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Roadmap for HCC Surveillance and Management in the Asia Pacific

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Simple Summary: Hepatocellular carcinoma (HCC) is a major health issue, in the Asia-Pacific region, where the number of cases is rising rapidly. Many people are diagnosed at later stages, making it harder to treat and manage. This roadmap examines the challenges people face across seven health systems in detecting and treating liver cancer, such as limited awareness, lack of robust surveillance, and financial barriers. The authors aim to identify solutions tailored to the needs of different countries, drawing from successful approaches like those used in Japan. By improving awareness, expanding access to early detection, and ensuring more affordable treatments, the research hopes to reduce the burden of liver cancer and improve the quality of life for those affected. The findings could provide valuable guidance for healthcare systems working to combat liver cancer.

Abstract: Background/Objectives: Hepatocellular carcinoma (HCC) is a leading cause of cancer-related mortality, with the Asia-Pacific (APAC) region bearing a disproportionate burden. This paper examines HCC challenges within seven APAC health systems, identifies key barriers at each stage of the patient journey, and proposes tailored, actionable solutions. To effectively address HCC

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challenges, a stepwise approach should prioritise high-impact solutions, focusing on prevention, early diagnosis, and expanding surveillance to maximise health outcomes and economic benefits, while tailoring strategies to each health system's unique resources and constraints. **Methods:** A mixed-methods approach was used, including expert consultations from the 2024 HCC APAC Policy Forum, a literature review, and a review of Japan's HCC management model. Data were collected through workshops and stakeholder feedback from healthcare professionals, policymakers, researchers and patient advocates across Australia, India, Malaysia, South Korea, Taiwan, Thailand, and Vietnam. **Results:** Key findings include significant disparities in HCC awareness, prevention, early detection, diagnosis, and access to treatment. Common challenges across APAC include limited public awareness, suboptimal surveillance infrastructure, and financial barriers to care. The integration of novel biomarkers and advanced surveillance modalities were identified as crucial priorities for improving early detection. Japan's multi-faceted approach to HCC management serves as a successful model for the region. **Conclusions:** A customised and targeted approach is essential for reducing HCC burden across APAC. The proposed recommendations, tailored to each health system's needs can significantly improve patient outcomes and reduce healthcare costs. Effective collaboration among stakeholders is necessary to drive these changes.

Keywords: Hepatocellular carcinoma; Asia-Pacific; HCC awareness; HCC prevention; HCC early detection; healthcare systems; HCC surveillance; HCC treatment access; HCC surveillance and management; regional healthcare challenges

1. The Need to Act on Hepatocellular Carcinoma

Primary liver cancer is a major global health challenge, with hepatocellular carcinoma (HCC) accounting for 85%–90% of cases [1,2]. HCC primarily affects individuals with chronic liver conditions such as cirrhosis caused by hepatitis B (HBV) or hepatitis C (HCV) infections [2]. However, non-viral risk factors—including obesity, diabetes, Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD; formerly NAFLD), alcohol-related liver disease, and aflatoxin exposure—are increasingly contributing to the disease burden [3,4].

1.1. Urgent Action is Needed in Asia Pacific, Which Shoulders a Disproportionate Share of the Global Liver Cancer Burden

In 2022, an estimated 866,136 new cases of liver cancer were diagnosed globally, causing 758,725 deaths [5]. The APAC region carries 73% of the global HCC burden [6]. Although HBV and HCV account for the majority of HCC cases, significant progress in addressing these infections has led to a relative decline in viral hepatitis-related HCC [7]. In 1990, HBV accounted for over half of all HCC cases, declining to 42% by 2019 [2]. At the same time, the incidence of MASLD has risen by an average of 0.21% per year from 2010 to 2019 [8]. This trend signals a growing shift towards non-viral aetiologies. This transition underscores the urgent need to address the increasing burden of MASLD-induced HCC, which is being driven by rising obesity and type 2 diabetes rates, particularly among younger demographic [2]. Unhealthy lifestyles, such as poor diets and sedentary behaviours, are also on the rise, leading to a growing prevalence of metabolic risk factors across APAC [9].

This evolving risk profile demands a multi-faceted response that not only targets traditional viral causes (i.e. HBV, HCV) but also accounts for metabolic (i.e. Obesity, diabetes, MASLD), immune-related (i.e. Primary biliary cholangitis, primary sclerosing cholangitis and autoimmune liver disease), and toxicological (i.e. Alcohol consumption, aflatoxin exposure, pesticide exposure) contributors to HCC [2,3].

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1.2. Strengthening Surveillance and Management of Hepatocellular Carcinoma in Asia Pacific can Significantly Reduce Hepatocellular Carcinoma Burden on Healthcare Systems, Societies and Economies

Despite progress, gaps persist in early detection and timely intervention for HCC, leading to suboptimal patient outcomes. Over 80% of HCC cases in APAC are diagnosed at advanced stages, limiting curative treatment options and making HCC the second leading cause of premature cancer mortality [10]. The economic implications of HCC in APAC are equally concerning. In China alone, liver cancer costs USD 11.1 billion annually (0.047% of national health spending), a figure expected to rise 206% to USD 34.0 billion by 2030 [11].

Implementing robust HCC surveillance and management systems is critical to alleviating the significant burden HCC places on healthcare systems, societies, and economies across APAC. HCC surveillance involves systematic efforts to identify individuals at risk of developing HCC or detecting the disease at its earliest stages through regular monitoring, while HCC management encompasses a continuum of care that includes early diagnosis, timely access to effective treatment, and ongoing patient support to improve outcomes and quality of life.

A structured roadmap for HCC surveillance and management, tailored to each APAC health system's unique challenges and capacities, is essential to drive early detection and timely treatment for HCC. Achieving this requires collaboration among policymakers, healthcare providers, researchers, and patient advocates to ensure that solutions are practical, sustainable, and equitable.

1.3. While the Challenges Facing Hepatocellular Carcinoma Are Significant, the Opportunity to Significantly Reduce the Overall Burden Is Within Reach

HCC can be diagnosed early through surveillance methods such as imaging and biomarker testing, allowing for timely and effective treatment [12]. Early diagnosis enables curative treatment options like surgical resection, liver transplantation, or locoregional therapies, which significantly improve patient outcomes and reduce the strain on healthcare systems. The urgency to act cannot be overstated. Elevating HCC as a public health priority and implementing tailored, actionable surveillance and management strategies can reduce mortality and economic burden. A unified, region-wide approach that strengthens prevention, surveillance, diagnosis, and treatment systems will improve outcomes for millions across the region. Japan provides a successful model, demonstrating that comprehensive awareness campaigns, early detection programs, and effective treatment strategies can significantly reduce HCC incidence and mortality. However, each health system must adapt best practices to local structures, leveraging context-specific solutions. This will be explored in detail later.

2. A methodology Grounded in Local Insights and Evidence

This paper presents actionable recommendations for improving HCC surveillance and management across seven APAC health systems: Australia, India, Malaysia, South Korea, Taiwan, Thailand, and Vietnam. These recommendations are based on local expert insights and supplemented with learnings from Japan's success in managing HCC and a literature search.

2.1. Local Expert Insights and Regional Collaboration Are the Cornerstones of Mitigating HCC Burden

The basis of this paper lies in the expertise and feedback gathered during the 2024 HCC APAC Policy Forum, organised by the APAC Liver Disease Alliance in Thailand. This forum convened over 70 stakeholders from seven health systems – including health ministry officials, clinicians, researchers, and patient advocates – for a multidisciplinary exchange of ideas.

2.2. Japan's Roadmap of World's Best Practice

A key highlight of the workshop, *"Co-creating a Roadmap for Robust National HCC Surveillance and Management Programmes in APAC,"* which used Japan's roadmap as a model. This study showcased Japan's best practices in HCC surveillance, early diagnosis, and management, serving as a catalyst

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for discussion. Experts analysed these strategies and explored how they could be adapted to their health systems to develop tailored solutions. Japan's proven success in managing HCC serves as a foundation for this paper. As a leader in HCC surveillance, early diagnosis, and management, Japan has demonstrated how robust, evidence-based roadmaps, supported by awareness, technology integration, and comprehensive reimbursement can significantly reduce the burden of disease.

2.3. Supplementing Expert Insights with Literature Search

Expert recommendations collected during the workshop were contextualised through a targeted literature review that analysed national HCC action plans, scientific publications, and reports from regional and international organisations. A key resource was the APAC Liver Disease Alliance's 2023 white paper, *"Eliminating Asia's Silent Emergency: Hepatitis and Hepatocellular Carcinoma"* which provided insights into HCC epidemiology, aetiology, surveillance, and management across 13 APAC systems [13]. This paper provides valuable insights and actionable recommendations derived from a select group of stakeholders who participated in the 2024 HCC APAC Policy Forum. As such, they may not fully capture the diversity of perspectives across the seven APAC health systems. These recommendations should be considered as a starting point and can be further expanded upon through additional engagement with a broader range of stakeholders.

3. Learning from Japan: A World-Leading Case Study

Japan has established a comprehensive and highly structured approach to HCC surveillance and management (see Table 1), serving as a global benchmark for healthcare systems worldwide. Through targeted interventions that encompass proactive prevention, early detection, timely diagnosis, and effective, affordable and equitable access to care, Japan has successfully addressed critical challenges across the entire patient journey [14]. By combining public health initiatives, financial support, and advanced medical technologies, Japan's model can inspire healthcare improvements across the APAC region.

Table 1. Japan's roadmap outlining its comprehensive and structured approach to HCC surveillance and management.

PATIENT JOURNEY STAGE	CHALLENGE	POTENTIAL SOLUTION(S)
AWARENESS	• Increasing difficulty in defining high-risk non-viral HCC patients and the need for broader awareness of emerging conditions like MASLD	• **"Stop HCC" campaign (1995)**: Educates general practitioners (GP) and the public on early detection and treatment of HCC every year since 1995 • **Annual public awareness campaigns**: Focus on the increased knowledge of high-risk population for HCC, importance of early detection and proactive surveillance • **Designated leaders**: Each of Japan's 47 prefectures has a leader for hepatology education, nominated by Japan Society of Hepatology
PREVENTION	• Reducing HCC cases though preventive measures	• **2009 Basic Act on hepatitis measures** [15]: Provides free universal testing for HBV and HCV at public health clinics or all the clinics/hospitals • **Universal HBV vaccination (2016):** Universal vaccination programme was launched in 2016 to prevent mother-to-child-transmission (MTCT) of the virus • **Special subsidy programmes** [15]: Cover antiviral treatment for HBV and HCV patients
EARLY DETECTION	• Ensuring that surveillance systems remain effective as the characteristics of HCC patients change (e.g. non-viral causes)	• **Surveillance for HCC in at-risk patients is covered by the national insurance:** Alpha-Fetoprotein (AFP), Protein Induced by Vitamin K Absence or Antagonist-II (PIVKA-II), Lectin-reactive Fraction of Alpha-fetoprotein (AFP-L3), ultrasound, Computed Tomography (CT), Magnetic Resonance Imaging (MRI) for hepatitis, MASLD and cirrhosis are all reimbursed

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		• **Advanced surveillance modalities**: Early adoption of PIVKA-II (1989) and AFP-L3 (1994), with simultaneous testing along with AFP encouraged and offered at a cost-effective rate • **Surveillance recommendations**: Ultrasound and 3 tumour markers every 6 months for high-risk patients; every 3-4 months for extremely high-risk patients, with optional dynamic CT/MRI
DIAGNOSIS	• Accurate and timely diagnosis of HCC, particularly in patients with complex or less common conditions	• **Advanced imaging coverage:** Includes dynamic CT, MRI, contrast-enhanced ultrasound, or contrast-enhanced MRI for cases where ultrasound is inadequate • **Referral system:** Electronic medical records prompt specialist referrals based on positive viral hepatitis tests
ACCESS TO TREATMENT	• Ensuring that patients have access to necessary treatments and follow-up care	• **Special subsidy programmes** [16]**:** Provide financial support for treatments for hepatitis, and a subsidy programme for treatment of liver cancer and decompensated cirrhosis (only for patients with HBV or HCV infection, not for non-viral cirrhosis/HCC) • **Integrated surveillance system and easy access programmme to sophisticated treatment:** Ensures that surveillance and treatment services are accessible across community hospitals, GPs, and small clinics, with referral systems to larger centres for specialised care, including locoregional therapy and systemic therapy, all of which are covered by insurance along with special coverage system for high cost treatment, such as immunotherapy, by government

Japan's multi-faceted strategy focuses on raising awareness, strengthening surveillance and early detection and expanding healthcare access – key elements of its success. In 2024, the government allocated ¥16.8 billion (USD 108 million) to support early detection initiatives, treatment subsidies, and public awareness campaigns [17]. This achievement has been realised through collaboration between academic societies, patient advocacy groups, and policymakers. While this investment represents less than 1% of Japan's annual national healthcare expenditure, it highlights how a relatively modest and strategic investment can lead to far-reaching, positive outcomes [18].

To facilitate timely diagnosis and referral, an integrated electronic medical records system automatically triggers specialist referrals for patients with positive viral hepatitis test results [19]. Japan also reimburses bi-annual surveillance and diagnostic tests, including biomarkers such as AFP, PIVKA-II, and AFP-L3, alongside ultrasound, CT, and MRI scans [20]. PIVKA-II, in particular, is highly specific to HCC, offering enhanced diagnostic accuracy and early detection capabilities, which are crucial for improving patient outcomes [21]. Its overall sensitivity and specificity in detecting HCC have been reported to range from 48% to 62% and 81% to 98%, respectively [21]. Japan's early adoption of advanced surveillance modalities, such as PIVKA-II in 1989 and AFP-L3 in 1994, has enhanced cost-effective and simultaneous biomarker testing, improving early disease identification [22]. Surveillance protocols recommend routine ultrasound and biomarker assessments every six months for high-risk individuals (individuals with HBV, HCV, and nonviral cirrhosis), with more frequent monitoring for those at extremely high risk (i.e. individuals with cirrhosis caused by HBV or HCV C) [20]. Notably, 68% of HCC cases are detected at an early stage, demonstrating the system's effectiveness [19]. Comprehensive cancer care networks further support patients throughout their treatment journey, contributing to improved survival rates, with median survival reaching 79.6 months for those undergoing regular surveillance [20]. This contrasts with a median survival of 20.9 months for patients in APAC [20,23].

The impact of Japan's efforts is also evident in the steady decline of HCC mortality and the reduction in the overall cost of illness. In 2002, Japan recorded 34,637 HCC-related deaths with a mortality rate of 27.4 per 100,000 population, which decreased to 24,082 deaths in 2021 [22]. Recent studies show a decline in HCC incidence in Japan, primarily due to effective HCV treatments, with projections indicating a continued reduction in social burden and mortality until 2029 at an annual rate of 2.2% [24,25]. The cost of illness also trended downwards with a decrease of 33% with the

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presence of a national surveillance program [17]. This highlights the economic benefits of a well-established HCC surveillance and management program.

These improvements are attributed to effective surveillance programmes, widespread surveillance for HBV and HCV, and the adoption of advanced antiviral treatments [26]. By reducing new HCC cases and improving early detection rates, Japan has demonstrated the effectiveness of its multi-pronged strategy.

Japan's comprehensive approach to HCC surveillance and management offers valuable insights that can be adapted and tailored to the unique healthcare landscapes of other APAC health systems to effectively address the key challenges associated with HCC. Japan's approach and its applicability to other health systems depends on factors such as healthcare coverage, screening adherence, and investment in early detection. Tailoring HCC surveillance and management strategies to local infrastructure will maximise economic and public health benefits while ensuring sustainable long-term improvements. By examining the key components of Japan's strategy—ranging from awareness initiatives to financial support mechanisms—other health systems can identify actionable pathways to enhance their own HCC surveillance and management.

4. Hepatocellular Carcinoma Challenges Facing Health Systems in Asia Pacific

After examining Japan's approach as a leading model for HCC surveillance and management, this section explores the persistent challenges faced by seven APAC health systems in implementing similar strategies. It maps key obstacles at each stage of the patient journey—from awareness and prevention to early detection, diagnosis, and access to treatment—based on insights from local experts. Across the health systems, HCC presents several challenges that impact patient outcomes, the healthcare system, and overall economic efficiency. These challenges, which span across each stage of the patient journey, contribute to delays in diagnosis and suboptimal care, which can lead to higher mortality rates and a greater burden on the healthcare system.

Table 2. HCC challenges in Australia.

PATIENT JOURNEY STAGE	CHALLENGE
AWARENESS	• Needs of indigenous and culturally and linguistically diverse (CALD) groups are not addressed • High prevalence of diabetes and obesity risk factors
PREVENTION	• High alcohol consumption rates • Viral hepatitis is not always diagnosed and treated in a timely manner
EARLY DETECTION	• Suboptimal access to ultrasound surveillance services and primary care diagnosis capabilities • Limitations in ultrasound accuracy for obese patients
DIAGNOSIS	• Suboptimal access to MRI for accurate diagnosis • Patient support services could be better
ACCESS TO TREATMENT	• Geographical and equity-related disparities • Lack of funded 2nd-line systemic therapies • Lack of management of HCC by non-oncologists

In Australia , indigenous and culturally and linguistically diverse (CALD) populations remain disproportionately affected by HCC, with obesity, diabetes, and alcohol-related liver disease contributing to rising incidence rates [27]. Hepatitis diagnosis and treatment uptake among younger people with newly acquired infections (typically people who inject drugs) also remains low [28].

Early detection remains a critical challenge, with suboptimal surveillance participation despite established clinical guidelines due to a combination of patient, clinician and system-level barriers [29]. Firstly, Indigenous Australians in particular have a higher incidence of HCC and late-stage

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disease at diagnosis, and poorer survival, which may stem from reduced access to surveillance in addition to socio-environmental inequality, cultural barriers, and a distrust of the health care system [29]. Secondly, the Australian 2023 HCC Surveillance Guidelines recommend ultrasound surveillance for HCC with or without α-fetoprotein (AFP) [30]. However, the sensitivity of AFP and ultrasound combination in detecting early-stage HCC is suggested to be 60%, meaning that 40 out of 100 patients may not receive an early diagnosis despite undergoing surveillance [31,32]. Lastly, despite high surveillance rates reported among patients in tertiary liver clinics in Melbourne, data on HCC surveillance in primary care remains limited, and one retrospective study of patients with HBV in primary care in Melbourne found that only 27% of patients had good adherence to HCC surveillance [29].

Ensuring equitable access to treatment is a challenge as indigenous Australians face 2.4 times higher incidence and mortality rates than non-Indigenous Australians [33]. Limited healthcare access in remote areas exacerbates these disparities, leading to preventable deaths [34]. Delayed treatment not only worsens patient outcomes but also increases healthcare costs due to prolonged hospitalisations, emergency care, and palliative care expenses [35].

Table 3. HCC challenges in India.

PATIENT JOURNEY STAGE	CHALLENGE
AWARENESS	• Lack of effective communication to scale up awareness [36] • Despite high awareness of the risks, behavioural change remains a challenge, with persistently high prevalence of diabetes, obesity-related risk factors, and excessive alcohol consumption [37]
PREVENTION	• Lack of affordable RUP (Re-Use Prevention syringes) [38] • Large geographic diversity with difficulties in reaching isolated and disadvantaged patients [39]
EARLY DETECTION/DIAGNOSIS	• HCC surveillance is neither well-organised nor universally practiced [40]
ACCESS TO TREATMENT	• Many treatment modalities are not accessible or affordable for a significant portion of the patient population [41]

HCC is a leading cause of cancer-related mortality in India [41]. Despite recent advance in early diagnosis and treatment, significant barriers persist in the patient's journey to effective care (see Table 3). The first barrier lies in the lack of effective interpersonal communication to scale up awareness of HCC and its associated risk factors. While India has made strides in promoting awareness of hepatitis – one of the top risk factors of HCC – through the National Viral Hepatitis Control Program [42], there is a rising incidence of HCC related to alcohol and MASLD [43].

A major issue in the prevention of HCC is the lack of affordable Re-Use Prevention (RUP) syringes. These play a key role in preventing HCV transmission and hence HCC alongside antiviral treatment and active surveillance of hepatitis [44]. These preventive efforts have been rolled out across the state of Punjab, but have yet to be scaled up at a national level as part of the National Viral Hepatitis Control Program [44]

Another challenge is a lack of widespread early detection and diagnosis. While Indian National Association for the Study of the Liver (INASL) guidelines suggest six-monthly HCC surveillance using abdominal ultrasound with or without AP testing, HCC surveillance is not well-organised or universally practiced across India [40,45]. Geographic diversity adds to this challenge, with disparities in healthcare access hindering the implementation of HCC prevention and surveillance. This means that HCC is often diagnosed at later stages where curative treatment is not possible and prognosis is poor [40].

Lastly, many treatment modalities, especially for late-stage HCC, are not accessible or affordable for a significant portion of the patient population [41]. As HCC is often diagnosed at a late stage, this means that patients are often relegated to palliative care [41]. The geographic diversity and large population of India, and the high cost of treatments such as immunotherapy for late-stage HCC

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underscore the importance of tackling challenges associated with prevention, awareness and early detection of HCC.

Table 4. HCC challenges in Malaysia.

PATIENT JOURNEY STAGE	CHALLENGE
AWARENESS	• Low awareness among HCPs outside of hepatologists and gastroenterologists • Low awareness among potential at-risk patients, with a need to better identify who falls into high-risk categories • Low awareness among laboratory personnel about the availability of relevant tests
PREVENTION	• Lack of screening for HCC risk factors (e.g. HBV, HCV, MASLD, and alcohol-related liver conditions) to prevent progression to HCC
EARLY DETECTION	• Lack of HCC surveillance for early detection of high-risk groups
DIAGNOSIS	• Diagnoses and management are not conducted within a multidisciplinary team setting, hindering access to care and treatment • Access to a multidisciplinary team approach needs to be strengthened (e.g. virtual multidisciplinary team discussion, to physically refer if there is a definitive management plan)
ACCESS TO TREATMENT	• Lack of access to evidence-based treatment options for patients

One of the primary challenges in Malaysia is the limited awareness among healthcare professionals and the general public [46]. While hepatologists and gastroenterologists are well-versed in HCC, there is a need to increase awareness among other specialists and general practitioners who may not be as familiar with liver conditions [47]. This lack of awareness extends to the public, particularly those at high risk of HCC. Many of these individuals may not recognise their vulnerability and, as a result, may not seek medical advice until the disease has progressed significantly. Additionally, laboratory personnel—who are essential in the diagnostic process—may not always be up to date with the latest testing protocols, leading to potential delays in diagnosis. The lack of widespread awareness in both the medical community and among patients often results in missed opportunities for early intervention, leading to more severe health states and higher costs of care.

Prevention is a crucial component in reducing the incidence of HCC. Although there are efforts to treat identified cases of HBV, HCV, MASLD, and alcohol-related liver diseases, preventive measures are not always consistently promoted or implemented. For example, despite the availability of vaccinations and antiviral treatments, many at-risk individuals remain undiagnosed or untreated [47]. The National Strategic Plan for HBV and HCV 2019-2023 aims to curb viral hepatitis through prevention, surveillance, and treatment, but its impact is limited by insufficient public engagement [48]. This means that a significant proportion of high-risk individuals are not receiving adequate interventions to prevent HCC. This situation highlights the need for more comprehensive and targeted prevention efforts to reduce the future burden of HCC.

Malaysia also faces challenges in ensuring regular HCC surveillance of high-risk groups. The national cancer surveillance programme is not always widely implemented or accessible, particularly in rural areas or among vulnerable populations. For example, a significant proportion of HCC cases in Malaysia are diagnosed at Stage IV when curative treatment options become more limited [49]. In Malaysia, the absence of a national liver cancer screening programmme leads to variations in surveillance protocols and eligibility criteria for high-risk individuals [50]. This inconsistency may lead to delay diagnoses. Current surveillance programmes covers only sonography and/or 1 biomarker for HCC surveillance which limits the sensitivity and effectiveness of early detection [51].

The integration of a multidisciplinary team—essential for accurate diagnosis and effective treatment planning—can be strengthened in some healthcare settings [52]. Inadequate or delayed diagnosis of liver diseases, particularly HCC, means that patients are less likely to benefit from early interventions that can significantly improve their prognosis. This delay not only affects patient

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outcomes but also contributes to the rising costs of healthcare, as more complex and expensive interventions are required in advanced stages of the disease.

While Malaysia offers curative options such as liver resection and transplantation at relatively lower costs than some other healthcare systems, these treatments are concentrated in specialised centres with limited capacity, thereby hindering access [53]. High demand and resource constraints result in long waiting lists, delaying access to potentially life-saving procedures.

Table 5. HCC challenges in South Korea.

PATIENT JOURNEY STAGE	CHALLENGE
AWARENESS	• Limited public awareness activities related to HCC prevention and early detection
PREVENTION	• Before the national HCV surveillance program, many opportunities for early intervention were missed. While detection has improved since its launch, gaps persists
EARLY DETECTION/DIAGNOSIS	• Current HCC surveillance guidelines rely on AFP as the only biomarker, which may limit the accuracy of early detection
ACCESS TO TREATMENT	• Limited reimbursement options hinder patient access to essential HCC treatments

Local experts noted that public awareness of HCC prevention and the importance of early detection remains low in South Korea. This lack of awareness may lead to missed opportunities for identifying high-risk individuals. Although South Korea implemented a national HCC surveillance programme for high-risk populations and introduced a national HCV surveillance programme in 2017, low public awareness still results in some patients being diagnosed at later stages, when treatment options are fewer and less effective [54]. This delay in intervention not only affects patient outcomes but also increases healthcare costs, as more advanced and costly treatments are required, placing a financial strain on both individuals and the national healthcare system.

Early detection is a critical component of reducing the burden of HCC. While the current approach to surveillance in South Korea primarily utilises two biomarkers (AFP and PIVKA II) for early identification [55,56], this method can be improved, particularly for detecting HCC at its early stages, where more accurate and sensitive methods are required for better outcomes [57].

While South Korea has made significant advancements in HCC diagnosis and treatment, systemic barriers remain, particularly in ensuring timely and equitable access to care. One challenge is the limited reimbursement options for essential HCC treatments, which creates additional financial barriers for patients [58]. Many individuals struggle to access critical therapies, such as targeted or immune check point treatments, which are necessary for improving survival rates and quality of life. These treatment access issues exacerbate the progression of the disease [59]. The financial strain on patients, in turn, leads to delays in treatment, further worsening health outcomes.

Table 6. HCC challenges in Taiwan.

PATIENT JOURNEY STAGE	CHALLENGE
AWARENESS	Awareness that chronic hepatitis is a risk factor for HCC remains limited, and even fewer people recognise that MASLD is also a significant risk factor
PREVENTION	• Management plans for MASLD patients need enhancement to ensure better awareness and mitigation of HCC risk • Patients with resolved HBV, MASLD, alcoholic liver disease at risk of fibrosis require emphasis on fibrosis evaluation, which may be often overlooked
EARLY DETECTION/DIAGNOSIS	• **Surveillance relies on ultrasound and AFP, with limited use of PIVKA-II which restricts more accurate and early detection of HCC**
ACCESS TO TREATMENT	• Immunotherapy reimbursement for intermediate/advanced HCC cases has a one-time eligibility • Patient advocacy involvement in reimbursement decisions could be more active

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In Taiwan, three-fourth of HCC cases were positive for HBsAg or anti-HCV [60], highlighting the strong association between viral hepatitis and HCC. Despite the availability of national HBV and HCV screening program [61] and a reimbursed HCC screening programme for hepatitis patients under national health insurance, gaps in early detection persist, with one-third of HCC patients still being diagnosed at an advanced or terminal stage [60].

While a portion of the population recognises chronic hepatitis as a risk factor for liver cancer, awareness of MASLD as a risk factor for HCC remains low. This gap in knowledge limits early intervention and risk reduction strategies.

Preventing hepatitis infections and minimising exposure to metabolic risk factors is crucial in reducing HCC incidence. However, management plans for MASLD patients require improvement, as there is no structured approach to address lifestyle modifications and fibrosis progression. Furthermore, many patients are unaware of the strong association between liver fibrosis severity and HCC occurrence [62]. Without reimbursement for serological and ultrasound-based non-invasive fibrosis tests, these tests cannot be effectively incorporated into high-risk patient identification for individuals with resolved HBV, cured HCV, habitual alcohol consumption, or MASLD.

Surveillance efforts rely primarily on ultrasound and AFP, with limited use of PIVKA-II. PIVKA-II testing is only reimbursed for patients with cirrhosis [63] and for those after curative treatment, limiting its potential role in broader early-stage HCC detection. Despite reimbursement for standard surveillance, poor patient adherence to surveillance recommendations [63] remains a significant barrier, leading to delayed diagnoses.

Given its ability to enhance HCC detection, PIVKA-II should be better leveraged as part of routine surveillance for high-risk individuals beyond those with cirrhosis. Expanding its reimbursement criteria could improve early detection rates and reduce the number of late-stage HCC diagnoses, which are harder and more costly to treat than early-stage cases [64].

Immunotherapy reimbursement for intermediate and advanced HCC cases is currently limited to one-time eligibility, restricting patient access to ongoing treatment. Expanding reimbursement policies and enhancing patient advocacy involvement in reimbursement decisions could help ensure broader, more sustainable access to essential therapies.

Table 7. HCC challenges in Thailand.

PATIENT JOURNEY STAGE	CHALLENGE
AWARENESS	• Insufficient updated knowledge among GPs, particularly regarding the rising prevalence of metabolic and toxic risk factors • Low awareness among the general population • Lack of continuity in government policy
PREVENTION	• HBV Viral load is underutilised due to the budget constraints of capitation reimbursement, restricting access for high-risk patients needing hepatitis treatment and HCC surveillance
EARLY DETECTION/DIAGNOSIS	• Early detection in high-risk adults is inadequate • Lack of a unified national database for hepatitis and HCC, posing challenges for tracking and surveillance • The HCC surveillance programme using ultrasound and AFP is inadequate, especially in resource-limited settings • New blood-based biomarkers for HCC surveillance, such as PIVKA II, which may enhance accessibility and accuracy in national level, are not included in the policy agenda and reimbursement programs
ACCESS TO TREATMENT	• Radiofrequency ablation for early stage cannot be reimbursed under universal health coverage scheme • Systemic therapy cannot be reimbursed for advance stages

In Thailand, there is inadequate updated knowledge regarding HCC among general practitioners, which hinders early symptom recognition and timely referral for specialised care [65].

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Additionally, with the evolving aetiologies of HCC in Thailand, from viral causes to an increasing prevalence of metabolic and toxicological risk factors, there is a need to raise awareness on these emerging aetiologies among the Thai population. Although efforts to improve awareness are being made, a more consistent and unified public health policy to address these knowledge gaps could help ensure that more patients are diagnosed earlier, when treatment is most effective. Raising awareness would not only improve patient outcomes but also support the healthcare system by reducing the need for more expensive treatments in advanced stages of the disease.

Furthermore, early detection in high-risk adults remains inadequate, posing a critical barrier to preventing the progression of HCC. Without a comprehensive and consistent approach to identifying at-risk individuals, many cases go undiagnosed until the disease reaches advanced stages, leading to poorer patient outcomes and increased healthcare costs. A major challenge in HCC surveillance is the lack of a unified national database for hepatitis and HCC, hindering effective surveillance. The absence of a comprehensive tracking system prevents policymakers from capturing the scope of the problem across the liver patients' journey, leading to delays in the implementation of timely interventions. Addressing these gaps could significantly reduce preventable cases and improve public health outcomes. In Thailand, HCC surveillance relies primarily on sonography and the AFP biomarker. Ultrasound is operator-dependent, and the country faces a shortage of trained sonographers, particularly in rural areas. As a result, many patients struggle to access routine surveillance, leading to late-stage diagnoses when treatment options are less effective. The AFP biomarker, despite its widespread use, has limited sensitivity in early-stage HCC, further contributing to missed diagnoses [66]. Additionally, digital algorithms such as GAAD/GALAD, which show promise in early detection, are neither reimbursed nor integrated into the healthcare system. This, combined with limited diagnostic options, exacerbates Thailand's challenges in improving HCC surveillance and early intervention.

Currently, there is local evidence generation of the cost-effectiveness of blood-based biomarkers using GAAD, GALAD, and PIVKA II +AFP for HCC surveillance as a standard of care. The analysis has compared the value of routine HCC surveillance using biomarker-based screening to the current standard of care (US+AFP) [67]. The analysis has suggested that routine bi-annual HCC surveillance is cost-effective and improves early-stage HCC detection, enabling more effective care and improved overall survival. From a cost-effectiveness perspective, using blood-based biomarkers, particularly GAAD is the preferred approach compared to US+AFP [67].

Access to treatment is another important area that warrants attention. In Thailand, reimbursement for systemic therapies and treatments such as Radiofrequency ablation for early-stage HCC is inconsistent and not always covered under the Universal Health Coverage or Social Security Scheme [68]. As a result, only 7% of the population—those under the Civil Servant Medical Benefit Scheme—have access to these options, highlighting a significant gap in equitable treatment accessibility [69]. This limits access to potentially life-saving treatments, particularly for patients in more remote areas or those from lower-income households.

Table 8. HCC challenges in Vietnam.

PATIENT JOURNEY STAGE	CHALLENGE
AWARENESS	• Community awareness about HCC is significantly lower compared to other diseases such as lung and breast cancer • The risk of HCC is often underestimated • There is a disparity in awareness levels between urban and rural areas
PREVENTION	• Although HBV is included in the National Immunisation Programme, some outreach communities have no access to it • HBV and HCV tests are not yet widely recognised as standard surveillance tool, resulting in limited testing and missed opportunities for early detection
EARLY DETECTION	• Surveillance for HCC is not covered by national health insurance • Lack of standardised surveillance guidelines

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	• Insufficient healthcare workforce and infrastructure for surveillance (i.e. technology, risk classification systems)
DIAGNOSIS	• There are challenges in accurate and timely diagnostics due to an imbalance in workforce distribution, limited access to diagnostic technology, tools and services
ACCESS TO TREATMENT	• Advanced therapies are lacking due to regulatory and insurance coverage limitations • Limited access to HCC treatment centres, with severe and late-stage cases treated only in major hospitals • Shortage of specialists and treatment centres in provincial hospitals

A major obstacle in addressing HCC is low public awareness. HCC is not widely recognised, and its risk factors, such as chronic HBV and HCV are often underestimated [70]. This lack of awareness, especially in rural areas where health education is limited, leads to delayed medical consultation and diagnosis [70]. As a result, many HCC cases are identified only at later stages, when treatment options are less effective, significantly impacting patient survival rates and escalating healthcare costs.

Access to preventive measures, such as vaccination and testing, also remains limited. Although HBV vaccination is part of the National Immunisation Programme, its reach in rural and underserved areas is inadequate [70]. Furthermore, Hepatitis C testing and treatment are not widely integrated into the healthcare system, leaving a substantial portion of the population at risk of infections that can lead to HCC [71]. The absence of widespread Hepatitis testing exacerbates the situation, as many individuals remain unaware of their infection status and delay seeking treatment, increasing the likelihood of developing HCC.

Timely and accurate diagnosis of HCC is hindered by a shortage of trained healthcare professionals and diagnostic equipment, particularly in rural areas. The concentration of specialists in urban centres results in delays for patients in remote regions, who may face difficulty accessing timely diagnostic services. The limited availability of advanced diagnostic technologies further complicates early detection, with many cases being diagnosed at advanced stages, when treatment is less effective and more costly.

Finally, access to advanced treatments for HCC is restricted by regulatory barriers, insurance limitations, and a shortage of specialists in provincial hospitals [72]. As a result, patients, especially those from rural areas, often must travel long distances to major hospitals for treatment, further straining the healthcare system. The inequitable distribution of healthcare resources means that rural populations face more significant barriers to receiving comprehensive care, contributing to disparities in health outcomes across the country.

5. Actionable Recommendations for Hepatocellular Carcinoma Surveillance and Management in Asia Pacific

Using Japan's comprehensive HCC surveillance and management approach as a gold standard reference, local experts proposed actionable solutions for specific challenges along the patient journey – spanning awareness, prevention, detection, diagnosis, and access to treatment. Experts also identified the agency or department who should be responsible for implementing each solution for their health system. These are summarised in the tables below.

Despite the importance of implementing all these solutions, it will not be feasible to implement them all simultaneously. It is essential to adopt a stepwise implementation approach, starting with those associated with the greatest health and economic benefits for each health system. Preventing hepatitis and non-viral risk factors such as MASLD, and expanding and driving uptake of HCC surveillance have been shown to be cost-effective by preventing the onset of HCC or allowing HCC patients to be diagnosed at an early stage for curative HCC treatment [64,67,73–75].

Effective HCC policy must also account for differences in resources, surveillance, diagnostics, and access to curative treatment across health systems. For instance, where efforts to expand and

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drive uptake of HCC surveillance are already underway, priority should be given to identifying and eliminating implementation barriers, and addressing any challenges associated with diagnosis and treatment access to maximise both health outcomes and economic benefits.

These solutions, mapped to each health system's specific challenges and resource constraints, offer tangible benefits for diverse stakeholders. For policymakers, they provide actionable insights and a clear framework to guide decision-making, allocate resources effectively, and foster collaboration. For patients and communities, they enhance access to timely detection, diagnosis, and treatment, improving quality of life and reducing the financial strain of care. From an economic perspective, prioritising prevention and early intervention can lower healthcare costs, boost workforce productivity, and contribute to sustainable public health outcomes.

Table 9. Overview of recommendations for addressing HCC key challenges in Australia.

PATIENT JOURNEY STAGE	CHALLENGE	POTENTIAL SOLUTION(S)	RESPONSIBLE AGENCY/DEPARTMENT
AWARENESS	• Needs of indigenous and culturally and linguistically diverse (CALD) groups are not addressed • High prevalence of diabetes and obesity risk factors	• Implement community co-design initiatives, leveraging the "Double Diamond" framework • Enhance primary care education	• Government (national, jurisdictional, cancer council)
PREVENTION	• High alcohol consumption rates • Viral hepatitis is not always diagnosed and treated in a timely manner	• Introduce alcohol control policies, incl. advertising regulations and minimum pricing • Implement "sugar" tax policies • Solutions should align with national HCV, HBV, obesity, and diabetes strategies, the 2023 Roadmap to Liver Cancer Control (2-, 5-, and 10-year goals), and the Australian Cancer Plan	
EARLY DETECTION	• Suboptimal access to ultrasound surveillance services and primary care diagnosis capabilities • Limitations in ultrasound accuracy for obese patients	• Expand comprehensive surveillance for HCV/HBV in all at-risk populations • Expand ultrasound surveillance programmes • Introduce blood-based biomarker tests i.e. GAAD/GALAD • Implement risk stratification tools • Strengthen primary care capacity to diagnose liver disease and establish referral pathways • Launch a national surveillance programme for high-risk groups, incl. individuals with cirrhosis and HBV	
DIAGNOSIS	• Suboptimal access to MRI/CT for accurate diagnosis • Patient support services could be better	• Optimise cost-effectiveness measures to improve access to diagnostic modalities (MRI/CT) and patient support services • Secure funding through the Medical Services Advisory Committee to enable access to diagositics • Develop a comprehensive surveillance strategy • Expand the role of liver specialist nurses • Establish patient support lines and navigation services	

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ACCESS TO TREATMENT	• Geographical and equity-related disparities • Lack of funded 2nd-line systemic therapies • Lack of management of HCC by non-oncologists	• Implement a national Australian cancer plan • Improve access to multidisciplinary teams • Develop comprehensive cancer care networks • Increase reimbursement and funding for second-line systemic therapies • Ensure that all solutions align with the 2023 HCC Surveillance Guidelines and Optimal Care Pathways

The Roadmap to Liver Cancer Control in Australia by the Cancer Council identified Indigenous and CALD populations as high-risk groups for HCC, emphasising the disproportionate burden of liver cancer within these communities and the need for targeted interventions to address the specific healthcare challenges faced by these populations [76]. A co-designed, culturally appropriate approach using the "Double Diamond" framework that actively involves Indigenous and CALD communities will be crucial in creating healthcare systems judged to be safe to approach and use [77,78]. Such inclusivity will be key in driving the design and implementation of effective programmes to raise awareness and prevent HCC and its risk factors and support equitable uptake of HCC surveillance among the Indigenous and CALD communities.

Despite the relatively high levels of alcohol use in Australia, there is limited local evidence on alcohol-related mortality. However, given the substantial harms caused by alcohol consumption, a comprehensive approach to reducing alcohol use is essential to lower the risk of alcohol-induced cirrhosis, a key contributor to HCC [79,80]. Additionally, expanding HBV and HCV surveillance and ensuring timely diagnosis and treatment of these viral infections is foundational in preventing the onset of HCC. For instance, early antiviral therapy has been shown to significantly reduce the risk of developing HCC among individuals with chronic HBV [81]. The implementation of enhanced primary care education on the link between diabetes, obesity and HCC also aligns with the Australian National Diabetes Strategy's goal of promoting awareness and earlier detection of diabetes through primary care providers [82].

Current HCC surveillance primarily rely on ultrasound and AFP [29], but emerging evidence in Thailand, United Kingdom and China supports the incremental integration of novel biomarkers such as PIVKA-II and digital algorithms like GAAD (Gender, Age, AFP, PIVKA-II) that have been shown to be cost effective for HCC surveillance and improve early detection of HCC [67,73,74]. Additionally, given the emergence of MASLD as a leading risk factor for HCC in Australia [83], it is imperative that the national surveillance programme evolves to include MASLD patients. To address the limitations of ultrasound accuracy, particularly in obese patients, AI-based screening programs for HCC can be considered. These programs aim to reduce diagnostic variability and enhance the accuracy of HCC detection, ensuring more reliable and consistent diagnoses [84].

As per the Roadmap to Liver Cancer Control, experts recommend implementing a national HCC surveillance programme in the next 5 years [76], similar to Japan and South Korea. Japan's national surveillance programme has been credited for 68% of HCC cases being detected at an early stage [19]. This is important since HCC has a significantly better prognosis when detected early, allowing for curative treatment options such as surgical resection, liver transplantation, or ablation [85].

After strengthening the foundation of HCC surveillance and management by implementing recommendations to improve awareness, prevention and early detection, the focus can shift to ensuring equitable access to diagnosis and treatment. The principles of the Optimal Care Pathway for HCC by Cancer Australia and the Cancer Council [86] can support the implementation of the national Australian Cancer Plan to achieve geographic equity, treatment accessibility, and culturally sensitivity. For instance, improving access to multidisciplinary teams improves survival rates and

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uptake of curative treatment by facilitating early specialist input, optimising treatment pathways, and ensuring appropriate allocation of curative therapies [87,88]. Comprehensive cancer care networks that integrate general practitioners, gastroenterologist, hepatologists, oncologists, and hepato-pancreato-biliary surgeons will also facilitate timely diagnosis and treatment [86].

Table 10. Overview of recommendations for addressing HCC key challenges in India .

PATIENT JOURNEY STAGE	CHALLENGE	POTENTIAL SOLUTION(S)	RESPONSIBLE AGENCY/DEPARTMENT
AWARENESS	• Lack of effective communication to scale up awareness [36] • Despite high awareness of the risks, behavioural change remains a challenge, with persistently high prevalence of diabetes, obesity-related risk factors, and excessive alcohol consumption [37]	• Scale up the existing counselling services (integrated for efficiency) to include counsellors trained to address integrated health priorities/programmes, driving efficiency and cost reduction	• Community health centre, led by a Chief Medical Officer at the block level, operating under the jurisdiction of the district-level health administration
PREVENTION	• Lack of affordable RUP (Re-Use Prevention syringes) [38] • Large geographic diversity with difficulties in reaching isolated and disadvantaged patients [39]	• Continue scaling up injection safety projects at a national level [44] • Ensure a more sustained supply of HCV therapy by extending treatment availability beyond just a month, incorporating lessons learned from the COVID-19 pandemic	• National Viral Hepatitis Management Unit [44] • Community health centre, led by a Chief Medical Officer at the block level, operating under the jurisdiction of the district-level health administration
EARLY DETECTION DIAGNOSIS	• HCC surveillance is neither well-organised nor universally practiced [40]	• Refine HCC surveillance strategies by integrating novel biomarkers like PIVKA II, and newer algorithms like GAAD/GALAD [40]	• Ministry of Health and Family Welfare
ACCESS TO TREATMENT	• Many treatment modalities are not accessible or affordable for a significant portion of the patient population [41]	• Work with government to develop sustainable financial models for affordable care • Develop incentives to enable an attractive treatment research and development (R&D) environment	• Ministry of Health and Family Welfare

In India, efforts to improve awareness, prevention and early detection should be prioritised over the next 12-24 months (see Table 10). To address the challenges in scaling up awareness, a key solution is to scale up existing counselling services by integrating them into broader health initiatives. This includes training counsellors to incorporate integrated health priorities – such as promoting behaviour change to combat obesity, alcohol consumption, and diabetes – into their programmes. By enhancing the efficiency of these services, policymakers can drive cost reduction while improving health outcomes [89].

The expansion of counselling programs could also align with strategies that address behavioural change, as evidence suggests that awareness alone is insufficient for long-term disease prevention including conditions associated with obesity and diabetes [90] which are HCC risk factors. Successful public health interventions must go beyond awareness to incorporate behaviour-changing strategies, which can also be achieved through such counsellor-led programmes and broader public campaigns. While counsellors provide personalised support, large-scale campaigns using social media, community outreach, and workplace education can ensure wider reach and engagement.

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In the realm of prevention, the National Viral Hepatitis Control Programme aims to ensure injection safety by formulating a policy to use Re-Use Prevention (RUP) syringes [42]. Scaling up initiatives around the use of affordable RUP syringes and safe injection practices support the effective implementation of this policy and reduce the risk of hepatitis transmission through unsafe injection practices at the population level.

Additionally, addressing the social determinants of health – including access to preventive measures – are important in designing effective interventions for HBV, a risk factor for HCC [91]. Health authorities should ensure that affordable preventive services, such as vaccinations and infection control practices, are accessible in both urban and rural areas.

Regarding early detection and diagnosis, refining surveillance strategies by integrating novel biomarkers like PIVKA-II and newer algorithms like GAAD can help enhance early detection of HCC [40]. Shifting from hospital-based imaging to community-based approaches using blood markers and digital technologies could be an effective solution for reaching at-risk populations [40]. Such advancements could significantly improve the precision and timeliness of HCC diagnosis, especially in high-risk populations. Expanding and increasing the uptake of HCC surveillance has proven to be a cost-effective strategy by allowing HCC patients to be diagnosed at an early stage for curative HCC treatment [64,67,73–75].

After strengthening efforts to improve awareness, prevention and early detection, the final challenge is ensuring that treatment modalities for HCC are accessible and affordable. Key recommendations include working with the government to develop sustainable financial models that ensure the affordability of life-saving treatments for HCC, such as liver transplantation and advanced chemotherapy. These include blending financing, which is the strategic use of development funds, such as those from government aid and philanthropic sources, to catalyse and mobilise private capital for social and environment results [13]. Blended financing models have been employed successfully to augment domestic financing and sustain the scale up of hepatitis health programs [13], and similar models can be explored for HCC treatment.

Incentives for research and development (R&D) of HCC treatment, particularly through government partnerships, are essential for creating an attractive treatment R&D environment. For instance, the U.S. Cancer Moonshot Initiative, which aims to accelerate cancer research by providing funding and fostering public-private partnerships, has facilitated breakthroughs, including immunotherapy advancements and new precision medicine approaches for cancer treatment in the United States [92]. A similar initiative has been launched in India with the support of the United States, and the United States Food and Drug Administration's Oncology Centre of Excellence will arrange a technical visit to India in 2025 to set up collaborations with stakeholders under Food and Drug Administration's 'Project Asha' [93]. This partnership will focus on capacity-building efforts, including education on the design, conduct, and management of clinical trials, promoting international standards, helping streamline approval processes, sharing regulatory expertise, and increasing cancer clinical trial access [93].

Table 11. Overview of recommendations for addressing HCC key challenges in Malaysia.

PATIENT JOURNEY STAGE	CHALLENGE	POTENTIAL SOLUTION(S)	RESPONSIBLE AGENCY/DEPARTMENT
AWARENESS	• Low awareness among HCPs outside of hepatologists and gastroenterologists • Low awareness among potential at-risk patients, with a need to better identify who falls into high-risk categories • Low awareness among laboratory personnel about the availability of relevant tests	• Implement HCC advocacy programmes targeting policymakers, healthcare professionals, lab professionals and high-risk patients • Strengthen the national cancer registry	• Ministry of Health

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PREVENTION	• Lack of screening for HCC risk factors (e.g. HBV, HCV, MASLD, and alcohol-related liver conditions) to prevent progression to HCC	• Integrate HCC risk factor assessments into existing noncommunicable disease surveillance programmes	• Ministry of Health
EARLY DETECTION	• Lack of HCC surveillance for early detection of high-risk groups	• Establish optimal HCC surveillance programmes for high-risk individuals and ensure timely referrals, potentially integrating electronic medical records	• Ministry of Health
DIAGNOSIS	• Diagnoses and management are not conducted within a multidisciplinary team setting, hindering access to care and treatment • Access to a multidisciplinary team approach needs to be strengthened (e.g. virtual multidisciplinary team discussion, to physically refer if there is a definitive management plan)	• Establish minimum requirements using the Extension for Community Healthcare Outcomes model, including virtual multidisciplinary teams comprising interventional radiologists, gastroenterologists, hepatologists, hepatobiliary surgeons and oncologists • Advocate for a value-based approach using a template model to guide policymakers in accessing evidence-based treatments	Ministry of Health
ACCESS TO TREATMENT	• Lack of access to evidence-based treatment options for patients		

By focusing first on targeted interventions that maximise impact within a shorter time frame, Malaysia can seek to improve patient outcomes and reduce the burden of HCC.

In terms of awareness, implementing advocacy programmes targeting policymakers and healthcare professionals outside of hepatology and gastroenterology is a key solution. Nationwide awareness campaigns can be launched to educate primary care physicians, laboratory personnel, and high-risk populations about HCC risks, early signs, and the importance of timely surveillance [47]. Additionally, strengthening Malaysia's national cancer registry will provide more accurate data to inform public health initiatives and resource allocation.

For prevention, integrating HCC risk factor assessments into existing noncommunicable disease surveillance programmes will allow for earlier intervention among at-risk individuals. By embedding liver disease surveillance and stratification, particularly for HBV, HCV and MASLD into routine healthcare visits, primary care providers can detect and manage risk factors before they progress to liver cancer. This strategy aligns with Malaysia's existing public health infrastructure and can be scaled efficiently by leveraging digital health tools and electronic medical records.

With early detection being critical to improving survival rates, the establishment of surveillance programmes to identify high-risk individuals and ensure timely referrals is essential. This can be achieved by integrating electronic medical records that flag patients with known HCC risk factors, prompting physicians to conduct necessary surveillance. Additionally, expanding access to non-invasive surveillance modalities in tertiary centres and primary healthcare settings will help detect liver cancer at an earlier, more treatable stage.

Regarding diagnosis and access to treatment, strengthening multidisciplinary team approaches is crucial. Establishing minimum requirements using the Extension for Community Healthcare Outcomes model, which includes virtual multidisciplinary teams with interventional radiologists, gastroenterologists, hepatologists, and oncologists, will improve diagnostic accuracy and streamline treatment planning. Moreover, advocating for a value-based approach to healthcare where treatments are selected based on their effectiveness, cost, and accessibility, can help policymakers prioritise investments in critical care infrastructure. Similarly, establishing a structured framework to enhance patient group participation in reimbursement decision-making, increasing awareness of

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the economic and social aspects of HCC, and advocating for a stronger patient voice in treatment reimbursement policies can help improve overall access to treatment.

By implementing these targeted initiatives, Malaysia can make significant strides in HCC surveillance and management. These efforts will not only reduce cancer-related morbidity and mortality but also alleviate the economic burden of late-stage disease management.

Table 12. Overview of recommendations for addressing HCC key challenges in South Korea.

PATIENT JOURNEY STAGE	CHALLENGE	POTENTIAL SOLUTION(S)	RESPONSIBLE AGENCY/DEPARTMENT
AWARENESS	• Limited public awareness activities related to HCC prevention and early detection	• Leverage existing awareness programmes led by the Korean Liver Cancer Association • Introduce targeted government initiatives to enhance public knowledge and engagement	• Ministry of Health and Welfare
PREVENTION	• Before the national HCV surveillance program, many opportunities for early intervention were missed. While detection has improved since its launch, gaps persists	• Implement a new national surveillance policy/programme for HCV, launched in 2024 to ensure wider coverage and early detection of HCC risk factors	• Ministry of Health and Welfare • Korea Disease Control and Prevention Agency
EARLY DETECTION/DIAGNOSIS	• Current HCC surveillance guidelines rely on AFP as the only biomarker, which may limit the accuracy of early detection	• Update national HCC guidelines to incorporate emerging evidence on multi-biomarker approaches and improve early detection rates	• Ministry of Health and Welfare
ACCESS TO TREATMENT	• Limited reimbursement options hinder patient access to essential HCC treatments	• Expand reimbursement policies through collaborative efforts involving the National Health Insurance Service, government agencies, pharmaceutical companies, and academic societies to enhance treatment accessibility	• National Health Insurance Service • Ministry of Health and Welfare

There are several opportunities to enhance awareness, prevention, and early detection of HCC in South Korea over the next 12 to 24 months (see Table 12).

For awareness, the priority is to expand and enhance existing public awareness campaigns led by the Korean Liver Cancer Association. While there have been efforts to inform the public, these programmes can be optimised to target high-risk individuals and promote early detection. By leveraging current initiatives and introducing targeted government programmes, public knowledge and engagement can be improved significantly. Cost-effective strategies such as media campaigns, community outreach, and integrating awareness into primary care settings can quickly and effectively reach a large population, including high-risk groups [94]. This approach, which builds on existing frameworks, ensures maximum impact without requiring substantial financial investments.

In terms of prevention, South Korea has laid a strong foundation with the introduction of the national HCV surveillance programme in 2017 [21]. To build on this, an updated national surveillance policy was launched in 2024, expanding coverage and improving the early identification of individuals at risk for HCC [95]. By further strengthening and implementing this updated policy, South Korea can achieve better health outcomes and generate significant economic savings at a

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relatively low cost. This approach leverages the existing framework, while enhancing the program's reach and effectiveness in the short term.

For early detection, a crucial improvement would be updating the national HCC guidelines to include emerging evidence on multi-biomarker approaches for early diagnosis. Currently, the guidelines rely solely on AFP and PIVKA II, which have limitations in detecting HCC, particularly in its early stages [55,56]. By incorporating additional biomarkers, such as AFP-L3, alongside the current standards, the combined use of these markers—backed by strong evidence showing their ability to significantly improve sensitivity and specificity—could enhance early detection [21]. This would allow more patients to be diagnosed at a stage where curative treatment options are still viable. This solution is both feasible and cost-effective, as ongoing advancements in biomarker research make it possible to update the guidelines within the next 12 to 24 months with minimal additional costs.

While the solutions for awareness, prevention, and early detection are immediate and cost-effective, diagnosis and access to treatment will require more systemic changes and may take longer to implement. In particular, expanding reimbursement policies to improve patient access to essential HCC treatments is a critical step. Limited reimbursement options currently hinder access to curative and life-saving therapies, such as targeted treatments. Overcoming these barriers will require close collaboration between the National Health Insurance Service, government agencies, pharmaceutical companies, and academic societies. Although this will require more time and coordination, these changes are essential to ensure that all patients have equitable access to timely and effective treatments.

Table 13. Overview of recommendations for addressing HCC key challenges in Taiwan.

PATIENT JOURNEY STAGE	CHALLENGE	POTENTIAL SOLUTION(S)	RESPONSIBLE AGENCY/DEPARTMENT
AWARENESS	Awareness that chronic hepatitis is a risk factor for HCC remains limited, and even fewer people recognise that MASLD is also a significant risk factor	• Deliver personalised health education via mobile apps, focusing on what patients should do rather than what they should avoid • Utilise social media to disseminate health information • Introduce gamification strategies, i.e. incentivised health education videos that reward users with points • Provide health information and checkups through workplaces • Enable cross-department data sharing (between Health Promotion Administration and National Health Insurance Administration) using standardised Fast Healthcare Interoperability Resources systems while ensuring privacy protection	• Health Promotion Administration (Ministry of Health and Welfare) • Ministry of Labor, Ministry of Defence, Ministry of Education
PREVENTION	• Management plans for MASLD patients need enhancement to ensure better awareness and mitigation of HCC risk • Patients with resolved HBV, MASLD, alcoholic liver disease at risk of	• Introduce a comprehensive metabolic syndrome management plan or campaign, targeted at lifestyle interventions to reduce risk factors	• Health Promotion Administration (Ministry of Health and Welfare)

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	fibrosis require emphasis on fibrosis evaluation	• Develop predictive risk models for at-risk MASLD patients • Promote health through exercise programmes and gym initiatives • Encourage social engagement through health-related activities • Offer spill-over insurance (i.e., policies that reward healthier lifestyle changes with reduced premiums) to promote healthier lifestyles	
EARLY DETECTION/DIAGNOSIS	• **Surveillance relies on ultrasound and AFP, with limited use of PIVKA-II which restricts more accurate and early detection of HCC**	• Implement targeted surveillance for cardiometabolic risk factors rather than general population surveillance • Enable the wider use of PIVKA-II for timely diagnosis by developing a high-risk patient calculator to optimise ultrasound, AFP, and PIVKA-II surveillance for cost-effective resource allocation.	• National Health Insurance Administration (Ministry of Health and Welfare)
ACCESS TO TREATMENT	• Immunotherapy reimbursement for intermediate/advanced HCC cases has a one-time eligibility • Patient advocacy involvement in reimbursement decisions could be more active	• Expand immunotherapy reimbursement beyond one-time eligibility to ensure sustained access to treatment • Establish a structured framework to enhance patient group participation in reimbursement decision-making, particularly in identifying treatments that should be considered for reimbursement • Increase awareness and engagement of patient groups to educate policymakers, regulatory bodies and healthcare payers on the economic and social impact of HCC, emphasising the importance of including patient perspectives in reimbursement decisions	• Taiwan's Food and Drug Administration (Ministry of Health and Welfare) • National Health Insurance Administration (Ministry of Health and Welfare)

Strengthening public awareness and education is essential to improving engagement in HCC risk reduction and surveillance. In Taiwan, a more targeted and proactive approach to health communication is needed to ensure that these groups understand the importance of regular screening and early intervention. Digital platforms such as mobile applications can provide personalised health education, focusing on actionable steps rather than broad warnings. Workplace-based health checkups and educational outreach would further enhance engagement, especially among working-age individuals who may not actively seek medical attention[85]. Cross-agency collaboration through

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standardised data-sharing platforms, such as Fast Healthcare Interoperability Resources systems, can facilitate more effective public health messaging and outreach, ensuring that at-risk populations receive the information necessary to make informed healthcare decisions [96].

Expanding prevention efforts is another critical step in reducing the incidence of HCC. While Taiwan has made notable progress in eliminating hepatitis-related HCC, additional emphasis is needed on addressing metabolic and lifestyle-related risk factors. A comprehensive metabolic syndrome management initiative that promotes exercise, dietary modifications, and proactive risk assessment would help mitigate these risks. Digital engagement through social media and gamified health education programs could encourage participation in preventive measures, making health literacy more accessible and interactive [97]. Additionally, integrating predictive risk models into routine healthcare checkups would allow for earlier identification of high-risk individuals and more tailored prevention strategies [98]. Encouraging insurers to offer incentives for preventive health behaviours, such as reduced premiums for those actively engaging in lifestyle modifications, could further support a culture of long-term health awareness and disease prevention.

Enhancing early detection and surveillance adherence is key to identifying HCC at more treatable stages. Improving risk stratification through a high-risk patient calculator, combining ultrasound, AFP and PIVKA-II could help with resource allocation and ensure early detection of high-risk individuals. Recent research indicates that integrating the GAAD algorithm (gender, age, AFP, and PIVKA-II) into surveillance strategies may enhance detection accuracy and clinical effectiveness [66,67,99]. Additionally, a cost-effectiveness analysis is currently underway in Taiwan to determine the optimal surveillance strategy that balances cost and early detection benefits, further emphasising the need to optimise HCC surveillance for high-risk populations.

While diagnosis and access to treatment are crucial areas for long-term consideration, they require greater financial investment and regulatory changes. In the future, efforts to improve access to advanced diagnostic tools, systemic therapies, and enhance patient advocacy in reimbursement decisions can be explored. Addressing limited reimbursement policies for immunotherapy and systemic treatments could help ensure that patients diagnosed at later stages have broader access to life-extending therapies. Similarly, establishing a structured framework to enhance patient group participation in reimbursement decision-making, increase awareness of economic and social aspects of HCC, and advocate for a stronger patient voice in treatment reimbursement policies can help to improve overall access to treatment.

Table 14. Overview of recommendations for addressing HCC key challenges in Thailand.

PATIENT JOURNEY STAGE	CHALLENGE	POTENTIAL SOLUTION(S)	RESPONSIBLE AGENCY/DEPARTMENT
AWARENESS	• Insufficient updated knowledge among GPs, particularly regarding the rising prevalence of metabolic and toxic risk factors • Low awareness among the general population • Lack of continuity in government policy	• Implement training programmes in medical schools to educate young HCPs • Drive HCC as a national healthcare priority • Develop segmented social media campaigns combined with health education curriculum reform	• Department of Disease Control and Department of Medical Services, Ministry of Public Health of Thailand • ThaiHealth • Government • Consortium of Thai Medical Schools
PREVENTION	• HBV Viral load is underutilised due to the budget constraints of capitation reimbursement, restricting access for high-risk patients	• Optimise HBV Viral load budget in Universal Health Coverage reimbursement • Increase hepatitis-related clinics nationwide at local/community level to address regional disparities	• Government cabinet • Department of Disease Control, Ministry of Public Health of Thailand • National Health Security Office

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	needing hepatitis treatment and HCC surveillance		
EARLY DETECTION/DIAGNOSIS	• Early detection in high-risk adults is inadequate • Lack of a unified national database for hepatitis and HCC, posing challenges for tracking and surveillance • The HCC surveillance programme using ultrasound and AFP is inadequate, especially in resource-limited settings • New blood-based biomarkers for HCC surveillance, such as PIVKA II, which may enhances accessibility and accuracy, are not included in the policy agenda and reimbursement programs	• Encourage surveillance in adults • Increase the ability of healthcare facilities to diagnose and treatment. • Establish a system for laboratory testing and patient referrals. • Emphasise greater focus on high-risk groups, such as cirrhosis patients, for surveillance programmes • Develop a unified comprehensive database for hepatitis and HCC to support early detection • Do the technology assessment of new blood-based biomarkers for national surveillance programmes • If the assessment shows the cost-effectiveness, reimburse new blood-based biomarkers for surveillance programmes, integrating both prevention and promotion strategies	• Department of Medical Services, Service plan, Ministry of Public Health of Thailand
ACCESS TO TREATMENT	• Radiofrequency ablation for early stage cannot be reimbursed under the universal health coverage scheme • Systemic therapy cannot be reimbursed for advanced stages	• Improve benefits in universal health coverage scheme • Include ablation needles in reimbursement in the universal health coverage scheme • Include systemic therapies under the universal health coverage scheme to increase access to care for advanced-stage HCC patients	• National List of Essential Medicines • National Health Security Office • Social Security Office

At the awareness stage, addressing knowledge gaps among GPs and the younger population is crucial, especially with the shift in HCC causes towards metabolic and toxic risk factors in Thailand. To tackle this, training programmes should be implemented in medical schools to educate young healthcare professionals, ensuring they are equipped with the knowledge to identify risk factors early and make timely referrals. Expanding public awareness through social media campaigns targeted at the public can also play a crucial role, particularly in informing the younger population about risk factors and prevention strategies. At the 2024 HCC APAC Policy Forum, hosted by the APAC Liver Disease Alliance, there was a strong emphasis on peer-to-peer advocacy, public awareness campaigns, and enhancing access to information through diverse communication channels to empower patients in making informed decision [17]. A consistent government policy driving HCC awareness could further enhance these efforts. This comprehensive approach would not only improve early detection but also prevent the disease from progressing to later stages, ultimately reducing healthcare costs associated with advanced treatments and hospitalisations.

In the prevention stage, full reimbursement for HBV viral load testing is essential to ensuring patient access to treatment and reducing the incidence of liver cancer [17]. Additionally, increasing the number of hepatitis-related clinics nationwide, particularly at the local and community levels,

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would help address regional healthcare disparities and ensure high-risk individuals, such as those with a history of HBV or chronic liver disease, receive timely care. Encouraging routine surveillance for these individuals can help identify early liver damage before it progresses to cancer. To further strengthen prevention efforts, increasing GP training is essential to ensure healthcare providers are equipped to recognise at-risk patients and implement appropriate preventive measures. By enhancing prevention and surveillance efforts, Thailand can reduce HCC rates and avoid the higher healthcare costs associated with advanced liver cancer, offering long-term economic and health benefits.

For early detection, expanding the use of novel biomarkers in surveillance programmes may improve the accuracy of detecting HCC at earlier stages, allowing for curative treatments like surgery or liver transplantation, which are more cost-effective than treating advanced-stage HCC. At the 2024 HCC APAC Policy Forum, the concept of liquid biopsies was introduced, which combines biomarkers such as PIVKA II and AFP-L3 with AFP and patient risk factors [17]. Models like the GALAD and AFP algorithms have shown promising results in early HCC detection. A study demonstrated that the GALAD score had a sensitivity of 70% and a specificity of over 90% for detecting early-stage HCC in a prospective, multicenter cohort [100]. The GAAD algorithm also demonstrates strong diagnostic performance, achieving an accuracy of 94.8% for all-stage HCC patients with chronic liver disease [101].

These findings suggest that combining biomarkers with clinical data could significantly enhance HCC surveillance and improve early detection. A comprehensive national database would also support better tracking of high-risk populations and provide data that could help shape effective prevention and treatment strategies [17]. This database would enable better targeting of surveillance programmes for high-risk individuals, who benefit the most from early detection. Additionally, increasing access to surveillance programmes at the local and community levels would help ensure that high-risk individuals receive timely care, further improving outcomes and reducing the need for more costly interventions in later stages. By increasing the accessibility of early detection methods, Thailand could prevent many cases from advancing to more costly and less treatable stages, ultimately saving both lives and resources.

Addressing the challenges in diagnosis and access to treatment for HCC in Thailand requires collaborative solutions, along with significant time and resources. Despite these challenges, Thailand has made commendable progress through the efforts of the Ministry of Public Health (MoPH), which has implemented multifaceted strategies to improve early detection and access to care. As part of the effort to promote early detection, hepatitis B virus (HBV) and hepatitis C virus (HCV) screening programs have been implemented, targeting high-risk populations and individuals born before 1992, who are at higher risk due to the absence of hepatitis B vaccination before the national program began that year. Those who test positive undergo viral load testing, and individuals diagnosed with HBV or HCV infections receive treatment in accordance with national guidelines to ensure timely access to care. To further strengthen the healthcare system's capacity for diagnosis and treatment, the MoPH has invested in public health insurance coverage and healthcare infrastructure. A nationwide system for laboratory testing and patient referrals has been established, including the setup of hepatitis clinics in secondary care hospitals. More than 60% of general practitioners have received training through an online platform, supporting the efficient referral of patients for specialized care. To further improve diagnosis and treatment, solutions should include enhancing reimbursement policies for diagnostic tests and treatments, ensuring critical options like radiofrequency ablation and systemic therapies are covered under the Universal Health Coverage scheme. Additionally, increasing government support for affordable surveillance and treatment, along with reimbursement assistance for price-sensitive patients, would significantly support early diagnosis and timely access to care.

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Table 15. Overview of recommendations for addressing HCC key challenges in Vietnam.

PATIENT JOURNEY STAGE	CHALLENGE	POTENTIAL SOLUTION(S)	RESPONSIBLE AGENCY/DEPARTMENT
AWARENESS	• Community awareness about HCC is significantly lower compared to lung and breast cancer • The risk of HCC is often underestimated • There is a disparity in awareness levels between urban and rural areas	• Enhance community awareness through tailored approaches targeting different population groups via social media, primary healthcare centres, and local community institutions such as wards	• Ministry of Health • Provincial health department • Commune health department
PREVENTION	• Although HBV is included in the National Immunisation Programme, some outreach communities have no access to it • HBV and HCV tests are not yet widely considered as universal surveillance tests	• Develop a national policy on HCC prevention, including vaccination and HBV/HCV testing • Call for funding from organisations to expand HBV vaccination outreach in underserved communities and integrate HBV and HCV testing as universal surveillance measures	• Centres for Disease Control and Prevention under the Ministry of Health
EARLY DETECTION	• Surveillance for HCC is not covered by NHI • Lack of standardised surveillance guidelines • Insufficient healthcare workforce and infrastructure for surveillance (i.e. technology, risk classification systems)	• Research the cost-effectiveness of surveillance programmes • Develop surveillance guidelines with clear recommendations • Implement capacity-building initiatives to enhance the healthcare workforce	• Ministry of Health
DIAGNOSIS	• There are challenges in accurate and timely diagnostics due to an imbalance in workforce distribution	• Focus capacity-building initiatives on enhancing diagnostic expertise, including ultrasound, CT, and MRI capabilities • Provide free diagnostic testing through government reimbursement programmes	• Ministry of Health
ACCESS TO TREATMENT	• Advanced therapies are lacking due to regulatory and insurance coverage limitations • Limited access to HCC treatment centres, with severe and late-stage cases treated only in major hospitals • Shortage of specialists and treatment centres in provincial hospitals	• Update HCC treatment guidelines regularly • Increase governmen subsidies to enhance access to treatment at lower-level hospitals, including provincial healthcare facilities • Explore sustainable reimbursement mechanisms to ensure long-term accessibility of innovative treatments • Implement capacity-building programmes to strengthen the healthcare workforce and address shortages	• Ministry of Health

Addressing the challenges of awareness, prevention, and early detection of HCC is feasible in the short term and offers the greatest potential for long-term economic savings. Improving public awareness is a high priority and can be achieved through tailored campaigns targeting different population groups, using channels like social media, community health centres, and local institutions. These efforts can help educate the public about the risks of HCC, particularly the connections with HBV HCV and non-viral risk factors such as MASLD. By raising awareness,

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individuals are more likely to seek early surveillance and medical consultations, thereby reducing the burden of advanced-stage diagnoses.

In terms of prevention, expanding HBV vaccination coverage to underserved communities and promoting routine HCV testing is essential. A national policy on HCC prevention, supported by funding from organisations, would help strengthen these efforts.

Early detection is equally vital. Research into the cost-effectiveness of HCC surveillance programmes will demonstrate the value of driving the uptake of regular surveillance. Establishing standardised surveillance guidelines and enhancing healthcare infrastructure will allow for the early detection of HCC, which significantly increases treatment success rates and reduces overall healthcare costs. Additionally, the adoption of a national HCC surveillance programme that combines the use of AFP and PIVKA-II, alongside diagnostic algorithms like GAAD, would be both cost-effective and practical in the short term. This phased approach ensures a more gradual implementation, with the potential for greater success in early detection and better patient outcomes. Regular assessments of emerging biomarkers and diagnostic technologies can also be conducted to align with the latest scientific advancements. In addition, there should also be an inclusion of HCC surveillance and surveillance services within the national health insurance scheme. This would facilitate early detection, prevent the progression of the disease, and reduce long-term healthcare costs.

While solutions for diagnosis and treatment access are equally important, they are better addressed in the long term, as they require more substantial resource investments. The shortage of trained specialists, diagnostic tools, and access to advanced treatment centres is a critical barrier that will take time to resolve. Nonetheless, the expansion of diagnostic capacity, particularly in rural areas, and the integration of more sophisticated diagnostic technologies will be necessary. Over time, the healthcare system should focus on enhancing diagnostic accuracy and increasing access to curative treatment options through increased sustainable reimbursement, which will further improve patient outcomes and reduce the economic burden on the system.

6. Turning Roadmaps into Action for Hepatocellular Carcinoma Surveillance and Management in Asia Pacific

This policy article has highlighted the pressing need for a comprehensive and targeted response to HCC surveillance and management across the APAC region. Implementing the proposed recommendations requires dedicated efforts to secure necessary resources, ensuring sustainable and scalable solutions tailored to the unique needs of each healthcare system.

Effective collaboration among governments, healthcare providers, industry stakeholders, and patient advocacy groups is critical to driving meaningful progress. A united approach will help harmonise policies, leverage collective expertise, and optimise resource allocation to address the challenges associated with HCC surveillance and management. Aligning efforts with national health priorities will pave the way for impactful and sustainable change.

To translate national HCC roadmaps into tangible outcomes, stakeholders must move from planning to decisive action. Establishing clear governance structures, setting measurable targets, and implementing robust monitoring mechanisms will be key. Transparent progress tracking will enable stakeholders to evaluate the effectiveness of implemented strategies and ensure continuous refinement and improvement.

However, results will not appear overnight, as seen in Japan's experience. Effective implementation requires sustained leadership and adaptability. Initial surges in detection may strain testing and treatment capacity, but long-term success depends on incremental improvements. Policymakers should anticipate these challenges and align resources accordingly to ensure sustainable impact.

The ambition for APAC is to achieve significant advancements in HCC surveillance, diagnosis, and management, ultimately reducing mortality rates and improving quality of life. Drawing

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inspiration from world-leading models such as Japan's comprehensive approach to tackling HCC can provide valuable insights for the region.

With a shared commitment and sustained engagement, each health system in the APAC region can make significant strides in reducing the burden of HCC, enhancing patient outcomes, and achieving long-term health and economic benefits. Establishing expert committees at the national level, involving all relevant stakeholders, will be instrumental in steering planning and implementation efforts effectively within each health system.

As HCC continues to pose a growing public health challenge, the urgency to act cannot be overstated. Every stakeholder in the ecosystem, from Ministries of Health, policymakers and funders, industry and providers, or physicians, caregivers and patients, has something to offer and something to gain. Through collective efforts, the region can move closer to a future where early detection, timely treatment, and comprehensive care are accessible to all.

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Abbreviations

AFP	**Alpha-Fetoprotein**
AFP-L3	Lectin-reactive Fraction of Alpha-fetoprotein
APAC	Asia Pacific
CALD	Culturally And Linguistically Diverse
CT	Computed Tomography
GAAD	Gender, Age, AFP, and Des-gamma carboxy-prothrombin (DCP)
GALAD	Gender, Age, AFP-L3, AFP, and Des-gamma carboxy-prothrombin (DCP)
GP	General Practitioner
HBV	Hepatitis B Virus
HCC	Hepatocellular Carcinoma
HCP	Healthcare Professional
HCV	Hepatitis C Virus
MASLD	Metabolic Dysfunction-associated Steatotic Liver Disease
MRI	Magnetic Resonance Imaging
PIVKA-II	Protein Induced by Vitamin K Absence or Antagonist-II
USD	United States Dollar

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