-producing Enterobacteriaceae* (CPE) or *C. difficile*, and IPC committees exist in LTCFs. In the United States, LTCFs serving Medicare and Medicaid patients are required to have IPC and AMS programmes.

In France, almost all regions have IPC elements in LTCFs. Funding is available at the central level for regional IPC centres and will soon be available for IPC teams in LTCFs. In Luxembourg, IPC elements are not mandatory in LTCFs, however new legislation may introduce incentives. In Finland, the Resident Assessment Instrument (RAI), which includes indicators related to AMR and IPC to audit the quality of care in Finnish LTCFs, will be mandatory from April 2023. The registration of residents colonised by multidrug-resistant organisms takes place at the subnational level. In Poland, the isolation of persons colonised with multidrug-resistant organisms (e.g. CPE) is regulated by legislation approved by the Ministry of Health. In Iceland, IPC requirements exist on a national level and are mandatory. In Malta, every LTCF has an IPC focal point. IPC policies are available in all LTCFs, however not all of them are LTCF-specific.

Most countries offer vaccination to LTCF residents and staff

A large majority of countries (96%; 26 out of 27 reporting countries) offer annual influenza vaccination to LTCF staff and 88% (22 out of 25 reporting countries) offer vaccines to all residents in LTCFs. Two-thirds (16 out of 24 reporting countries) develop care protocols in LTCFs. In the United States, Medicare and Medicaid-certified LTCFs are required to provide immunisation against influenza and pneumococcal disease to all residents. However, other types of LTCFs may not have such requirements and are regulated by the respective state in which they are located. In Italy, the national seasonal influenza campaign strongly recommends vaccination for staff and residents in LTCFs. In Ireland, IPC elements are mandatory in LTCFs except for patient and staff vaccination, which are voluntary but strongly encouraged.

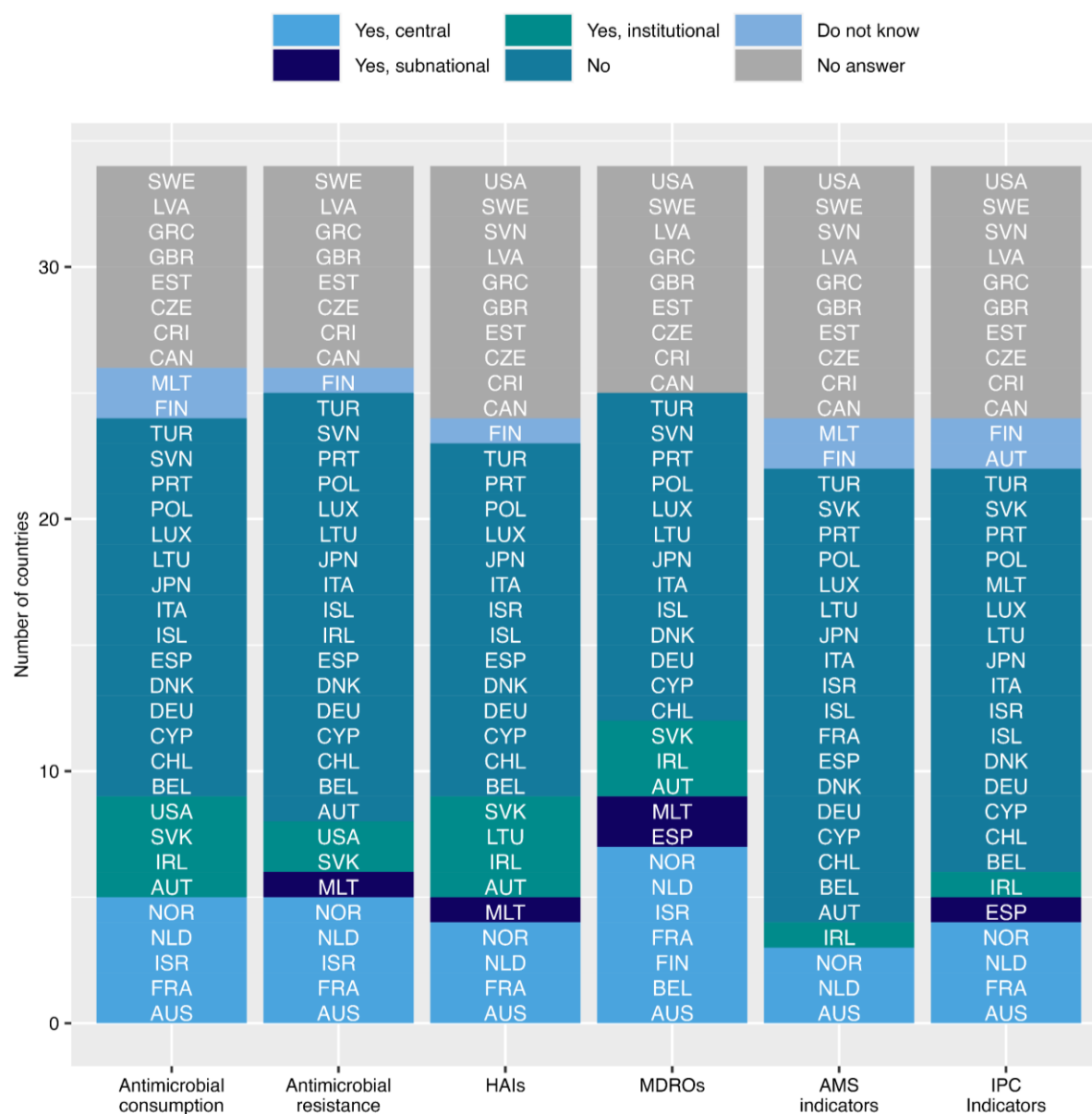
Several German LTCFs have IPC protocols and offer vaccination to staff and residents. At the federal level, the recommendations of the Commission for Hospital Hygiene and Infection Protection at the Robert Koch Institute provide advice for LTCFs related to resistant organisms. In Poland, influenza vaccinations are offered free of charge to medical staff and LTCF residents. IPC is at the LTCF level and is not mandatory. In Iceland, influenza vaccines are offered to all LTCF staff and residents but there are no incentives to increase uptake. In Malta, vaccinations are available for both staff and residents and some of the vaccinations are administered free of charge.

Monitoring of AMR in LTCFs

Many countries do not have any guidelines, protocols or requirements for the adoption of surveillance of antibiotic use and AMR in LTCFs (Figure 7.8). Just over a third of countries (9 out of 25 reporting countries) conduct surveillance of antibiotic consumption in LTCFs and 32% (8 out of 25 reporting countries) conduct surveillance of AMR in LTCFs. About 40% (9 out of 23 reporting countries) conduct surveillance of HAIs and 50% (12 out of 24 countries) have surveillance of multidrug-resistant organisms. Fewer than 1 in 5 (4 out of 23 reporting countries) have surveillance of indicators of ASP and 26% (6 out of 23 reporting countries) have surveillance of indicators of IPC in LTCFs.

In Israel, all LTCFs are required to report cases of CPE. In the United States, Medicare and Medicaid requirements for certified LTCFs include stipulations for a system to monitor antibiotic use. In France, surveillance in LTCFs is not mandatory but the country reports there is good national coverage. No incentives are currently used and surveillance is annual except for HAIs where the national PPS is conducted every five to seven years. Indicators of ASP in LTCFs are currently under development. In Belgium, there is a mandatory notification of outbreaks of multidrug-resistant infections at the national level. Work is in progress at the subnational level. In Spain, some regions have protocols and requirements for the mandatory surveillance of AMR at the regional level. Malta maintains an LTCF-specific database of residents that have HAIs and multidrug-resistant organisms and is used to monitor AMR in LTCFs.

Figure 7.8. Overview of key country actions related to surveillance of antibiotic consumption and AMR in LTCFs in the EU/EEA and OECD, 2021-22



Note: HAIs – healthcare-associated infections; multidrug-resistant organisms; ASP – antimicrobial stewardships; IPC – infection prevention and control.

Source: Analysis of OECD Survey on Antibacterial Resistance in LTCFs (2021-22).

Data sharing between long-term care and healthcare settings

In most countries, when an LTCF resident is admitted, transferred or discharged to another healthcare facility, data on infections and multidrug-resistant organisms are shared with the receiving facility. In some countries, data sharing is mandatory and/or supported by legislation or guidelines. In Israel, when an LTCF resident is discharged from the hospital, the hospital notifies the facility of multidrug-resistant organisms. The National Institute for Antimicrobial Resistance and Infection Control is notified if a resident from an

LTCF screened positive for CPE upon hospital admission and then notifies the LTCF and gives instructions for contact screening. In the United States, when a resident is discharged, the discharging facility (i.e. the hospital or LTCF) should provide details of the patient's health condition.

In France, national guidelines recommend sharing information when patients are infected, using antibiotics or colonised with multidrug-resistant organisms but there is no national process in place to incentivise or facilitate this. All hospitals and a majority of LTCFs have electronic medical records but these records are usually not shared. In Ireland, patient-specific information is shared with the receiving facility in relation to the patient's status regarding HAIs, however no central patient information database of this currently exists. In many German regions, MRE Networks bring together hospitals, general practitioners, public health services and LTCFs. Information on infections and resistant organisms is shared via these networks. In Austria, it is mandatory to share data on infections and multidrug-resistant organisms with the National Standard for Admission and Discharge Management (*Qualitätsstandard Aufnahme- und Entlassungsmanagement*). In both Cyprus and the Slovak Republic, when a patient or resident is discharged, information on infection and colonisation is provided in the discharge letter.

In Luxembourg, patient-specific data are shared between hospitals and LTCFs on admission and upon discharge. In Finland, sharing information is a routine process recommended in the national guidelines. In Greece, current legislation mandates that the patient discharge letter include previous infection or colonisation by an MDRO. In Poland, acute care hospitals should notify the facility when the LTCF resident is colonised or infected with MDRO and vice versa. In Iceland, patient-specific data on resistant organisms are registered in patient electronic medical records that may be shared among facilities. In Denmark, hospitals routinely notify LTCFs of infections requiring special precautions on discharge, even though the law does not specifically require this. In Norway, data are shared with the national public health institute and are summarised and disseminated to other LTCFs. In Spain, when a resident who has or has had a multidrug-resistant infection is discharged from an ACH to an LTCF, the ACH shares this information with the LTCF and vice versa. In some Spanish regions, it is mandatory for LTCFs to share information on multidrug-resistant infections with the regional public health authority.

Impact of COVID-19 on AMR in LTCFs

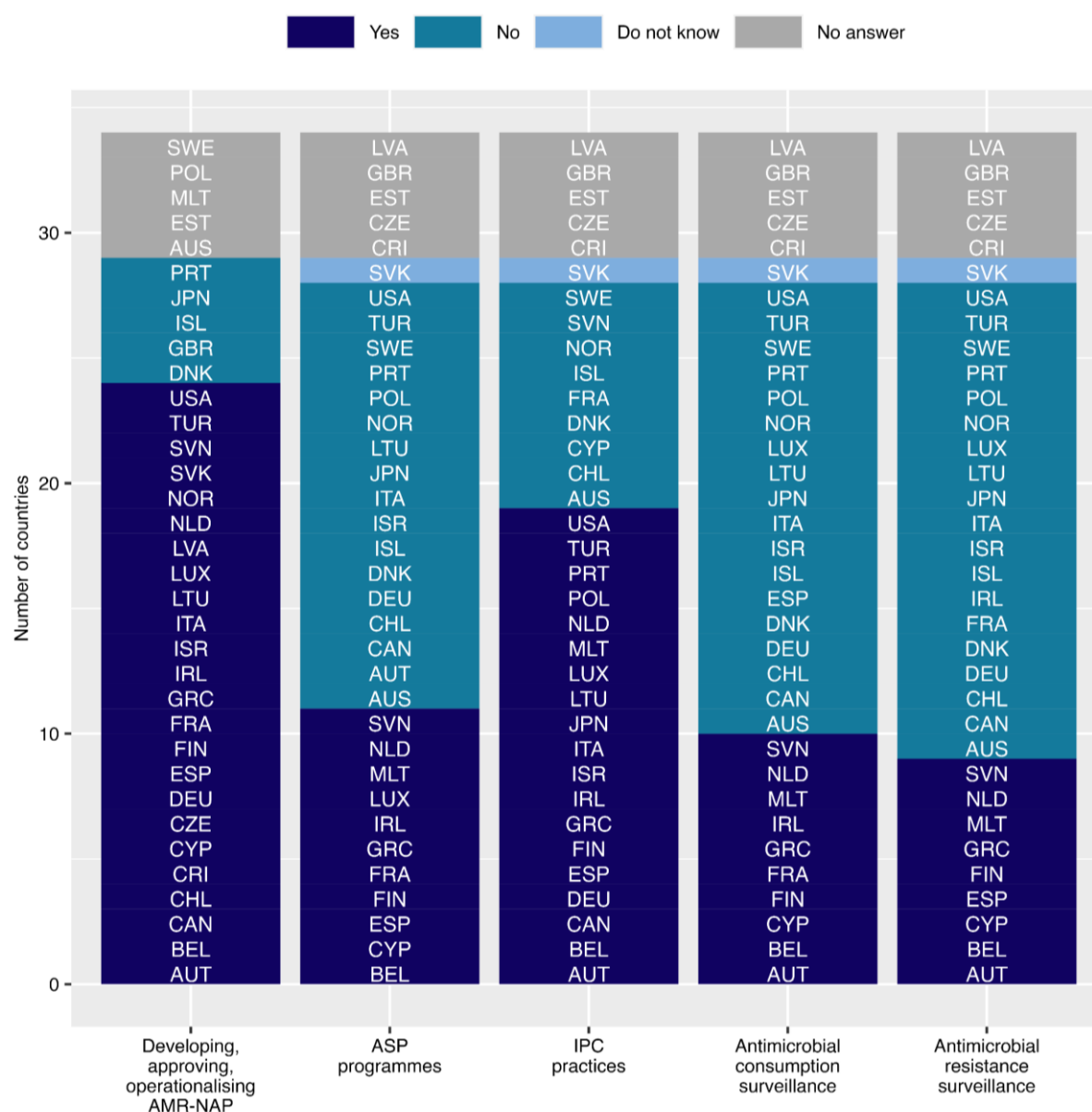
Across the EU/EEA and OECD countries, the COVID-19 pandemic has had a significant impact on policy actions related to antibiotic use and AMR in LTCFs, as illustrated in Figure 7.9. In 83% of countries (24 out of 29 reporting countries), the pandemic led to delays in developing, approving or operationalising the national action plan on AMR. In 37% of countries (10 out of 27 reporting countries), the pandemic affected surveillance of antibiotic consumption, in 33% (9 out of 27 reporting countries), it impacted surveillance of AMR and, in 41% (11 out of 27 reporting countries), it impacted surveillance of HAIs. A third of countries (9 out of 27 reporting countries) report that the COVID-19 pandemic affected the rapid testing of residents and 30% of countries (8 out of 27 countries) report it had an impact on audits of antibiotic prescribing behaviours.

Austria, Cyprus, Greece, Lithuania, Luxembourg, the Slovak Republic, Slovenia and Spain all reported delays in developing, approving or operationalising their national action plan on AMR due to staff reallocation as a result of the pandemic. Canada and Chile reported delays in finalising their national action plans because of the pandemic. The United States reported a six-month delay in the publication of the national action plan and, in Italy, work on the national action plan was halted in the first six months of 2020 due to the pandemic. France reported a one-year delay in finalising the national action plan and delayed the final approval and budget allocation for the full implementation of the plan. Ireland's national action plan was delayed. Belgium postponed the validation of the human health pillar of the national action plan. In Germany and Norway, although the national action plan was delayed, there was no perceived negative impact on the fight against AMR or IPC.

In the United States, there was a decline in compliance surveys during some periods of the pandemic to reduce the number of people entering and leaving LTCFs, unless there was an eminent threat to patient health. In Belgium, France, Ireland and Spain, surveillance of antibiotic use was either stopped or delayed because of increased workload, and available resources were redirected to fighting the pandemic. Similarly, Belgium, Greece and Spain all reported delays in the development and implementation of surveillance of AMR in LTCFs. In Ireland, surveillance of HALs was delayed for the period 2019-20.

Figure 7.9. Overview of the impact of the COVID-19 pandemic on country actions related to AMR in LTCFs in the EU/EEA and OECD, 2021-22

Did the COVID-19 pandemic affect the following country actions?



Note: AMR-NAP – National Action Plan on Antimicrobial Resistance; ASP – antimicrobial stewardships; IPC – infection prevention and control.
Source: Analysis of OECD Survey on Antibacterial Resistance in LTCFs (2021-22).

Box 7.6. COVID-19 has been a grim reminder of vulnerabilities in LTCFs

COVID-19 infections disproportionately affected residents of LTCFs

Residents of LTCFs died from COVID-19 at a much higher rate compared to older people living in the community and outbreaks in LTCFs were larger and more severe than in acute care hospitals. COVID-19 infection is more severe in older adults who experience much higher morbidity and mortality rates, compared to the younger population. In LTCFs, the pandemic had a devastating effect on residents and staff. LTCF residents who were admitted to hospital with a COVID-19 infection were much more likely to die in hospital from COVID-19 compared to those admitted from their homes (D'ascanio et al., 2021^[82]). A study comparing COVID-19 mortality rates between older LTCF residents and community-dwelling older adults (aged 65 years and older) in 12 OECD countries in the first 4 months of the pandemic found that LTCF residents had a 24-fold higher death rate, compared to community-dwelling older adults (Sepulveda, Stall and Sinha, 2020^[83]). By February 2021, an estimated 40% of all deaths from COVID-19 in participating OECD countries had occurred in LTC settings, ranging from 4% in Greece to 75% in Australia (Rocard, Sillitti and Llana-Nozal, 2021^[84]).

Numerous outbreaks have been reported in LTCFs and, in some countries, outbreaks in LTCFs were larger and more severe than outbreaks in acute care hospitals (Suwono et al., 2022^[85]; Thompson et al., 2020^[86]). The size of outbreaks and large number of deaths from COVID-19 in LTCFs have been attributed to several factors, including asymptomatic healthcare workers, multi-occupancy rooms shared by residents and shared bathrooms, and insufficient staff to conduct effective IPCs (Hoxha et al., 2021^[87]; Olmos et al., 2021^[88]). For example, a study found that in Ontario, Canada, multi-occupancy rooms in LTCFs contributed to the spread of infection and converting 4-bed rooms to 2-bed rooms in LTCFs could have averted 998 COVID-19 cases and 263 deaths (Brown et al., 2021^[89]).

Note: Data from Rocard, Sillitti and Llana-Nozal (2021^[84]) include LTCFs, community care settings and home-based care. The vast majority of recipients were aged 65 and older.

Source: D'ascanio, M. et al. (2021^[82]), "Age is not the only risk factor in COVID-19: The role of comorbidities and of long staying in residential care homes", <https://doi.org/10.1186/S12877-021-02013-3/TABLES/5>; Sepulveda, E., N. Stall and S. Sinha (2020^[83]), "A comparison of COVID-19 mortality rates among long-term care residents in 12 OECD countries", <https://doi.org/10.1016/j.jamda.2020.08.039>; Rocard, E., P. Sillitti and A. Llana-Nozal (2021^[84]), "COVID-19 in long-term care: Impact, policy responses and challenges", <https://doi.org/10.1787/b966f837-en>; Suwono, B. et al. (2022^[85]), "SARS-CoV-2 outbreaks in hospitals and long-term care facilities in Germany: A national observational study", <https://doi.org/10.1016/J.LANEPE.2021.100303>; Thompson, N. et al. (2020^[86]), "Prevalence of antimicrobial use and opportunities to improve prescribing practices in U.S. nursing homes", <https://doi.org/10.1016/j.jamda.2016.08.013>; Hoxha, A. et al. (2021^[87]), "Asymptomatic SARS-CoV-2 infection in Belgian long-term care facilities", [https://doi.org/10.1016/S1473-3099\(20\)30560-0](https://doi.org/10.1016/S1473-3099(20)30560-0); Olmos, C. et al. (2021^[88]), "SARS-CoV-2 infection in asymptomatic healthcare workers at a clinic in Chile", <https://doi.org/10.1371/JOURNAL.PONE.0245913>; Brown, K. et al. (2021^[89]), "Association between nursing home crowding and COVID-19 infection and mortality in Ontario, Canada", <https://doi.org/10.1001/jamainternmed.2020.6466>.

The pandemic also had an impact on vaccination campaigns in 36% of countries (10 out of 28 countries), it affected AMR awareness campaigns in 19% of countries (5 out of 27 countries), ASP practices in 39% of countries (11 out of 28 countries) of countries and IPC in LTCFs in 64% of countries (18 out of 28 countries). France reported a one-year delay in implementing national ASP campaigns targeting the public and professionals and Greece reported a delay in the development of campaigns. In Germany, during the pandemic, immunisation campaigns targeted nurses and LTCF residents. In Luxembourg and Poland, there was an improved uptake of influenza vaccines. In Greece, Ireland, Luxembourg, Portugal and the United States, there was an increase in rapid testing of LTCF residents to help with early diagnosis and screening for COVID-19 infection, which potentially helped reduce the spread of infection in LTCFs. In Australia, progress on some AMR Strategy implementation activities was temporarily impacted to some extent by the prioritisation of resources to address the COVID-19 pandemic, particularly when specific expertise or areas were needed, such as epidemiologists, modellers, general practitioners, communicable disease specialists and laboratories.

The COVID-19 pandemic has raised awareness of the need for IPC measures but has delayed or even stopped ASPs

Many countries reported a positive impact on the adoption of IPC components, such as hand hygiene, in LTCFs because of the pandemic. In Canada, Germany, Ireland, Italy, Japan, Portugal, Spain and the United States, education and IPC protocols increased awareness of the importance of hand hygiene. In Lithuania, intensive training, national and regional meetings, consultations in outbreak control and additional external inspections were targeted at LTCFs. In Belgium, free education on IPC and centralised e-learning sessions were offered in LTCFs. Luxembourg improved IPC implementation, and Greece and Poland enhanced hand hygiene through better access to disinfectants and protective cloths.

The impact of the pandemic on ASPs was significant. In France, ASPs were slowed down due to the pandemic. Greece and Luxembourg experienced implementation delays on ASPs and, in Spain, a development framework for ASPs was stopped because all resources were focused on COVID-19. However, in Ireland, there were increased webinars, delivered by the Irish Health Service Antimicrobial Resistance and Infection Control programme, and webinars on education and guidance on COVID-19 for LTCFs.

Policy options to tackle AMR in LTCFs

Countries recognise that national action plans on AMR need to acknowledge inappropriate antibiotic use and AMR in LTCFs but there is some way to go to fill important gaps in the design, adoption and effective use of ASP, IPC and surveillance in LTCFs.

With 28 countries (out of 28 countries) reporting that they plan to include references to LTC in their next national action plan on AMR, it is clear that EU/EEA and OECD countries recognise that tackling AMR and inappropriate antibiotic use in LTCFs requires targeted policy actions. However, as illustrated in the previous sections, there are a number of important gaps in the design, adoption and effective use of ASP, IPC and surveillance in LTCFs. Policy options for countries seeking to reduce the threat of inappropriate antibiotic use and AMR in LTCFs include:

- Setting up routine surveillance systems that can collect and report data on antibiotic use and AMR in LTCFs. Routine surveillance is needed to establish a baseline situation, design policies that are fit for LTCFs and monitor and evaluate the impact of those policies.
- Promoting the design, implementation and effective use of ASPs that are fit for LTCFs, including more integration with prescribers (e.g. general practitioners), better feedback on antibiotic use and AMR profiles, regular training and a budget specifically dedicated to ASP.
- Incentivising adoption and compliance with IPC practices that are tailored to LTCFs, emphasising the need for budgets specifically earmarked for IPC, creation of IPC committees and adoption of procedures for surveillance and auditing of IPC processes in LTCFs.

Guidelines and centralised policy advice are helpful but may be insufficient to ensure change at scale. Many LTCFs face enormous challenges, from staff shortages to limited financial resources, to significant and complex demands from their residents (Box 7.5). A survey of over 1 000 LTCFs in the United States concluded that LTCFs may not follow voluntary IPC guidelines if doing so requires significant financial investment, such as recruiting staff or investing in infrastructure (Ye et al., 2015^[90]). Without appropriate financial and technical support, it is unlikely that all LTCFs will be able to implement the surveillance, ASP and IPC protocols that can make a difference in the fight against AMR.

A combination of well-funded mandates and financial incentives may be a way forward. Financial strategies targeting healthcare providers to promote the prudent use of antibiotics have been shown to improve the appropriateness of antibiotic prescribing in various healthcare settings (Yoshikawa et al., 2021^[91]). Both

financial penalties and rewards can be effective and the choice of whether to use financial rewards or penalties should be informed by the context (Yoshikawa et al., 2021^[91]). More research is needed on whether such strategies could work in LTCFs, so pilot projects and experimentation could be useful.

Routine surveillance of AMR in LTCFs

Despite efforts to improve surveillance of antibiotic prescribing and AMR in LTCFs by EU/EEA countries, Australia and Canada, among others, comparable data on the prevalence of HAIs, antibiotic consumption and AMR in LTCFs are not yet widely available. Routine surveillance of AMR in LTCFs is limited in most countries (Haenen et al., 2019^[27]).

Routine surveillance of both antibiotic use and AMR in LTCFs can promote benchmarking, auditing and goal setting. When combined with other interventions, routine surveillance can be an effective way to promote the use of ASPs and IPC practices and is associated with reduced rates of HAIs (Daneman et al., 2012^[92]; Fleming et al., 2014^[93]; Furuno and Mody, 2020^[15]). Routine data on AMR in LTCFs can also help to determine susceptibility rates within a given community or country and to guide the development of antibiotic restrictive lists, and specific antibiograms that can reduce the rates of inappropriate prescribing in LTCFs (Furuno et al., 2014^[94]). Unlike PPSs, routine surveillance provides ongoing monitoring of infections in LTCF residents admitted to acute care hospitals or other healthcare settings and provides a comprehensive, integrated approach to tackling AMR within the healthcare system.

Almost half of countries (13 out of 24 countries) require LTCFs to register residents infected or colonised with multidrug-resistant organisms and 63% (15 out of 24 countries) have a designated person responsible for reporting and managing outbreaks. Moreover, a few countries are starting to implement annual PPSs for HAIs and antibiotic use in LTCFs (Public Health Agency of Canada, 2019^[95]; Ministry of Health/Ministry for Primary Industries, 2017^[96]). However, these types of reporting provide only a picture in time and are not well suited to characterise antibiotic use and AMR over time. Furthermore, findings from PPS indicate the majority of infections in LTCFs originate in the residents' own LTCF. Yet, existing systems of routine surveillance would identify these infections when residents are admitted to acute care hospitals and these findings may not be shared back with the LTCF. Setting up routine surveillance systems that can capture these details is instrumental to fighting AMR in LTCFs.

Establishing routine LTCF-specific surveillance systems may be challenging because LTCFs often use several laboratories and many countries aggregate surveillance data from LTCFs with samples from GP clinics in the community. This challenge may be circumvented by collecting LTCF postcodes to help identify and disaggregate samples from LTCFs in surveillance databases (Raban et al., 2021^[97]; Rosello et al., 2017^[23]). Despite the challenges associated with LTCF-specific surveillance, setting up surveillance systems for LTCFs is feasible and can be integrated into existing healthcare systems (Nicolle et al., 2000^[13]; El Emam et al., 2014^[98]).

ASPs that are fit for LTCFs

Educating healthcare workers, prescribers, LTCF residents and their family members is an important element of successful ASP (Holmes et al., 2003^[99]). Only 1 in 5 countries (4 out of 21 countries) report having guidelines, protocols or requirements for the provision of regular training on appropriate antibiotic prescribing in LTCFs. Initial and continuous ASP education and training are lacking in many LTCFs, and healthcare workers in LTCFs often do not have sufficient knowledge of ASP. Prescriber education is important because knowledge gaps may influence physician prescribing behaviour and decision-making (Kassett et al., 2016^[100]), yet prescriber education implemented in isolation may be ineffective to reduce inappropriate prescribing in LTCFs. To improve the effectiveness of educational ASP, ASP strategies should be integrated into existing LTCF systems of healthcare delivery using behavioural incentives such

as monitoring, surveillance, goal setting, feedback and audits (Fleming, Browne and Byrne, 2013^[101]; Nguyen, Tunney and Hughes, 2019^[102]).

Establishing clear communication channels between stakeholders in LTCFs and other healthcare settings within the community is also important to the success of ASPs. A common barrier to effective implementation of ASPs in LTCFs is the fragmented nature of healthcare delivery in LTCFs, where residents have multiple caregivers and prescribers working in other healthcare settings are often based off site and prescribe antibiotics over the phone (Crnich et al., 2015^[103]). This model contributes to the lack of continuity of care often experienced by LTCF residents, which can lead to inappropriate antibiotic prescribing and emphasises the need for a co-ordinated and collaborative approach to ASP in LTCFs (Pulia et al., 2018^[69]). Improved collaboration between LTCF stakeholders and other healthcare settings is important because of the potential for LTCFs to spread multidrug-resistant organisms across healthcare networks (Kahvecioglu et al., 2014^[28]). Collaboration also creates opportunities for Acute care hospitals to share expertise with neighbouring LTCFs which can in turn tailor interventions to suit their specific needs (Kullar et al., 2018^[104]).

To illustrate, a community-wide campaign “Do bugs need drugs?” was implemented in LTCFs in Alberta and British Columbia in Canada. The campaign, aimed at LTCFs, sought to provide a consistent approach to the management of urinary tract infections and nursing home-acquired pneumonia; and to facilitate the communication of signs and symptoms between LTCFs and physicians. Reductions in antibiotic prescribing were achieved with staff education and feedback in Alberta (Carson and Patrick, 2015^[105]; Do Bugs Need Drugs?, 2016^[106]).

Incentives for effective use of IPC measures

As most IPC programmes are designed for closed systems such as hospital wards in acute care hospitals, without modification and careful planning, these interventions can be challenging to implement in LTCFs, as these often have multiple areas for socialisation and fewer resources for IPC compared to acute care hospitals. These challenges can be tackled by targeting interventions to residents who are at a high risk of acquiring infections, such as those with indwelling devices (e.g. feeding tubes and urinary catheters) and those with pressure ulcers (Blanco et al., 2018^[107]; Mody et al., 2015^[7]). A few examples of best practices in preventing urinary tract infections and reducing the unnecessary use of antibiotics in LTCFs are shown in Box 7.7 below.

Many LTCFs have limited resources and cost may be a barrier to implementing IPC measures and employing staff with experience or specialised training in IPC practices. In smaller LTCFs, a member of staff could be adequately trained in IPC, assume responsibility for the co-ordination of activities in the facility and have access to expert advice at a more central level if needed. Adherence to IPC measures is likely a cost-effective way to reduce the use of antimicrobials in healthcare settings (OECD, 2018^[14]) and may also be cost-effective from the perspective of the healthcare payer (Hutton et al., 2018^[108]). Moreover, the potential costs of controlling an outbreak, the costs of longer hospital stays and more intensive treatment, and the costs associated with morbidity and mortality for residents and healthcare workers can be significantly higher than implementing effective IPCs in LTCFs. Therefore, it is likely beneficial for payers to provide incentives to LTCFs to implement IPC programmes.

Box 7.7. Examples of best practices in preventing urinary tract infections and reducing the unnecessary use of antibiotics in LTCFs

To Dip or Not to Dip

Infection prevention can lead to lower use of antibiotics. In the United Kingdom, a quality improvement programme “To Dip or Not to Dip” was used to improve the diagnosis and management of urinary tract infections in LTCFs. Instead of using dip-stick urinalysis to diagnose urinary tract infections, which can lead to misleading results, LTCF staff were trained to use an evidence-based clinical algorithm for diagnosis, recording and sharing resident symptoms with general practitioners. The change in practice reduced both treatment and prophylactic antibiotic prescriptions for urinary tract infections and hospital admissions among LTCF residents, without recorded adverse effects (UK Government, 2019^[109]). The programme has been adopted by the Australian Aged Care Quality and Safety Commission to improve the diagnosis and management of urinary tract infections in LTCFs (Australian Government, 2022^[110]).

Good Hydration! initiative

Dehydration is common among LTCF residents, can increase the risk of urinary tract infections, disorientation, falls and is a common cause of hospital admission among LTCF residents (Schols et al., 2009^[111]). This initiative involved staff and resident training on hydration, posters and introducing a “7 structured drinks round” for residents each day (Lean et al., 2019^[112]; Booth and Agnew, 2019^[113]). The intervention successfully reduced the incidence of urinary tract infections requiring antibiotics and hospital admissions with a primary diagnosis of urinary tract infections among LTCF residents. The programme has won multiple awards and has been adopted in other LTCFs in England (United Kingdom) (Oxford Patient Safety Collaborative, 2019^[114]). Improving hydration in LTCF residents is a relatively low-cost intervention, as the direct and indirect costs of antibiotic treatment and hospitalisation are high.

A national project to prevent catheter-associated urinary tract infections in LTCFs

The use of indwelling urinary catheters is a risk factor for urinary tract infections and, in LTCFs, the urine of residents with chronic (>30 days) indwelling catheters is the most common site for isolation of resistant gram-negative organisms (Mody et al., 2007^[115]; Nicolle, 2014^[116]). In the United States, an evidence-based programme to tackle catheter-associated urinary tract infections, adapted from a similar programme in acute care hospitals, was implemented in over 400 LTCFs. The intervention involved education, surveillance, change champions and an evidence-based tool to assist with the correct diagnosis, in an effort to reduce the inappropriate use of antibiotics for asymptomatic urinary tract infections. The intervention also targeted residents with indwelling urinary catheters and included guidance for catheter removal, aseptic insertion, regular assessments, training and incontinence planning. After adjusting for LTCF characteristics (e.g. ownership, number of beds, having an infection preventionist), the incidence of catheter-associated urinary tract infections dropped from 6.42 at the beginning of the project to 3.33 per 1 000 catheter-days at the end of the project. Furthermore, 75% of the nursing homes (276 in 368) reported at least a 40% reduction in the rates of catheter-associated urinary tract infections and a reduction in the frequency of orders for urine cultures (Mody et al., 2007^[115]). Cost-effectiveness analysis showed that the intervention was likely to have net cost savings of USD 34 000 per year (Hutton et al., 2018^[108]).

Source: UK Government (2019^[109]), *Tackling Antimicrobial Resistance 2019-24: The UK's Five-year National Action Plan*, Department of Health and Social Care, London; Australian Government (2022^[110]), *To Dip or Not to Dip flyer*, <https://www.agedcarequality.gov.au/resources/dip-or-not-dip-flyer> (accessed on 4 April 2022); Schols, J. et al. (2009^[111]), “Preventing and treating dehydration in the elderly during periods of illness and warm weather”, <https://doi.org/10.1007/s12603-009-0023-z>; Lean, K. et al. (2019^[112]), “Reducing urinary tract infections in care homes by improving hydration”, <https://doi.org/10.1136/bmjog-2018-000563>; Booth, J. and R. Agnew (2019^[113]), “Evaluating a hydration intervention (DRInK Up) to prevent urinary tract infection in care home residents: A mixed methods exploratory study”, <https://doi.org/10.22540/ifs-04-036>; Oxford Patient Safety Collaborative (2019^[114]), *Good Hydration!*, <http://bit.ly/good-hydration> (accessed on 4 April 2022); Mody, L. et al. (2007^[115]), “Indwelling device use and antibiotic resistance in nursing homes: Identifying a high-risk group”, <https://doi.org/10.1111/j.1532-5415.2007.01468.x>; Nicolle, L. (2014^[116]), “Catheter associated urinary tract infections”, *Antimicrobial Resistance and Infection Control*, Vol. 3/1, <https://doi.org/10.1186/2047-2994-3-23>; Hutton, D. et al. (2018^[108]), “Economic evaluation of a catheter-associated urinary tract infection prevention programme in nursing homes”, <https://doi.org/10.1111/jgs.15316>.

Conclusion

Many factors come together to make AMR in LTCFs an especially challenging threat, not only to residents and staff of LTCFs but also to broader communities in which these facilities are located. When staff, visitors and residents move in and out of LTCFs, so do organisms, including resistant pathogens.

Residents of LTCFs are at a higher risk of HAIs and infections from resistant pathogens, compared to community-dwelling older adults. Many residents of LTCFs receive multiple courses of antibiotics each year. Despite it being crucial to ensure that antibiotics are used wisely, many antibiotic prescriptions in LTCFs are unnecessary or inappropriate and are often given without laboratory or diagnostic testing, not always in alignment with evidence-based guidelines.

Many countries have legislation and policies to tackle AMR in LTCFs but there are important gaps in the effective use of ASPs and IPC measures. According to a new OECD survey, just over half of reporting EU/EEA and OECD countries report having a national action plan on AMR that specifically references LTCFs. In most countries, there are no guidelines, protocols or requirements for the adoption of ASPs in LTCFs. A majority of countries do report having guidelines, protocols or requirements for the adoption of IPC programmes or protocols in LTCFs but far fewer report having a process of surveillance/audit of IPC policies in LTCFs. Finally, data on antibiotic consumption and AMR in LTCFs are not widely available and routine surveillance is still limited in most countries. Only around a third of countries conduct surveillance of antibiotic consumption and AMR in LTCFs and around one in five report having surveillance of indicators of ASP or IPC in LTCFs.

Tackling AMR in LTCFs is a key part of addressing the threat of AMR more broadly but responses to this challenge must acknowledge that LTCFs have different needs and face different risks compared to acute care hospitals. It is positive that 28 countries report that they plan to include references to LTC in their next national action plan on AMR. Policy options for countries to consider include:

- Setting up routine surveillance systems that can collect and report data on antibiotic use and AMR in LTCFs. Routine surveillance is essential to establish a baseline situation, design policies that are fit for LTCFs, and monitor and evaluate the impact of those policies.
- Promoting the design, implementation and effective use of ASPs that are fit for LTCFs, including more integration with prescribers (e.g. general practitioners), better feedback on antibiotic use and AMR profiles, regular training and a budget dedicated to ASPs.
- Incentivising adoption and compliance with IPC practices that are tailored to LTCFs, emphasising the need for budgets specifically earmarked for IPC, creation of IPC committees and adoption of procedures for surveillance and auditing of IPC processes in LTCFs.

Many countries do not mandate, incentivise or monitor the adoption of ASPs and IPC measures in LTCFs. Because LTCFs face enormous challenges, ASPs and IPC practices may be underutilised. Financial strategies targeting healthcare providers to promote the prudent use of antibiotics have been shown to improve the appropriateness of antibiotic prescribing in various healthcare settings. A combination of well-funded mandates and financial incentives may be a way forward.

References

- ACSQHC (2021), *AURA 2021: Fourth Australian Report on Antimicrobial Use and Resistance in Human Health*, Australian Commission on Safety and Quality in Health Care, Sydney, <https://www.safetyandquality.gov.au/publications-and-resources/resource-library/aura-2021-fourth-australian-report-antimicrobial-use-and-resistance-human-health>. [44]
- ACSQHC (2019), *2018 Aged Care National Antimicrobial Prescribing Survey Report*, Australian Commission on Safety and Quality in Health Care. [41]
- Auditor General of Ontario (2009), “3.06 Infection prevention and control at long-term-care homes”, in *2009 Annual Report*, <https://www.auditor.on.ca/en/content/annualreports/arreports/en09/306en09.pdf>. [8]
- Augustine, S. and R. Bonomo (2011), “Taking stock of infections and antibiotic resistance in the elderly and long-term care facilities: A survey of existing and upcoming challenges”, *European Journal of Microbiology and Immunology*, Vol. 1/3, pp. 190-197, <https://doi.org/10.1556/eujmi.1.2011.3.2>. [30]
- Australian Government (2022), *To Dip or Not to Dip flyer*, Aged Care Quality and Safety Commission, <https://www.agedcarequality.gov.au/resources/dip-or-not-dip-flyer> (accessed on 4 April 2022). [110]
- Baloyannis, S. (ed.) (2020), “The impact of COVID-19 pandemic on long-term care facilities worldwide: An overview on international issues”, *BioMed Research International*, Vol. 2020, pp. 1-7, <https://doi.org/10.1155/2020/8870249>. [86]
- Beović, B. et al. (2018), *Antibiotic Prescribing in Long-term Care Facilities for the Elderly*, WHO Regional Office for Europe, Copenhagen, <https://apps.who.int/iris/handle/10665/346473>. [46]
- Bergman, J., J. Schjøtt and H. Blix (2011), “Prevention of urinary tract infections in nursing homes: Lack of evidence-based prescription?”, *BMC Geriatrics*, Vol. 11, <https://doi.org/10.1186/1471-2318-11-69>. [57]
- Blanco, N. et al. (2018), “Transmission of resistant Gram-negative bacteria to healthcare personnel gowns and gloves during care of residents in community-based nursing facilities”, *Infection Control and Hospital Epidemiology*, Vol. 39/12, pp. 1425-1430, <https://doi.org/10.1017/ice.2018.247>. [107]
- Boivin, Y. et al. (2013), “Antibiotic prescription in nursing homes for dependent elderly people: A cross-sectional study in Franche-Comté”, *Médecine et Maladies Infectieuses*, Vol. 43/4, pp. 163-169, <https://doi.org/10.1016/j.medmal.2013.03.004>. [72]
- Bonomo, R. (2000), “Multiple antibiotic-resistant bacteria in long-term-care facilities: An emerging problem in the practice of infectious diseases”, *Clinical Infectious Diseases*, Vol. 31/31, pp. 1414-1422, <https://doi.org/10.1086/317489>. [1]
- Booth, J. and R. Agnew (2019), “Evaluating a hydration intervention (DRInK Up) to prevent urinary tract infection in care home residents: A mixed methods exploratory study”, *Journal of Frailty, Sarcopenia and Falls*, Vol. 04/02, pp. 36-44, <https://doi.org/10.22540/jfsf-04-036>. [113]

- Braykov, N. et al. (2013), "Trends in resistance to carbapenems and third-generation cephalosporins among clinical isolates of *Klebsiella pneumoniae* in the United States, 1999–2010", *Infection Control & Hospital Epidemiology*, Vol. 34/3, pp. 259-268, <https://doi.org/10.1086/669523>. [77]
- Brown, K. et al. (2021), "Association between nursing home crowding and COVID-19 infection and mortality in Ontario, Canada", *JAMA Internal Medicine*, Vol. 181/2, p. 229, <https://doi.org/10.1001/jamainternmed.2020.6466>. [89]
- Capitano, B. and D. Nicolau (2003), "Evolving epidemiology and cost of resistance to antimicrobial agents in long-term care facilities", *Journal of the American Medical Directors Association*, Vol. 4/Supplement, pp. S90-S99, <https://doi.org/10.1097/01.jam.0000066029.00660.5a>. [76]
- Carson, M. and D. Patrick (2015), "'Do Bugs Need Drugs?' A community education program for the wise use of antibiotics", *Canada Communicable Disease Report*, Vol. 41/S4, pp. 5-8, <https://doi.org/10.14745/ccdr.v41is4a02>. [105]
- Cassone, M. and L. Mody (2015), "Colonization with multidrug-resistant organisms in nursing homes: Scope, importance, and management", *Current Geriatrics Reports*, Vol. 4/1, pp. 87-95, <https://doi.org/10.1007/s13670-015-0120-2>. [21]
- Chopra, T. and E. Goldstein (2015), "Clostridium difficile infection in long-term care facilities: A call to action for antimicrobial stewardship", *Clinical Infectious Diseases*, Vol. 60/suppl_2, pp. S72-S76, <https://doi.org/10.1093/cid/civ053>. [63]
- Crnich, C. et al. (2015), "Optimizing antibiotic stewardship in nursing homes: A narrative review and recommendations for improvement", *Drugs & Aging*, Vol. 32/9, pp. 699-716, <https://doi.org/10.1007/s40266-015-0292-7>. [103]
- D'ascanio, M. et al. (2021), "Age is not the only risk factor in COVID-19: The role of comorbidities and of long staying in residential care homes", *BMC Geriatrics*, Vol. 21/1, pp. 1-10, <https://doi.org/10.1186/S12877-021-02013-3/TABLES/5>. [82]
- Daneman, N. et al. (2013), "Prolonged antibiotic treatment in long-term care", *JAMA Internal Medicine*, Vol. 173/8, p. 673, <https://doi.org/10.1001/jamainternmed.2013.3029>. [66]
- Daneman, N. et al. (2011), "Antibiotic use in long-term care facilities", *Journal of Antimicrobial Chemotherapy*, Vol. 66/12, pp. 2856-2863, <https://doi.org/10.1093/jac/dkr395>. [58]
- Do Bugs Need Drugs? (2016), *Do Bugs Need Drugs? Annual Report 2015/16*. [106]
- Dyar, O., L. Pagani and C. Pulcini (2015), "Strategies and challenges of antimicrobial stewardship in long-term care facilities", *Clinical Microbiology and Infection*, Vol. 21/1, pp. 10-19, <https://doi.org/10.1016/j.cmi.2014.09.005>. [70]
- ECDC (2014), *Point Prevalence Survey of Healthcare-associated Infections and Antimicrobial Use in European Long-term Care Facilities April to May 2013*, European Centre for Disease Prevention and Control, 2014, <https://doi.org/10.2900/24172>. [40]
- El-Halfawy, O. and M. Valvano (2015), "Antimicrobial heteroresistance: An emerging field in need of clarity", *Clinical Microbiology Reviews*, Vol. 28/1, pp. 191-207, <https://doi.org/10.1128/cmr.00058-14>. [79]

- Fleming, A. et al. (2015), "Antibiotic prescribing in long-term care facilities: A meta-synthesis of qualitative research", *Drugs & Aging*, Vol. 32/4, pp. 295-303, <https://doi.org/10.1007/s40266-015-0252-2>. [71]
- Fleming, A. et al. (2014), "Antibiotic prescribing in long-term care facilities: A qualitative, multidisciplinary investigation", *BMJ Open*, Vol. 4/11, p. e006442, <https://doi.org/10.1136/bmjopen-2014-006442>. [93]
- Fleming, A., J. Browne and S. Byrne (2013), "The effect of interventions to reduce potentially inappropriate antibiotic prescribing in long-term care facilities: A systematic review of randomised controlled trials", *Drugs & Aging*, Vol. 30/6, pp. 401-408, <https://doi.org/10.1007/s40266-013-0066-z>. [101]
- Fulchini, R. et al. (2019), "Antibiotic-resistant pathogens in different patient settings and identification of surveillance gaps in Switzerland – A systematic review", *Epidemiology and Infection*, Vol. 147, <https://doi.org/10.1017/s0950268819001523>. [35]
- Furuno, J. et al. (2014), "Using antibiograms to improve antibiotic prescribing in skilled nursing facilities", *Infection Control & Hospital Epidemiology*, Vol. 35/S3, pp. S56-S61, <https://doi.org/10.1086/677818>. [94]
- Furuno, J. and L. Mody (2020), "Several roads lead to Rome: Operationalizing antibiotic stewardship programs in nursing homes", *Journal of the American Geriatrics Society*, Vol. 68/1, pp. 11-14, <https://doi.org/10.1111/jgs.16279>. [15]
- Gouin, K. et al. (2021), "Trends in prescribing of antibiotics and drugs investigated for coronavirus disease 2019 (COVID-19) treatment in US nursing home residents during the COVID-19 pandemic", *Clinical Infectious Diseases*, Vol. 74/1, pp. 74-82, <https://doi.org/10.1093/cid/ciab225>. [52]
- Guerrero, D. et al. (2011), "Clostridium difficile infection in a department of veterans affairs long-term care facility", *Infection Control & Hospital Epidemiology*, Vol. 32/5, pp. 513-515, <https://doi.org/10.1086/659765>. [62]
- Haenen, A. et al. (2019), "Surveillance of infections in long-term care facilities (LTCFs): The impact of participation during multiple years on health care-associated infection incidence", *Epidemiology and Infection*, Vol. 147, <https://doi.org/10.1017/s0950268819001328>. [27]
- Hajogrudmannrnmnl, H. et al. (2010), "Carbapenem-non-susceptible Enterobacteriaceae in Europe: Conclusions from a meeting of national experts", *Eurosurveillance*, Vol. 15/46, pp. 1-13, <https://doi.org/10.2807/es.15.46.19711-en>. [80]
- HALT Study Group (2018), "Antimicrobial use in European long-term care facilities: Results from the third point prevalence survey of healthcare-associated infections and antimicrobial use, 2016 to 2017", *Eurosurveillance*, Vol. 23/46, <https://doi.org/10.2807/1560-7917.es.2018.23.46.1800394>. [74]
- Harbarth, S. (ed.) (2012), "Reduction in Clostridium difficile infection rates after mandatory hospital public reporting: Findings from a longitudinal cohort study in Canada", *PLoS Medicine*, Vol. 9/7, p. e1001268, <https://doi.org/10.1371/journal.pmed.1001268>. [92]
- Hedin, K. et al. (2002), "Asymptomatic bacteriuria in a population of elderly in municipal institutional care", *Scandinavian Journal of Primary Health Care*, Vol. 20/3, pp. 166-168, <https://doi.org/10.1080/028134302760234627>. [64]

- Holmes, J. et al. (2003), "Developing a patient intervention to reduce antibiotic overuse", *AMIA Annual Symposium Proceedings*, Vol. 2003, p. 864, <https://pubmed.ncbi.nlm.nih.gov/14728369/> (accessed on 4 April 2022). [99]
- Hoxha, A. et al. (2021), "Asymptomatic SARS-CoV-2 infection in Belgian long-term care facilities", *The Lancet Infectious Diseases*, Vol. 21/4, p. e67, [https://doi.org/10.1016/S1473-3099\(20\)30560-0](https://doi.org/10.1016/S1473-3099(20)30560-0). [87]
- Hughes, J. et al. (2016), "How to measure the impacts of antibiotic resistance and antibiotic development on empiric therapy: New composite indices", *BMJ Open*, Vol. 6/12, p. e012040, <https://doi.org/10.1136/bmjopen-2016-012040>. [73]
- Hutton, D. et al. (2018), "Economic evaluation of a catheter-associated urinary tract infection prevention program in nursing homes", *Journal of the American Geriatrics Society*, Vol. 66/4, pp. 742-747, <https://doi.org/10.1111/jgs.15316>. [108]
- Jones, S. et al. (1987), "Appropriateness of antibiotic therapy in long-term care facilities", *The American Journal of Medicine*, Vol. 83/3, pp. 499-502, [https://doi.org/10.1016/0002-9343\(87\)90761-3](https://doi.org/10.1016/0002-9343(87)90761-3). [32]
- Jump, R. and C. Donskey (2014), "Clostridium difficile in the long-term care facility: Prevention and management", *Current Geriatrics Reports*, Vol. 4/1, pp. 60-69, <https://doi.org/10.1007/s13670-014-0108-3>. [60]
- Kahvecioglu, D. et al. (2014), "Multidrug-resistant organism infections in US nursing homes: A national study of prevalence, onset, and transmission across care settings, October 1, 2010-December 31, 2011", *Infection Control & Hospital Epidemiology*, Vol. 35/S3, pp. S48-S55, <https://doi.org/10.1086/677835>. [28]
- Karunasagar, I. (ed.) (2021), "Temporal and regional trends of antibiotic use in long-term aged care facilities across 39 countries, 1985-2019: Systematic review and meta-analysis", *Plos ONE*, Vol. 16/8, p. e0256501, <https://doi.org/10.1371/journal.pone.0256501>. [45]
- Kassett, N. et al. (2016), "Impact of antimicrobial stewardship on physician practice in a geriatric facility", *Canadian Journal of Hospital Pharmacy*, Vol. 69/6, pp. 460-465, <https://doi.org/10.4212/cjhp.v69i6.1609>. [100]
- Khurana, S. et al. (2021), "Profile of co-infections & secondary infections in COVID-19 patients at a dedicated COVID-19 facility of a tertiary care Indian hospital: Implication on antimicrobial resistance", *Indian Journal of Medical Microbiology*, Vol. 39/2, pp. 147-153, <https://doi.org/10.1016/J.IJMMB.2020.10.014>. [51]
- Kistler, C. et al. (2013), "Challenges of antibiotic prescribing for assisted living residents: Perspectives of providers, staff, residents, and family members", *Journal of the American Geriatrics Society*, Vol. 61/4, pp. 565-570, <https://doi.org/10.1111/jgs.12159>. [65]
- Kullar, R. et al. (2018), "A roadmap to implementing antimicrobial stewardship principles in long-term care facilities (LTCFs): Collaboration between an acute-care hospital and LTCFs", *Clinical Infectious Diseases*, Vol. 66/8, pp. 1304-1312, <https://doi.org/10.1093/cid/cix1041>. [104]
- Langford, B. et al. (2021), "Antibiotic prescribing in patients with COVID-19: Rapid review and meta-analysis", *Clinical Microbiology and Infection*, Vol. 27/4, pp. 520-531, <https://doi.org/10.1016/J.CMI.2020.12.018>. [48]

- Latour, K. et al. (2012), "Indications for antimicrobial prescribing in European nursing homes: Results from a point prevalence survey", *Pharmacoepidemiology and Drug Safety*, Vol. 21/9, pp. 937-44, <https://doi.org/10.1002/pds.3196>. [17]
- Laxminarayan, R. and K. Klugman (2011), "Communicating trends in resistance using a drug resistance index", *BMJ Open*, Vol. 1/2, pp. e000135-e000135, <https://doi.org/10.1136/bmjopen-2011-000135>. [75]
- Lean, K. et al. (2019), "Reducing urinary tract infections in care homes by improving hydration", *BMJ Open Quality*, Vol. 8/3, p. e000563, <https://doi.org/10.1136/bmjopen-2018-000563>. [112]
- Lee, B. et al. (2012), "Methenamine hippurate for preventing urinary tract infections", *Cochrane Database of Systematic Reviews*, <https://doi.org/10.1002/14651858.cd003265.pub3>. [59]
- Lee, S. et al. (2019), "Antimicrobial utilization data: Does point prevalence data correlate with defined daily doses?", *Infection Control & Hospital Epidemiology*, Vol. 40/8, pp. 920-921, <https://doi.org/10.1017/ice.2019.154>. [39]
- Lim, C. et al. (2014), "Antimicrobial stewardship in residential aged care facilities: Need and readiness assessment", *BMC Infectious Diseases*, Vol. 14/1, <https://doi.org/10.1186/1471-2334-14-410>. [68]
- Loeb, M. (2003), "Risk factors for resistance to antimicrobial agents among nursing home residents", *American Journal of Epidemiology*, Vol. 157/1, pp. 40-47, <https://doi.org/10.1093/aje/kwf173>. [53]
- Loeb, M. et al. (2001), "Colonization with multiresistant bacteria and quality of life in residents of long-term-care facilities", *Infection Control & Hospital Epidemiology*, Vol. 22/02, pp. 67-68, <https://doi.org/10.1086/503394>. [10]
- Marinosci, F. et al. (2013), "Carbapenem resistance and mortality in institutionalized elderly with urinary infection", *Journal of the American Medical Directors Association*, Vol. 14/7, pp. 513-517, <https://doi.org/10.1016/j.jamda.2013.02.016>. [78]
- Marra, F. et al. (2018), "A decrease in antibiotic utilization for urinary tract infections in women in long-term care facilities", *Canadian Geriatrics Journal*, Vol. 21/3, pp. 262-263, <https://doi.org/10.5770/cgj.21.303>. [5]
- Marra, F. et al. (2017), "Utilization of antibiotics in long-term care facilities in British Columbia, Canada", *Journal of the American Medical Directors Association*, Vol. 18/12, pp. 1098.e1-1098.e11, <https://doi.org/10.1016/j.jamda.2017.09.018>. [36]
- McGeer, A. et al. (1991), "Definitions of infection for surveillance in long-term care facilities", *American Journal of Infection Control*, Vol. 19/1, pp. 1-7, [https://doi.org/10.1016/0196-6553\(91\)90154-5](https://doi.org/10.1016/0196-6553(91)90154-5). [55]
- Ministry of Health/Ministry for Primary Industries (2017), *New Zealand Antimicrobial Resistance Action Plan*, <http://www.health.govt.nz/system/files/documents/publications/new-zealand-antimicrobial-resistance-action-plan.pdf>. [96]
- Mody, L. et al. (2015), "A targeted infection prevention intervention in nursing home residents with indwelling devices", *JAMA Internal Medicine*, Vol. 175/5, p. 714, <https://doi.org/10.1001/jamainternmed.2015.132>. [7]

- Mody, L. et al. (2007), "Indwelling device use and antibiotic resistance in nursing homes: Identifying a high-risk group", *Journal of the American Geriatrics Society*, Vol. 55/12, pp. 1921-1926, <https://doi.org/10.1111/j.1532-5415.2007.01468.x>. [115]
- Morrill, H. et al. (2016), "Antimicrobial stewardship in long-term care facilities: A call to action", *Journal of the American Medical Directors Association*, Vol. 17/2, pp. 183.e1-183.e16, <https://doi.org/10.1016/j.jamda.2015.11.013>. [54]
- Moyo, P. et al. (2020), "Risk factors for pneumonia and influenza hospitalizations in long-term care facility residents: A retrospective cohort study", *BMC Geriatrics*, Vol. 20/1, pp. 1-13, <https://doi.org/10.1186/s12877-020-1457-8>. [2]
- Nguyen, H., M. Tunney and C. Hughes (2019), "Interventions to improve antimicrobial stewardship for older people in care homes: A systematic review", *Drugs & Aging*, Vol. 36/4, pp. 355-369, <https://doi.org/10.1007/s40266-019-00637-0>. [102]
- Nicolle, L. (2014), "Catheter associated urinary tract infections", *Antimicrobial Resistance and Infection Control*, Vol. 3/1, <https://doi.org/10.1186/2047-2994-3-23>. [116]
- Nicolle, L. (2014), "Infection prevention issues in long-term care", *Current Opinion in Infectious Diseases*, Vol. 27/4, pp. 363-369, <https://doi.org/10.1097/qco.0000000000000071>. [20]
- Nicolle, L. (2001), "Preventing infections in non-hospital settings: Long-term care", *Emerging Infectious Diseases*, Vol. 7/2, p. 205, <https://doi.org/10.3201/EID0702.010210>. [4]
- Nicolle, L. et al. (2000), "Antimicrobial use in long-term-care facilities", *Infection Control & Hospital Epidemiology*, Vol. 21/8, pp. 537-545, <https://doi.org/10.1086/501798>. [13]
- Nucleo, E. et al. (2018), "Colonization of long-term care facility residents in three Italian Provinces by multidrug-resistant bacteria", *Antimicrobial Resistance and Infection Control*, Vol. 7/1, pp. 1-11, <https://doi.org/10.1186/s13756-018-0326-0>. [31]
- Oberjé, E., M. Tanke and P. Jeurissen (2016), *Cost-Effectiveness of Policies to Limit Antimicrobial Resistance in Dutch Healthcare Organisations*. [6]
- OECD (2018), *Stemming the Superbug Tide: Just A Few Dollars More*, OECD Health Policy Studies, OECD Publishing, Paris, <https://doi.org/10.1787/9789264307599-en>. [14]
- OECD/Eurostat/WHO (2017), *A System of Health Accounts 2011: Revised edition*, OECD Publishing, Paris, <https://doi.org/10.1787/9789264270985-en>. [25]
- Olmos, C. et al. (2021), "SARS-CoV-2 infection in asymptomatic healthcare workers at a clinic in Chile", *Plos ONE*, Vol. 16/1, p. e0245913, <https://doi.org/10.1371/JOURNAL.PONE.0245913>. [88]
- Oxford Patient Safety Collaborative (2019), *Good Hydration!*, <http://bit.ly/good-hydration> (accessed on 4 April 2022). [114]
- Patterson, L. et al. (2019), "Evidence of a care home effect on antibiotic prescribing for those that transition into a care home: A national data linkage study", *Epidemiology and Infection*, Vol. 147, <https://doi.org/10.1017/s0950268818003382>. [16]
- Pelfrene, E., R. Botgros and M. Cavaleri (2021), "Antimicrobial multidrug resistance in the era of COVID-19: A forgotten plight?", *Antimicrobial Resistance and Infection Control*, Vol. 10/1, <https://doi.org/10.1186/S13756-021-00893-Z>. [47]

- Peron, E. et al. (2013), "Another setting for stewardship: High rate of unnecessary antimicrobial use in a veterans affairs long-term care facility", *Journal of the American Geriatrics Society*, Vol. 61/2, pp. 289-290, <https://doi.org/10.1111/jgs.12099>. [38]
- Public Health Agency of Canada (2019), *2019 Point Prevalence Survey in Canadian Long Term Care Facilities Information Session - Protocol*. [95]
- Pulia, M. et al. (2018), "Comparing appropriateness of antibiotics for nursing home residents by setting of prescription initiation: A cross-sectional analysis", *Antimicrobial Resistance and Infection Control*, Vol. 7/1, p. 74, <https://doi.org/10.1186/s13756-018-0364-7>. [69]
- Raban, M. et al. (2021), "Temporal and regional trends of antibiotic use in long-term aged care facilities across 39 countries, 1985-2019: Systematic review and meta-analysis", *PLOS ONE*, Vol. 16/8, p. e0256501, <https://doi.org/10.1371/JOURNAL.PONE.0256501>. [97]
- Rawson, T. et al. (2020), "Bacterial and fungal coinfection in individuals with coronavirus: A rapid review to support COVID-19 antimicrobial prescribing", *Clinical Infectious Diseases*, Vol. 71/9, pp. 2459-2468, <https://doi.org/10.1093/CID/CIAA530>. [49]
- Ricchizzi, E. et al. (2018), "Antimicrobial use in European long-term care facilities: Results from the third point prevalence survey of healthcare-associated infections and antimicrobial use, 2016 to 2017", *Eurosurveillance*, Vol. 23/46, <https://doi.org/10.2807/1560-7917.ES.2018.23.46.1800394>. [42]
- Rocard, E., P. Sillitti and A. Llana-Nozal (2021), "COVID-19 in long-term care: Impact, policy responses and challenges", *OECD Health Working Papers*, No. 131, OECD Publishing, Paris, <https://doi.org/10.1787/b966f837-en>. [84]
- Rosello, A. et al. (2017), "Impact of long-term care facility residence on the antibiotic resistance of urinary tract Escherichia coli and Klebsiella", *Journal of Antimicrobial Chemotherapy*, p. dkw555, <https://doi.org/10.1093/jac/dkw555>. [23]
- Rotjanapan, P., D. Dosa and K. Thomas (2011), "Potentially inappropriate treatment of urinary tract infections in two Rhode Island nursing homes", *Archives of Internal Medicine*, Vol. 171/5, <https://doi.org/10.1001/archinternmed.2011.13>. [61]
- Schols, J. et al. (2009), "Preventing and treating dehydration in the elderly during periods of illness and warm weather", *The Journal of Nutrition, Health and Aging*, Vol. 13/2, pp. 150-157, <https://doi.org/10.1007/s12603-009-0023-z>. [111]
- Schora, D. et al. (2014), "Impact of detection, education, research and decolonization without isolation in long-term care (DERAIL) on methicillin-resistant Staphylococcus aureus colonization and transmission at 3 long-term care facilities", *American Journal of Infection Control*, Vol. 42/10, pp. S269-S273, <https://doi.org/10.1016/j.ajic.2014.05.011>. [11]
- Sepulveda, E., N. Stall and S. Sinha (2020), "A comparison of COVID-19 mortality rates among long-term care residents in 12 OECD countries", *Journal of the American Medical Directors Association*, Vol. 21/11, pp. 1572-1574.e3, <https://doi.org/10.1016/j.jamda.2020.08.039>. [83]
- Stone, P. et al. (2018), "Nursing home infection control program characteristics, CMS citations, and implementation of antibiotic stewardship policies: A national study", *Inquiry*, Vol. 55, <https://doi.org/10.1177/0046958018778636>. [9]

- Strathdee, S., S. Davies and J. Marcelin (2020), "Confronting antimicrobial resistance beyond the COVID-19 pandemic and the 2020 US election", *Lancet*, Vol. 396/10257, pp. 1050-1053, [https://doi.org/10.1016/S0140-6736\(20\)32063-8](https://doi.org/10.1016/S0140-6736(20)32063-8). [50]
- Stuart, R., C. Lim and D. Kong (2014), "Reducing inappropriate antibiotic prescribing in the residential care setting: Current perspectives", *Clinical Interventions in Aging*, p. 165, <https://doi.org/10.2147/cia.s46058>. [12]
- Suetens, C. et al. (2018), "Prevalence of healthcare-associated infections, estimated incidence and composite antimicrobial resistance index in acute care hospitals and long-term care facilities: Results from two European point prevalence surveys, 2016 to 2017", *Eurosurveillance*, Vol. 23/46, pp. 1-17, <https://doi.org/10.2807/1560-7917.ES.2018.23.46.1800516>. [22]
- Suwono, B. et al. (2022), "SARS-CoV-2 outbreaks in hospitals and long-term care facilities in Germany: A national observational study", *The Lancet Regional Health - Europe*, Vol. 14, p. 100303, <https://doi.org/10.1016/J.LANEPE.2021.100303>. [85]
- Szabó, R. and K. Böröcz (2014), "Antimicrobial use in Hungarian long-term care facilities: High proportion of quinolone antibacterials", *Archives of Gerontology and Geriatrics*, Vol. 59/1, pp. 190-193, <https://doi.org/10.1016/j.archger.2014.02.011>. [18]
- Tandan, M. et al. (2018), "Antimicrobial prescribing and infections in long-term care facilities (LTCF): A multilevel analysis of the HALT 2016 study, Ireland, 2017", *Eurosurveillance*, Vol. 23/46, <https://doi.org/10.2807/1560-7917.ES.2018.23.46.1800278>. [3]
- Thompson, N. et al. (2016), "Prevalence of antimicrobial use and opportunities to improve prescribing practices in U.S. nursing homes", *Journal of the American Medical Directors Association*, Vol. 17/12, pp. 1151-1153, <https://doi.org/10.1016/j.jamda.2016.08.013>. [43]
- Thornley, T. et al. (2019), "Antimicrobial use in UK long-term care facilities: Results of a point prevalence survey", *Journal of Antimicrobial Chemotherapy*, Vol. 74/7, pp. 2083-2090, <https://doi.org/10.1093/jac/dkz135>. [37]
- UK Government (2019), *Tackling Antimicrobial Resistance 2019–2024: The UK's Five-year National Action Plan*, Department of Health and Social Care, London. [109]
- van Buul, L. et al. (2020), "Antibiotic stewardship in European nursing homes: Experiences from the Netherlands, Norway, Poland, and Sweden", *Journal of the American Medical Directors Association*, Vol. 21/1, pp. 34-40.e1, <https://doi.org/10.1016/j.jamda.2019.10.005>. [26]
- van Buul, L. et al. (2015), "Antibiotic prescribing In Dutch nursing homes: How appropriate is it?", *Journal of the American Medical Directors Association*, Vol. 16/3, pp. 229-237, <https://doi.org/10.1016/j.jamda.2014.10.003>. [56]
- van den Dool, C. et al. (2016), "The role of nursing homes in the spread of antimicrobial resistance over the healthcare network", *Infection Control & Hospital Epidemiology*, Vol. 37/7, pp. 761-767, <https://doi.org/10.1017/ice.2016.59>. [29]
- Van Dulm, E. et al. (2019), "High prevalence of multidrug resistant Enterobacteriaceae among residents of long term care facilities in Amsterdam, the Netherlands", *PLoS ONE*, Vol. 14/9, <https://doi.org/10.1371/journal.pone.0222200>. [81]

- Vazquez-Lago, J. et al. (2011), "Attitudes of primary care physicians to the prescribing of antibiotics and antimicrobial resistance: A qualitative study from Spain", *Family Practice*, Vol. 29/3, pp. 352-360, <https://doi.org/10.1093/fampra/cmr084>. [67]
- Wang, L. (ed.) (2014), "Secure surveillance of antimicrobial resistant organism colonization or infection in Ontario long term care homes", *PLoS ONE*, Vol. 9/4, p. e93285, <https://doi.org/10.1371/journal.pone.0093285>. [98]
- Warren, J. et al. (1991), "Incidence and characteristics of antibiotic use in aged nursing home patients", *Journal of the American Geriatrics Society*, Vol. 39/10, pp. 963-972, <https://doi.org/10.1111/j.1532-5415.1991.tb04042.x>. [33]
- Xie, C. et al. (2012), "Comparison of the bacterial isolates and antibiotic resistance patterns of elderly nursing home and general community patients", *Internal Medicine Journal*, Vol. 42/7, <https://doi.org/10.1111/j.1445-5994.2011.02436.x>. [24]
- Ye, Z. et al. (2015), "Healthcare-associated pathogens and nursing home policies and practices: Results from a national survey", *Infection Control & Hospital Epidemiology*, Vol. 36/7, pp. 759-766, <https://doi.org/10.1017/ice.2015.59>. [90]
- Yoshikawa, Y. et al. (2021), "Financial strategies targeting healthcare providers to promote the prudent use of antibiotics: A systematic review of the evidence", *International Journal of Antimicrobial Agents*, Vol. 58/6, p. 106446, <https://doi.org/10.1016/j.ijantimicag.2021.106446>. [91]
- Zabarsky, T., A. Sethi and C. Donskey (2008), "Sustained reduction in inappropriate treatment of asymptomatic bacteriuria in a long-term care facility through an educational intervention", *American Journal of Infection Control*, Vol. 36/7, pp. 476-480, <https://doi.org/10.1016/j.ajic.2007.11.007>. [19]
- Zervos, M. (1987), "High-level aminoglycoside-resistant enterococci. Colonization of nursing home and acute care hospital patients", *Archives of Internal Medicine*, Vol. 147/9, pp. 1591-1594, <https://doi.org/10.1001/archinte.147.9.1591>. [34]

Annex 7.A. Country participation in data collection

Annex Table 7.A.1. Country participation in the OECD Survey on Antibacterial Resistance in LTCFs (2021-22), as of 1 March 2022

Country	Participation in policy survey
Australia	Participated
Austria	Participated
Belgium	Participated
Canada	Participated
Chile	Participated
Cyprus	Participated
Costa Rica	Participated *
Colombia	Did not participate
Czech Republic	Participated *
Denmark	Participated
Estonia	Participated *
Finland	Participated
France	Participated
Germany	Participated
Greece	Participated
Hungary	Participated
Iceland	Participated
Ireland	Participated
Israel	Participated
Italy	Participated
Japan	Participated
Korea	Did not participate
Latvia	Participated *
Lithuania	Participated
Luxembourg	Participated
Mexico	Did not participate
Netherlands	Participated
New Zealand	Did not participate
Norway	Participated
Poland	Participated
Portugal	Participated
Slovak Republic	Participated
Slovenia	Participated
Spain	Participated
Sweden	Participated
Switzerland	Did not participate
Türkiye	Participated
United Kingdom	Participated
United States	Participated

* Responded to a shorter version of the questionnaire.

Annex 7.B. Country responses to selected questions in the OECD survey

Country responses to selected questions in the OECD Survey on Antibacterial Resistance in Long-Term Care Facilities (2021-22) are presented in Tables 7.B.1 through 7.B.13.

Annex Table 7.B.1. Overview of policies and legislation from central governments to tackle AMR in LTCFs in the EU/EEA and OECD, 2021-22

Country	Does your country's national action plan on AMR refer specifically to long-term care?	Do you plan to include references to long-term care in your next national action plan on AMR?	Besides a national action plan, does your country have legislation, policies and/or programmes aimed at addressing antibacterial resistance in LTCFs?	Do the national action plan, legislation, policies and/or programmes you referenced in previous questions include monitoring and evaluation plans focusing specifically on LTCFs?	Does your country have a process for auditing the quality of care provided in LTCFs, which includes indicators related to antibacterial resistance?
Australia	Yes	Yes	Yes	Yes	No
Austria	Yes	Yes	Yes	No	Yes
Belgium	No	Yes	No	No answer	No
Canada	Yes	Yes	Yes	No answer	No
Chile	Yes	Yes	Yes	No	No
Costa Rica	No answer	Yes	No answer	No answer	No
Cyprus	Yes	No answer	Yes	Yes	No
Czech Republic	No	Yes	No answer	No answer	No
Denmark	No	No answer	Yes	Yes	No
Estonia	No	Yes	No	No answer	No
Finland	Yes	Yes	Yes	Yes	Yes
France	No	No answer	Yes	No	No answer
Germany	Yes	Yes	Yes	No	No
Greece	No	Yes	Yes	Yes	No answer
Iceland	Yes	Yes	Yes	Yes	Yes
Ireland	Yes	Yes	Yes	Yes	Yes
Israel	No	Yes	Yes	No	No
Italy	Yes	Yes	Yes	Yes	No
Japan	No	Yes	No answer	No answer	No answer
Latvia	No	Yes	Yes	No	Yes
Lithuania	No	Yes	Yes	No answer	No
Luxembourg	Yes	Yes	Yes	Yes	No
Malta	Yes	Yes	Yes	Yes	Yes
Netherlands	Yes	Yes	Yes	Yes	Yes
Norway	No	No answer	No	No	No
Poland	Yes	Yes	No	No	No
Portugal	No	Yes	No	No	No
Slovak Republic	Yes	Yes	No	No	No

Country	Does your country's national action plan on AMR refer specifically to long-term care?	Do you plan to include references to long-term care in your next national action plan on AMR?	Besides a national action plan, does your country have legislation, policies and/or programmes aimed at addressing antibacterial resistance in LTCFs?	Do the national action plan, legislation, policies and/or programmes you referenced in previous questions include monitoring and evaluation plans focusing specifically on LTCFs?	Does your country have a process for auditing the quality of care provided in LTCFs, which includes indicators related to antibacterial resistance?
Slovenia	No	Yes	No	No	Yes
Spain	No	Yes	No	No	Yes
Sweden	Yes	No answer	No answer	No answer	No answer
Türkiye	No	Yes	No	No	No
United Kingdom	No	No answer	No answer	No	No answer
United States	Yes	Yes	Yes	Yes	No answer

Note: Countries are sorted alphabetically.

Source: OECD analysis of Survey on Antibacterial Resistance in LTCFs (2021-22).

Annex Table 7.B.2. Use of ASP budgeting and committees to tackle AMR in LTCFs in the EU/EEA and OECD, 2021-22

Country	A budget dedicated to ASP in LTCFs	Antimicrobial committee in LTCFs
Australia	No answer	No answer
Austria	No	No
Belgium	No	Yes, at institutional level
Canada	Do not know	Do not know
Chile	No	No
Costa Rica	No answer	No answer
Cyprus	No	No
Czech Republic	No answer	No answer
Denmark	No	No
Estonia	No answer	No answer
Finland	No	Do not know
France	Yes, at subnational level	No
Germany	No	No
Greece	No	No
Iceland	No	No
Ireland	Yes, at central level	Yes, at institutional level
Israel	No	Yes, at institutional level
Italy	No answer	No answer
Japan	No	No
Latvia	No answer	No answer
Lithuania	No answer	No answer
Luxembourg	No	No
Malta	Yes, at central level	Do not know
Netherlands	No answer	No answer
Norway	No	No
Poland	No	No
Portugal	No answer	No answer
Slovak Republic	No	Yes, at institutional level
Slovenia	No answer	No answer
Spain	No	No
Sweden	No answer	No answer
Türkiye	No answer	No answer
United States	No answer	No answer

Note: Countries are sorted alphabetically.

Source: OECD analysis of Survey on Antibacterial Resistance in LTCFs (2021-22).

Annex Table 7.B.3. Use of ASP written guidelines to tackle AMR in LTCFs in the EU/EEA and OECD, 2021-22

Country	Written guidelines for the appropriate use of antimicrobials in LTCFs	Written guidelines for the appropriate use of antimicrobials for residents with cognitive impairments or advanced dementia	Written guidelines on antimicrobial treatment for respiratory tract infections in LTCFs	Written guidelines on antimicrobial treatment for urinary tract infections in LTCFs	Written guidelines on antimicrobial treatment for wound and soft tissue infections in LTCFs
Australia	No answer	No answer	No answer	No answer	No answer
Austria	No	No	No	No	Yes, at institutional level
Belgium	Yes, at central level	Do not know	Yes, at central level	Yes, at central level	Yes, at central level
Canada	Do not know	Do not know	Do not know	Do not know	Do not know
Chile	No	No	No	No	No
Costa Rica	No answer	No answer	No answer	No answer	No answer
Cyprus	No	No	No	No	No
Czech Republic	No answer	No answer	No answer	No answer	No answer
Denmark	No	No	No	No	No
Estonia	No answer	No answer	No answer	No answer	No answer
Finland	Do not know	Do not know	Yes, at central level	Yes, at central level	Yes, at central level
France	Yes, at subnational level	No	Yes, at central level	Yes, at central level	Yes, at central level
Germany	No	No	No	No	No
Greece	No	No	Yes, at central level	Yes, at central level	Yes, at central level
Iceland	No	No	No	No	No
Ireland	Yes, at central level	Yes, at central level	Yes, at central level	Yes, at central level	Yes, at central level
Israel	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level
Italy	No	No	No	No	No
Japan	No	No	No	No	No
Latvia	No answer	No answer	No answer	No answer	No answer
Lithuania	No answer	No answer	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level
Luxembourg	No	No	No	No	No
Malta	Do not know	Do not know	Do not know	Do not know	Do not know
Netherlands	No answer	No answer	No answer	No answer	No answer
Norway	Yes, at central level	No	Yes, at central level	Yes, at central level	Yes, at central level
Poland	No	No	No	No	No
Portugal	Yes, at central level	No answer	Yes, at central level	Yes, at central level	No answer
Slovak Republic	Yes, at central level	No	Yes, at central level	Yes, at central level	Yes, at central level
Slovenia	No answer	Do not know	No answer	No answer	No answer
Spain	No	No	Yes, at central level	Yes, at central level	Yes, at central level
Sweden	No answer	No answer	No answer	No answer	No answer
Türkiye	Yes, at institutional level	No answer	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level
United States	No answer	No answer	No answer	No answer	No answer

Note: Countries are sorted alphabetically.

Source: OECD analysis of Survey on Antibacterial Resistance in LTCFs (2021-22).

Annex Table 7.B.4. Use of ASP components to tackle AMR in LTCFs in the EU/EEA and OECD, 2021-22

Country	A therapeutic formulary, comprising a list of antimicrobials in LTCFs	A restrictive list of antimicrobials to be prescribed in LTCFs	A system that requires permission from a designated person(s) for prescribing restricted antimicrobials, not included in the local formulary in LTCFs	A system to remind healthcare workers of the importance of microbiological samples to inform the best antimicrobial choice in LTCFs
Australia	No answer	No answer	No answer	No answer
Austria	No	No	No	No
Belgium	Yes, at institutional level	Yes, at institutional level	No	Yes, at institutional level
Canada	Do not know	Do not know	Do not know	Do not know
Chile	Do not know	No	No	No
Costa Rica	No answer	No answer	No answer	No answer
Cyprus	No	No	No	No
Czech Republic	No answer	No answer	No answer	No answer
Denmark	No	No	No	No
Estonia	No answer	No answer	No answer	No answer
Finland	Do not know	Do not know	Do not know	Do not know
France	Yes, at institutional level	Yes, at institutional level	No	No
Germany	No	No	No	No
Greece	Yes, at central level	Yes, at central level	Yes, at institutional level	No
Iceland	No	No	No	No
Ireland	Do not know	Yes, at central level	No	Yes, at central level
Israel	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level
Italy	No answer	No answer	No answer	No answer
Japan	No	No	No	No
Latvia	No answer	No answer	No answer	No answer
Lithuania	No answer	No answer	No answer	No answer
Luxembourg	No	No	No	No
Malta	Do not know	Yes, at institutional level	Do not know	No
Netherlands	No answer	No answer	No answer	No answer
Norway	Yes, at central level	No	No	Yes, at central level
Poland	No	No	No	No
Portugal	Yes, at central level	Yes, at central level	No answer	No answer
Slovak Republic	Yes, at institutional level	Yes, at central level	Yes, at institutional level	No
Slovenia	No answer	No answer	No answer	No answer
Spain	No	No	No	No
Sweden	No answer	No answer	No answer	No answer
Türkiye	No answer	No answer	No answer	No answer
United States	No answer	No answer	No answer	No answer

Note: Countries are sorted alphabetically.

Source: OECD analysis of Survey on Antibacterial Resistance in LTCFs (2021-22).

Annex Table 7.B.5. Use of ASP monitoring, feedback and training to tackle AMR in LTCFs in the EU/EEA and OECD, 2021-22

Country	Data available on annual antimicrobial consumption by antimicrobial class at the LTCF level	Subnational AMR profile summaries available in LTCFs or local primary care practices	Annual regular training on appropriate antimicrobial prescribing in LTCFs	Advice on antimicrobials not included in the formulary in LTCFs	Feedback to the local general practitioner on antimicrobial consumption in the facility in LTCFs
Australia	No answer	No answer	No answer	No answer	No answer
Austria	No	No	No	No	Yes, at institutional level
Belgium	No	No	Yes, at institutional level	Do not know	Do not know
Canada	Do not know	Do not know	Do not know	Do not know	Do not know
Chile	No	No	No	No	No
Costa Rica	No answer	No answer	No answer	No answer	No answer
Cyprus	No	No	No	No	No
Czech Republic	No answer	No answer	No answer	No answer	No answer
Denmark	No	No	No	No	No
Estonia	No answer	No answer	No answer	No answer	No answer
Finland	Do not know	Do not know	Do not know	Do not know	Do not know
France	Yes, at central level	Yes, at central level	No	No	No
Germany	No	No	No	No	No
Greece	No	Do not know	No	Yes, at central level	No
Iceland	No	No	No	No	No
Ireland	No	No	Yes, at institutional level	Do not know	Yes, at institutional level
Israel	Yes, at central level	Do not know	Yes, at institutional level	Yes, at institutional level	Yes, at central level
Italy	No answer	No answer	No answer	No answer	No answer
Japan	No	No	No	No	No
Latvia	No answer	No answer	No answer	No answer	No answer
Lithuania	No answer	No answer	Yes, at institutional level	No answer	Yes, at institutional level
Luxembourg	No	No	No	No	No
Malta	No	Do not know	Do not know	Do not know	Do not know
Netherlands	No answer	No answer	No answer	No answer	No answer
Norway	Yes, at central level	Yes, at central level	No	Yes, at central level	Yes, at central level
Poland	No	No	No	No	No
Portugal	No answer	No answer	No answer	No answer	No answer
Slovak Republic	No	Yes, at institutional level	No	Yes, at institutional level	No
Slovenia	No	No answer	No answer	No answer	No answer
Spain	No	No	No	No	No
Sweden	No answer	No answer	No answer	No answer	No answer
Türkiye	No answer	No answer	Yes, at subnational level	No answer	Yes, at institutional level
United States	No answer	No answer	No answer	No answer	No answer

Note: Countries are sorted alphabetically.

Source: OECD analysis of Survey on Antibacterial Resistance in LTCFs (2021-22).

Annex Table 7.B.6. Use of infection prevention and control budgeting and committees to tackle AMR in LTCFs in the EU/EEA and OECD, 2021-22

Country	An infection prevention and control programme or protocol in LTCFs	An infection prevention and control focal point in LTCFs	A budget dedicated to infection prevention and control in LTCFs	Internal or external infection control committee in LTCFs
Australia	No answer	No answer	No answer	No answer
Austria	No	No	No	No
Belgium	Yes, at subnational level	Yes, at institutional level	Do not know	Yes, at subnational level
Canada	Yes, at central level	Do not know	Yes, at central level	Do not know
Chile	No	No	No	No
Costa Rica	No answer	No answer	No answer	No answer
Cyprus	No	No	No	No
Czech Republic	No answer	No answer	No answer	No answer
Denmark	Yes, at central level	No	Yes, at institutional level	Yes, at institutional level
Estonia	No answer	No answer	No answer	No answer
Finland	Yes, at central level	Yes, at subnational level	No	Do not know
France	Yes, at central level	Yes, at central level	Yes, at central level	No
Germany	Yes, at central level	Yes, at central level	Yes, at central level	Do not know
Greece	Yes, at institutional level	No	No	No
Iceland	Yes, at central level	Yes, at institutional level	No	Yes, at institutional level
Ireland	Yes, at central level	Yes, at institutional level	Yes, at central level	Yes, at institutional level
Israel	Yes, at central level	Yes, at central level	No	Yes, at institutional level
Italy	Yes, at institutional level	Do not know	Do not know	Yes, at institutional level
Japan	Yes, at subnational level	Yes, at central level	Yes, at central level	Yes, at central level
Latvia	No answer	No answer	No answer	No answer
Lithuania	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level	No
Luxembourg	Do not know	Do not know	No	No
Malta	Yes, at central level	Yes, at subnational level	Yes, at central level	No
Netherlands	Yes, at central level	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level
Norway	Yes, at central level	Yes, at subnational level	Yes, at institutional level	No
Poland	No	No	No	No
Portugal	Yes, at central level	Yes, at central level	No	No
Slovak Republic	Yes, at central level	No	No	Yes, at institutional level
Slovenia	No answer	No answer	No answer	No answer
Spain	Yes, at institutional level	No	No	No
Sweden	No answer	No answer	No answer	No answer
Türkiye	No answer	No answer	No answer	No Answer
United Kingdom	Yes, at central level	Yes, at central level	Yes, at central level	Yes, at central level
United States	Yes, at institutional level	No answer	No answer	No answer

Note: Countries are sorted alphabetically.

Source: OECD analysis of Survey on Antibacterial Resistance in LTCFs (2021-22).

Annex Table 7.B.7. Use of infection prevention and control written guidelines to tackle AMR in LTCFs in the EU/EEA and OECD, 2021-22

Country	Management of MRSA and/or other multidrug-resistant microorganisms in LTCFs	Hand hygiene in LTCFs	Management of urinary catheters in LTCFs	Management of venous catheters/lines in LTCFs	Management of enteral feeding in LTCFs
Australia	No answer	No answer	No answer	No answer	No answer
Austria	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level
Belgium	Yes, at subnational level	Yes, at subnational level	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level
Canada	Yes, at subnational level	Yes, at central level	Do not know	Do not know	Do not know
Chile	No	Do not know	Yes, at central level	Yes, at central level	Yes, at central level
Costa Rica	No answer	No answer	No answer	No answer	No answer
Cyprus	No	No	No	No	No
Czech Republic	No answer	No answer	No answer	No answer	No answer
Denmark	Yes, at central level	Yes, at central level	Yes, at central level	Yes, at central level	Do not know
Estonia	No answer	No answer	No answer	No answer	No answer
Finland	Yes, at central level	Yes, at central level	Yes, at central level	Do not know	Do not know
France	Yes, at central level	Yes, at central level	Yes, at central level	Yes, at central level	Yes, at central level
Germany	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level
Greece	Yes, at central level	Yes, at central level	Yes, at central level	Yes, at central level	No
Iceland	Yes, at central level	Yes, at central level	Do not know	Do not know	Do not know
Ireland	Yes, at central level	Yes, at central level	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level
Israel	Yes, at central level	Yes, at central level	Yes, at central level	Yes, at central level	Yes, at central level
Italy	No	Do not know	No	No	No
Japan	Yes, at central level	Yes, at central level	No	No	No
Latvia	No answer	No answer	No answer	No answer	No answer
Lithuania	Do not know	Yes, at central level	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level
Luxembourg	No	Yes, at central level	No	No	Yes, at institutional level
Malta	Yes, at central level	Yes, at central level	Yes, at central level	No	Yes, at central level
Netherlands	Yes, at central level	Yes, at central level	Yes, at central level	Yes, at central level	No answer
Norway	Yes, at central level	Yes, at central level	Yes, at central level	Yes, at central level	No
Poland	Do not know	Do not know	Do not know	Do not know	Do not know
Portugal	Yes, at central level	Yes, at central level	Yes, at central level	Yes, at central level	Yes, at central level
Slovak Republic	Yes, at central level	Yes, at central level	Yes, at central level	Yes, at central level	Yes, at central level
Slovenia	Yes, at central level	Yes, at central level	Yes, at central level	Yes, at central level	Yes, at central level
Spain	No	No	No	No	No answer
Sweden	No answer	No answer	No answer	No answer	No answer
Türkiye	No answer	Yes, at central level	No answer	No answer	No answer
United Kingdom	Yes, at central level	Yes, at central level	Yes, at central level	Yes, at central level	Yes, at central level
United States	No answer	No answer	No answer	No answer	No answer

Note: Countries are sorted alphabetically.

Source: OECD analysis of Survey on Antibacterial Resistance in LTCFs (2021-22).

Annex Table 7.B.8. Use of infection prevention and control components to tackle AMR in LTCFs in the EU/EEA and OECD, 2021-22

Country	Registration of residents colonised/infected with multi-resistant microorganisms in LTCFs	Decisions on isolation and additional precautions for residents colonised with resistant microorganisms in LTCFs	Designation of a person responsible for reporting and management of outbreaks in LTCFs	Supervision of disinfection and sterilisation of medical and care material in LTCFs	Organisation, control, feedback on hand hygiene in the LTCF on a regular basis	Organisation, control, feedback of a process of surveillance/audit of IPC policies in LTCFs
Australia	Yes, at central level	Yes, at central level	Yes, at institutional level	Yes, at subnational level	Yes, at central level	No answer
Austria	Yes, at central level	Yes, at central level	Yes, at central level	Yes, at institutional level	Yes, at institutional level	No
Belgium	No	Yes, at central level	Yes, at central level	Yes, at subnational level	Yes, at central level	Yes, at institutional level
Canada	Yes, at central level	Yes, at central level	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level	Yes, at subnational level
Chile	No	Yes, at central level	Yes, at central level	Yes, at institutional level	Yes, at institutional level	No
Costa Rica	Yes, at institutional level	Yes, at subnational level	Yes, at subnational level	Yes, at institutional level	Yes, at subnational level	No answer
Cyprus	No	Yes, at central level	No	Yes, at central level	Yes, at institutional level	No
Czech Republic	Yes, at institutional level	Yes, at institutional level	Yes, at subnational level	Yes, at institutional level	Yes, at subnational level	No answer
Denmark	Yes, at central level	Yes, at central level	Yes, at institutional level	Do not know	Yes, at institutional level	Yes, at institutional level
Estonia	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level	Yes, at central level	Yes, at institutional level	No answer
Finland	No answer	No answer	No answer	No answer	No answer	Yes, at central level
France	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level	Yes, at central level	Yes, at subnational level
Germany	Yes, at institutional level	Yes, at central level	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level
Greece	No	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level	Yes, at subnational level	No
Iceland	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level	No
Ireland	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level	No	No
Israel	No	No answer	No	Yes, at institutional level	Yes, at central level	Yes, at institutional level
Italy	Yes, at subnational level	Yes, at subnational level	Do not know	Do not know	No	Do not know
Japan	No	Do not know	No	Yes, at central	Do not know	No

Country	Registration of residents colonised/infected with multi-resistant microorganisms in LTCFs	Decisions on isolation and additional precautions for residents colonised with resistant microorganisms in LTCFs	Designation of a person responsible for reporting and management of outbreaks in LTCFs	Supervision of disinfection and sterilisation of medical and care material in LTCFs	Organisation, control, feedback on hand hygiene in the LTCF on a regular basis	Organisation, control, feedback of a process of surveillance/audit of IPC policies in LTCFs
				level		
Latvia	Yes, at institutional level	No	No	Do not know	No	No answer
Lithuania	Do not know	Do not know	Yes, at central level	Do not know	No	Yes, at institutional level
Luxembourg	Do not know	Yes, at institutional level	Do not know	Do not know	Do not know	No
Malta	Do not know	Do not know	Do not know	No	No	No
Netherlands	Do not know	Do not know	Do not know	Yes, at institutional level	Do not know	Yes, at subnational level
Norway	Do not know	Do not know	Do not know	Do not know	Do not know	Yes, at central level
Poland	No answer	No answer	No answer	No answer	No answer	No
Portugal	No answer	No answer	No answer	No answer	No answer	No
Slovak Republic	No answer	No answer	No answer	No answer	No answer	Yes, at institutional level
Slovenia	No answer	No answer	No answer	No answer	No answer	No answer
Spain	No answer	No answer	No answer	No answer	No answer	No
Sweden	No answer	No answer	No answer	No answer	No answer	No answer
Türkiye	No answer	No answer	No answer	No answer	Yes, Subnational	No answer
United Kingdom	No	Yes, at institutional level	Yes, at subnational level	Yes, at institutional level	Yes, at central level	Yes, at central level
United States	No answer	No answer	No answer	No answer	No answer	No answer

Note: Countries are sorted alphabetically.

Source: OECD analysis of Survey on Antibacterial Resistance in LTCFs (2021-22).

Annex Table 7.B.9. Use of infection prevention and control training to tackle AMR in LTCFs in the EU/EEA and OECD, 2021-22

Country	Regular infection prevention and control training of the nursing and paramedical staff in LTCFs	Regular infection prevention and control training for general practitioners working with LTCFs
Australia	No answer	No answer
Austria	Yes, at subnational level	No
Belgium	Yes, at institutional level	Yes, at institutional level
Canada	Do not know	Do not know
Chile	Do not know	Do not know
Costa Rica	No answer	No answer
Cyprus	No	No
Czech Republic	No answer	No answer
Denmark	Yes, at institutional level	No
Estonia	No answer	No answer
Finland	Yes, at central level	Yes, at central level
France	Yes, at institutional level	Yes, at institutional level
Germany	Yes, at institutional level	Yes, at institutional level
Greece	No	No
Iceland	Yes, at institutional level	No
Ireland	Yes, at central level	Yes, at central level
Israel	Yes, at central level	Yes, at central level
Italy	Do not know	Do not know
Japan	Yes, at central level	Do not know
Latvia	No answer	No answer
Lithuania	Yes, at institutional level	Yes, at institutional level
Luxembourg	Do not know	Do not know
Malta	Yes, at central level	Yes, at central level
Netherlands	Yes, at institutional level	Do not know
Norway	Yes, at institutional level	Yes, at central level
Poland	No	No
Portugal	Yes, at institutional level	Yes, at institutional level
Slovak Republic	Yes, at institutional level	Yes, at institutional level
Slovenia	Yes, at institutional level	Yes, at institutional level
Spain	No	No
Sweden	No answer	No answer
Türkiye	No Answer	No Answer
United Kingdom	Yes, at subnational level	Yes, at central level
United States	No answer	No answer

Note: Countries are sorted alphabetically.

Source: OECD analysis of Survey on Antibacterial Resistance in LTCFs (2021-22).

Annex Table 7.B.10. Use of infection prevention and control protocols to tackle AMR in LTCFs in the EU/EEA and OECD, 2021-22

Country	Offer of annual influenza vaccination to all LTCF residents	Offer of annual influenza vaccination to all staff in LTCFs	Development of care protocols in LTCFs
Australia	No answer	No answer	No answer
Austria	Yes, at subnational level	Yes, at subnational level	No
Belgium	Yes, at subnational level	Yes, at institutional level	Yes, at institutional level
Canada	Yes, at subnational level	Yes, at subnational level	Yes, at central level
Chile	Yes, at central level	Yes, at central level	Yes, at central level
Costa Rica	No answer	No answer	No answer
Cyprus	Yes, at central level	Yes, at central level	Do not know
Czech Republic	No answer	No answer	No answer
Denmark	Yes, at central level	Do not know	Yes, at institutional level
Estonia	No answer	No answer	No answer
Finland	Yes, at central level	Yes, at central level	Yes, at central level
France	Yes, at institutional level	Yes, at institutional level	Yes, at subnational level
Germany	Yes, at institutional level	Yes, at institutional level	Yes, at central level
Greece	Yes, at central level	Yes, at central level	Yes, at institutional level
Iceland	Yes, at central level	Yes, at central level	Do not know
Ireland	Yes, at central level	Yes, at central level	Yes, at institutional level
Israel	Yes, at central level	Yes, at central level	Yes, at central level
Italy	Yes, at central level	Yes, at central level	Do not know
Japan	No	No	Do not know
Latvia	No answer	No answer	No answer
Lithuania	Yes, at central level	Yes, at central level	Yes, at institutional level
Luxembourg	Yes, at institutional level	Yes, at institutional level	Do not know
Malta	Yes, at central level	Yes, at central level	Yes, at central level
Netherlands	Yes, at central level	Yes, at institutional level	Yes, at central level
Norway	Yes, at institutional level	Yes, at institutional level	Yes, at central level
Poland	Yes, at central level	Yes, at central level	No
Portugal	Yes, at central level	Yes, at central level	Yes, at institutional level
Slovak Republic	Yes, at central level	No	No
Slovenia	Yes, at institutional level	No answer	No answer
Spain	Yes, at central level	Yes, at central level	Yes, at institutional level
Sweden	No answer	No answer	No answer
Türkiye	Yes, at central level	Yes, at central level	No Answer
United Kingdom	Yes, at central level	Yes, at central level	Yes, at subnational level
United States	Yes, at central level	No answer	No answer

Note: Countries are sorted alphabetically.

Source: OECD analysis of Survey on Antibacterial Resistance in LTCFs (2021-22).

Annex Table 7.B.11. Use of surveillance and monitoring to tackle AMR in LTCFs in the EU/EEA and OECD, 2021-22

Country	Antimicrobial consumption in LTCFs	AMR in LTCFs	HAIs in LTCFs	Multidrug-resistant organisms in LTCFs	Indicators of ASP in LTCFs	Indicators of infection prevention and control in LTCFs
Australia	Yes, at central level	Yes, at central level	Yes, at central level	Yes, at central level	Yes, at central level	Yes, at central level
Austria	Yes, at institutional level	No	Yes, at institutional level	Yes, at institutional level	No	Do not know
Belgium	No	No	No	Yes, at central level	No	No
Canada	No answer	No answer	No answer	No answer	No answer	No answer
Chile	No	No	No	No	No	No
Costa Rica	No answer	No answer	No answer	No answer	No answer	No answer
Cyprus	No	No	No	No	No	No
Czech Republic	No answer	No answer	No answer	No answer	No answer	No answer
Denmark	No	No	No	No	No	No
Estonia	No answer	No answer	No answer	No answer	No answer	No answer
Finland	Do not know	Do not know	Do not know	Yes, at central level	Do not know	Do not know
France	Yes, at central level	Yes, at central level	Yes, at central level	Yes, at central level	No	Yes, at central level
Germany	No	No	No	No	No	No
Greece	No answer	No answer	No answer	No answer	No answer	No answer
Iceland	No	No	No	No	No	No
Ireland	Yes, at institutional level	No	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level
Israel	Yes, at central level	Yes, at central level	No	Yes, at central level	No	No
Italy	No	No	No	No	No	No
Japan	No	No	No	No	No	No
Latvia	No answer	No answer	No answer	No answer	No answer	No answer
Lithuania	No	No	Yes, at institutional level	No	No	No
Luxembourg	No	No	No	No	No	No
Malta	Do not know	Yes, at subnational level	Yes, at subnational level	Yes, at subnational level	Do not know	No
Netherlands	Yes, at central level	Yes, at central level	Yes, at central level	Yes, at central level	Yes, at central level	Yes, at central level
Norway	Yes, at central level	Yes, at central level	Yes, at central level	Yes, at central level	Yes, at central level	Yes, at central level
Poland	No	No	No	No	No	No
Portugal	No	No	No	No	No	No
Slovak Republic	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level	Yes, at institutional level	No	No
Slovenia	No	No	No answer	No	No answer	No answer
Spain	No	No	No	Yes, at subnational level	No	Yes, at subnational level
Sweden	No answer	No answer	No answer	No answer	No answer	No answer
Türkiye	No	No	No	No	No	No
United States	Yes, at institutional level	Yes, at institutional level	No answer	No answer	No answer	No answer

Note: Countries are sorted alphabetically.

Source: OECD analysis of Survey on Antibacterial Resistance in LTCFs (2021-22).

Annex Table 7.B.12. Overview of the impact of the COVID-19 pandemic on surveillance of AMR in LTCFs in the EU/EEA and OECD, 2021-22

Did the COVID-19 pandemic affect the following country actions?

Country	Surveillance of antimicrobial consumption in LTCFs	Surveillance of AMR in LTCFs	Surveillance of HAls in LTCFs	Rapid testing of residents in LTCFs to determine whether they have viral or bacterial infections
Australia	No	No	No	No
Austria	Yes	Yes	Yes	No
Belgium	Yes	Yes	Yes	No
Canada	No	No	No	No
Chile	No	No	No	No
Costa Rica	No answer	No answer	No answer	No answer
Cyprus	Yes	Yes	Yes	No
Czech Republic	No answer	No answer	No answer	No answer
Denmark	No	No	No	No
Estonia	No answer	No answer	No answer	No answer
Finland	Yes	Yes	Yes	Yes
France	Yes	No	No	No
Germany	No	No	Yes	Yes
Greece	Yes	Yes	Yes	Yes
Iceland	No	No	No	No
Ireland	Yes	No	Yes	Yes
Israel	No	No	No	No
Italy	No	No	No	No
Japan	No	No	No	No
Latvia	No answer	No answer	No answer	No answer
Lithuania	No	No	No	No
Luxembourg	No	No	No	Yes
Malta	Yes	Yes	Yes	Yes
Netherlands	Yes	Yes	Yes	Yes
Norway	No	No	No	No
Poland	No	No	No	No
Portugal	No	No	No	Yes
Slovak Republic	Do not know	Do not know	Do not know	Do not know
Slovenia	Yes	Yes	Yes	No
Spain	No	Yes	Yes	No
Sweden	No	No	No	No
Türkiye	No	No	No	No
United States	No	No	No	Yes

Note: Countries are sorted alphabetically.

Source: OECD analysis of Survey on Antibacterial Resistance in LTCFs (2021-22).

Annex Table 7.B.13. Overview of the impact of the COVID-19 pandemic on policy actions related to AMR in LTCFs in the EU/EEA and OECD, 2021-22

Did the COVID-19 pandemic affect the following country actions?

Country	Developing, approving or operationalising the national action plan on antimicrobial resistance	Audits of antibiotic prescribing behaviours in LTCFs	ASP in LTCFs (e.g. education)	Infection prevention and control in LTCFs (e.g. hand hygiene)	Activities to improve awareness and understanding of antibacterial resistance in LTCFs in the general public (e.g. social media campaigns)	Vaccination campaigns for non-COVID-19 related diseases (e.g. influenza) in LTCFs
Australia	No answer	No	No	No	No	No
Austria	Yes	No	No	Yes	No	Yes
Belgium	Yes	No	Yes	Yes	No	Yes
Canada	Yes	No	No	Yes	No	No
Chile	Yes	No	No	No	No	No
Costa Rica	Yes	No answer	No answer	No answer	No answer	No answer
Cyprus	Yes	Yes	Yes	No	No	No
Czech Republic	Yes	No answer	No answer	No answer	No answer	No answer
Denmark	No	No	No	No	No	No
Estonia	No answer	No answer	No answer	No answer	No answer	No answer
Finland	Yes	Yes	Yes	Yes	Yes	Yes
France	Yes	Yes	Yes	No	Yes	No
Germany	Yes	No	No	Yes	No	Yes
Greece	Yes	Yes	Yes	Yes	Yes	Yes
Iceland	No	No	No	No	No	No
Ireland	Yes	No	Yes	Yes	No	No
Israel	Yes	No	No	Yes	No	No
Italy	Yes	No	No	Yes	No	Yes
Japan	No	No	No	Yes	No	No
Latvia	Yes	No answer	No answer	No answer	No answer	No answer
Lithuania	Yes	No	No	Yes	No	No
Luxembourg	Yes	No	Yes	Yes	No	Yes
Malta	No answer	Yes	Yes	Yes	Yes	Yes
Netherlands	Yes	Yes	Yes	Yes	Yes	Yes
Norway	Yes	No	No	No	No	No
Poland	No answer	No	No	Yes	No	Yes
Portugal	No	No	No	Yes	No	No
Slovak Republic	Yes	Do not know	Do not know	Do not know	Do not know	Do not know
Slovenia	Yes	Yes	Yes	No	No	No
Spain	Yes	No	Yes	Yes	No	No
Sweden	No answer	No	No	No	No	No
Türkiye	Yes	No			No	Yes
United Kingdom	No	No answer	No answer	No answer	No answer	No answer
United States	Yes	Yes	No	Yes	No	No

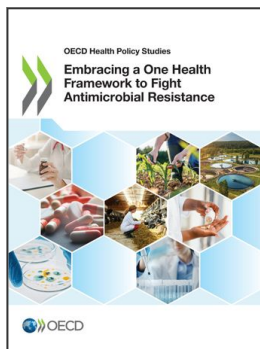
Note: Countries are sorted alphabetically.

Source: OECD analysis of Survey on Antibacterial Resistance in LTCFs (2021-22).

Notes

¹ The first level markers used in the ECDC Composite Index of AMR are: *Staphylococcus aureus* resistant to methicillin (MRSA), *Enterococcus faecium* and *Enterococcus faecalis* resistant to vancomycin, *Enterobacteriaceae* resistant to third-generation cephalosporins and *Pseudomonas aeruginosa* and *Acinetobacter baumannii* resistant to carbapenems. *Enterobacteriaceae* selected for the AMR markers: *Escherichia coli*, *Klebsiella* spp., *Enterobacter* spp., *Proteus* spp., *Citrobacter* spp., *Serratia* spp. and *Morganella* spp.

² Frequencies and percentages for specific questions in the policy survey are based on countries that responded to each specific question in the policy survey. Countries that did respond to a specific question are excluded from analyses of that specific question.



From:

Embracing a One Health Framework to Fight Antimicrobial Resistance

Access the complete publication at:

<https://doi.org/10.1787/ce44c755-en>

Please cite this chapter as:

OECD (2023), "Antimicrobial resistance in long-term care facilities", in *Embracing a One Health Framework to Fight Antimicrobial Resistance*, OECD Publishing, Paris.

DOI: <https://doi.org/10.1787/4bba3b52-en>

This document, as well as any data and map included herein, are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area. Extracts from publications may be subject to additional disclaimers, which are set out in the complete version of the publication, available at the link provided.

The use of this work, whether digital or print, is governed by the Terms and Conditions to be found at <http://www.oecd.org/termsandconditions>.