Addressing Antimicrobial Resistance in Cancer Care: A Review of national cancer control plans and policy recommendations

Introduction and Background

A national cancer control plan (NCCP) offers governments the strategic tools to improve the prevention of cancer and ensure that appropriate treatment and supportive care are available based on the country's specific needs and resources. NCCPs are designed within the context of national cancer burden, risk factors, prevalence, available resources, sociocultural environment and healthcare system.[1]

In 2018, the International Cancer Control Partnership (ICCP), with project leadership from WHO and UICC, conducted the first global review of NCCPs and other cancer related documents. As part of this international collaboration, a group of 67 experts reviewed NCCPs and NCD plans from 158 countries. The survey consisted of a 121-question tool covering the cancer control continuum and was based on the WHO questionnaire on core elements of an NCCP.[2] The purpose of the review was to understand the strengths and limitations of current plans and the key domains addressed. Data from the review has been used by various stakeholders, from national cancer planners to researchers to civil society to advocate for NCCPs that are effectively formulated, financed, implemented and monitored.

Since then, many countries have developed or updated NCCPs, prompting a five year follow up global review. The 2024 global review of NCCPs highlighted both substantial progress and persistent gaps in countries' approaches to cancer policy and planning. The study also underscores the centrality of NCCPs for national cancer control, as they provide the overarching structure to align policies, mobilise resources, and coordinate multisectoral stakeholders. NCCPs are therefore crucial for enabling countries to implement context-specific, data-driven, and sustainable strategies to reduce cancer burden and improve outcomes.[3] This updated review also featured a revised questionnaire (for the purpose of reviewing a plan) reflecting evolving priorities and included new domains.

One of these domains includes antimicrobial resistance (AMR), recognizing its critical role in improving cancer care outcomes and the importance of including AMR strategies in NCCPs.

The importance of addressing AMR for better cancer treatment and care outcomes

The clinical overlap between cancer control and AMR is extremely concerning. As the global burden of cancer continues to rise, AMR poses a parallel threat that undermines modern medicine and the effectiveness of cancer care and patient treatment outcomes.

People living with cancer face an increased risk of infection (including and more frequently drug-resistant infections). They are more vulnerable to infections due to compromised immune systems from chemotherapy and other treatments, invasive surgical procedures and frequent hospitalisations. In fact, infections are the second leading cause of

[1] Romero Y et al. National cancer control plans: a global analysis. Lancet Oncol. 2018 Oct;19(10):e546-e555. doi: 10.1016/S1470-2045(18)30681-8. Epub 2018 Sep 26. PMID: 30268693.
[2] Oar A, et al. Core elements of national cancer control plans: a tool to support plan development and review. *Lancet Oncol.* 2019;20(11):e645–52.
[3] Romero Y et al. NCCP Global Review Consortium. The changing global landscape of national cancer control plans. Lancet Oncol. 2025 Jan;26(1):e46-e54. doi: 10.1016/S1470-2045(24)00405-4. Epub 2024 Dec 16. Erratum in: Lancet Oncol. 2025 Jul;26(7):e349. doi: 10.1016/S1470-2045(25)00335-3. PMID: 39701116.

death in cancer patients after the cancer itself [4] and can lead to the delay or interruption of cancer treatment, negatively impacting the overall effectiveness of therapy.

Drug-resistant infections, or AMR infections, happen when pathogens like bacteria, viruses and fungi, evolve and become resistant to medicines like antibiotics or antifungals designed to kill them. This means that infections become harder or impossible to treat with standard medicines, potentially leading to severe illness and disability, and even death. Of particular concern is the rise of these drug-resistant infections in cancer care. Many hospital-based microbial surveillance studies have documented an increasing incidence of AMR pathogens in the cancer patient population. This has also been emphasized by two studies recently published in *The Lancet Oncology* that highlight the high burden of AMR in cancer patients. One study found that cancer patients face AMR infections at up to three times the rate of those without cancer.[5] The other study, a large scoping review, reported that 35% of bacterial infections in cancer patients involved resistant pathogens, with bloodstream infections being the most frequent. This review also highlighted increased resistance to key antibiotics and increased mortality linked to AMR.[6] It is clear that AMR is a growing threat to the treatment of cancer and must be addressed through integrated strategies that include surveillance and data, effective antimicrobial stewardship (AMS), robust infection prevention and control practises (IPC), as well as sustained access to quality antimicrobials and diagnostics. **A critical starting point is to include AMR mitigation strategies in NCCPs.**

Including AMR strategies in NCCPs is crucial because these plans set the national agenda and priorities for cancer care, guiding policy, funding, and clinical practice. **By including AMR actions into NCCPs, countries ensure that AMR surveillance, antimicrobial stewardship, infection prevention and control, and access to quality antimicrobials become embedded in cancer care.** This coordinated approach is needed to address AMR at a systemic level, improving guidelines, training, procurement, and multidisciplinary collaboration so that cancer patients are better protected from drug-resistant infections and progress in cancer treatment is preserved.

Incorporating AMR into NCCPs for better cancer control

A review of NCCPs shows that AMR strategies - including infection prevention and control practices, antimicrobial stewardship and access to essential antimicrobials are rarely addressed in NCCPs. Out of a total number of 98 NCCPs only two referenced AMR related strategies. One (Turkey, NCCP 2021) mentioned antibiotic use for *Helicobacter pylori* infections and in prophylactic use for colorectal cancer treatment. [7] The other (Zambia, NCCP 2022–2026) highlighted antibiotics alongside essential cancer medicines and referenced WHO guidance on antibiotic use and surveillance. [8] Similarly, a critical component of AMR mitigation – infection prevention and control, was mentioned in two NCCPs (Malta, NCCP 2017–2021 and Moldova, NCCP 2016–2025).[9] The limited inclusion of AMR strategies in existing NCCPs highlights a critical opportunity to include key AMR components like stewardship, surveillance, IPC, and access to antimicrobials into cancer control planning.

Surveillance and data

Data on the impact of AMR on cancer care is still scarce, with data gaps especially in low- and middle-income countries (LMICs), thus emphasising the need to expand microbiology laboratory capacity and data collection systems to improve knowledge on the extent of AMR in cancer treatment.[10] This is essential in ensuring optimal care and in making evidence-based decisions, especially on infection prevention and control programmes and the use of essential antimicrobials.

Policy recommendations

- Strengthen national diagnostic and microbiology laboratory capacity to ensure timely and accurate detection of drug-resistant infections.
- Allocate resources to support collaboration between cancer care and infectious disease

[4] Nanayakkara AK et al. Antibiotic resistance in the patient with cancer: Escalating threat and implications for clinical practice. *CA Cancer J Clin.* 2021;71(2):107–118. doi: 10.3322/caac.21697.
[5] Gupta V et al. Incidence and prevalence of antimicrobial resistance in outpatients with cancer: a multicentre, retrospective, cohort study. Lancet Oncol. 2025 May;26(5):620-628. doi: 10.1016/S1470-2045(25)00128-7. PMID: 40318645.
[6] Sallah YH, Bratti VF, Rafinejad-Farahani B, et al. Antimicrobial resistance in patients with haematological malignancies: a scoping review. *Lancet Oncol.* 2025 May;26(5):e264–e272. doi: 10.1016/S1470-2045(25)00779-8.
[7] International Cancer Control Partnership (ICCP) Portal (NCCP,Turkey). https://www.iccp-portal.org/sites/default/files/plans/Turkey%20NCCP%2018%20Apr%C4%B1l%202022.pdf
[8] International Cancer Control Partnership (ICCP) Portal (NCCP, Zambia). https://www.iccp-portal.org/sites/default/files/plans/NATIONAL-CANCER-CONTROL-STRATEGIC-PLAN-2022-to-2026.pdf
[9] International Cancer Control Partnership (ICCP) Portal. The one-stop shop online resource for cancer planners | ICCP Portal
[10] Murray, C. JL, et al. "Global Burden of Bacterial Antimicrobial Resistance in 2019: a Systematic Analysis." The Lancet, vol. 399, no. 10325, Elsevier, 2022, pp. P629–655.

sectors in collecting and analysing data on the prevalence and impact of resistant infections in cancer patients.
- Use surveillance data to guide evidence-based, locally relevant interventions and inform the integration of AMR considerations into cancer policies and programs.

Infection prevention and control

The number of fatal outcomes among patients with drug-resistant infections is at least two to three times higher than with patients infected with sensitive pathogens.[11] Strong infection prevention and control (IPC) reduces the risk of healthcare associated infections and must be a priority.

Policy recommendations

- Develop IPC programmes at cancer facilities using WHO guidance such as the Guidelines on Core Components of Infection Prevention and Control Programmes at the National and Acute Health Care Facility Level.[12]
- Involve infectious disease experts in cancer care teams and multidisciplinary planning.
- Ensure oncology professionals are trained in AMS and IPC.
- Embed AMR awareness into patient education.

Effective antimicrobial stewardship (AMS)

The 2024 global review highlighted that 81.4% of NCCPs include reference to cancer treatment guidelines, which is very encouraging. Systemic therapy - an essential component of cancer treatment can compromise the immune system, increasing the risk of infections, including those caused by drug-resistant pathogens. Therefore, this dual reality underscores a critical opportunity: highlighting the need to implement evidence-based cancer treatment, can also be used to leverage the importance of addressing infection management and effective antimicrobial stewardship to ensure appropriate use of antimicrobials, through similarly robust, evidence-based approaches.

Policy recommendations

- Incorporate tailored AMS interventions for optimal use of antimicrobials in cancer care. This includes using WHO guidance [13] and tools like the WHO AWaRe classification antibiotic book [14] to optimise antibiotic use.
- Update infection management guidelines based on local data.
- Include infectious disease experts in cancer care planning.
- Conduct regular AMS assessments using WHO's checklist of essential health-care facility core elements for AMS programmes for low-and-middle-income countries.[15]

Access to quality antimicrobials and diagnostics

Essential medicines are those that address the priority healthcare needs of the population by being both effective and safe.[16] For people living with cancer, access to essential cancer medicines is fundamental to treatment. However, this access must also include essential antimicrobials, which are critical for managing infections that arise during cancer care.

As illustrated in Figure 1, only 23.5% of national cancer control plans reviewed include reference to an essential medicines list (EML), and even fewer articulate a detailed strategy for ensuring access. This gap is concerning.

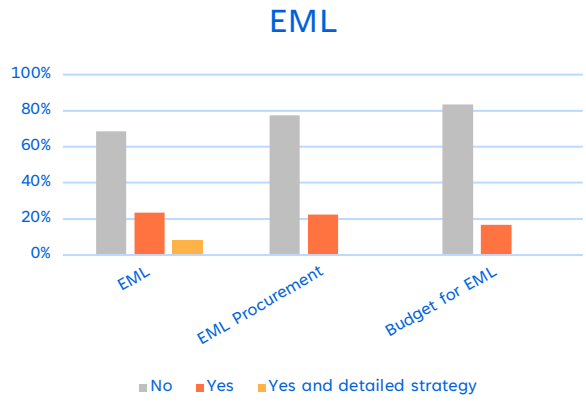

Figure 1 EML in NCCPs

[11] World Health Organization. Global report on infection prevention and control; 2022. Geneva: World Health Organization. ISBN: 978-92-4-005116-4.
[12] World Health Organization. Guidelines on Core Components of Infection Prevention and Control Programmes at the National and Acute Health Care Facility Level. WHO. 2016. [cited 2025 September 01].Available from: 9789241549929-eng.pdf
[13] World Health Organization. Antimicrobial stewardship programmes in health-care facilities in low-and middle-income countries: a WHO practical toolkit. Geneva: WHO; 2019. [cited 2025 March 01].Available from: 9789241515481-eng.pdf
[14] World Health Organization. The WHO AWaRe (Access, Watch, Reserve) antibiotic book. Geneva: World Health Organization; 2022 Dec 9. Available from: The WHO AWaRe (Access, Watch, Reserve) antibiotic book
[15] World Health Organization. Antimicrobial stewardship programmes in health-care facilities in low-and middle-income countries: a WHO practical toolkit. Geneva: WHO; 2019. [cited 2025 March 15].Available from: 9789241515481-eng.pdf
[16] World Health Organization. Essential medicines. Geneva: World Health Organization; 2024 Sep 25. Available from: Essential medicines

To strengthen cancer control, NCCPs must integrate strategies for access to essential medicines, including antimicrobials and align with the WHO Model List of Essential Medicines.[17] Doing so ensures that patients receive not only the core treatments for cancer but also the necessary support to manage infections that can compromise outcomes. Furthermore, the majority of national action plans on AMR (NAPs) reference the concept of essential medicines. This presents an opportunity to collaborate with AMR focal points in government to ensure access to all essential cancer medicines, which must include antimicrobials. Without explicit inclusion of essential antimicrobials, cancer plans risk overlooking a key component of comprehensive care.

Policy recommendations

- Ensure access to essential antimicrobials and infectious diseases diagnostics in NCCPs alongside cancer medicines.
- Align procurement with the WHO Model List of Essential Medicines.
- Prioritise quality assured antimicrobials based on WHO guidance and local data.
- Collaborate with infectious diseases focal points to ensure comprehensive access to cancer and antimicrobial medicines.

Funding and implementation

Adequate funding is a critical prerequisite for the successful implementation of any plan, whether an NCCP or a National Action Plan on AMR (NAP). As illustrated in Figure 2, a significant proportion of NCCPs lack financial planning: 55% make no reference to financial resources, and 72.5% do not include any costing for implementation. Similarly, data from 2023 indicate that only 20 out of 177 countries (11%) have allocated funding within their national budgets to support the implementation of their NAPs on AMR.[18] With resources becoming scarce, both programmes could explore the opportunity to develop synergies, for example, through joint planning, shared implementation mechanisms, or integrated strategies that address infection prevention and control, antimicrobial stewardship, and access to essential medicines within NCCPs and NAPs on AMR.

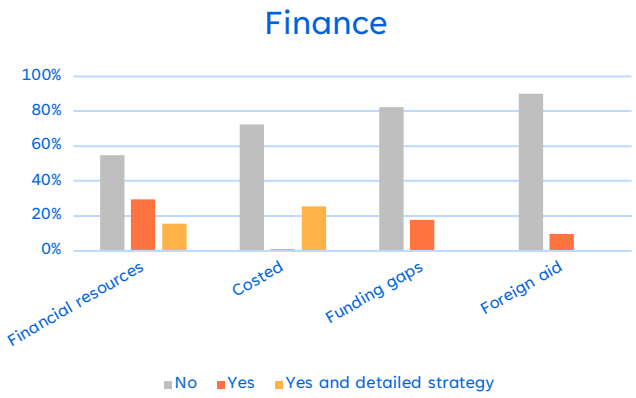

Figure 2 – Finance and funding in NCCPs

Policy recommendations

- Designate responsibility for AMR and cancer integration within NCCP governance.
- Ensure cancer and AMR stakeholders are involved in each other's planning processes and align AMR indicators within NCCP implementation frameworks.

Conclusion

AMR poses a serious and growing threat to effective cancer treatment and care. Despite its importance to cancer care outcomes, AMR is not addressed in most NCCPs. To safeguard the progress made in preventing and treating cancer, it is essential that cancer planners integrate AMR strategies into NCCPs as a critical component. Aligning these plans with national and global AMR efforts is not only cost-effective but critical to ensuring the sustainability of cancer care. Strengthening collaboration between the cancer and AMR communities will help bridge current gaps and protect patients. Without urgent and coordinated action, the gains achieved in cancer control risk being reversed by the unchecked rise of AMR.

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[17] WHO Model List of Essential Medicines.2025. WHO Model Lists of Essential Medicines

[18] Report by the Director-General: Status of antimicrobial resistance national action plan implementation 2022-2023 and specific human health considerations ahead of the High-level Meeting on AMR to be held at the 79th session of the United Nations General Assembly. dg_amr-status-report_wha77_unga_hlm_amr-2024.pdf

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