



# Primary Care Physicians' Action Plans for Responding to Results of Screening Tests Based on the Concept of Quaternary Prevention

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Since noncommunicable diseases (NCDs) are generally controllable rather than curable, more emphasis is placed on prevention than on treatment. For the early detection of diseases, primary care physicians (PCPs), as well as general practitioners and family physicians, should interpret screening results accurately and provide screenees with appropriate information about prevention and treatment, including potential harms. The concept of quaternary prevention (QP), which was introduced by Jamoulle and Roland in 1995, has been applied to screening results. This article summarizes situations that PCPs encounter during screening tests according to the concept of QP, and suggests measures to face such situations. It is suggested that screening tests be customized to fit individual characteristics instead of being performed based on general guidelines. Since screening tests should not be carried out in some circumstances, further studies based on the concept of prevention levels proposed by Jamoulle and Roland are required for the development of strategies to prevent NCDs, including cancers. Thus, applying the concept of QP helps PCPs gain better insights into screening tests aimed at preventing NCDs and also helps improve the doctor-patient relationship by helping screenees understand medical uncertainties.

**Key words:** Early detection of cancer, Diagnosis, Professional-patient relations, Patient compliance, Quaternary prevention

## INTRODUCTION

In the framework of the epidemiological transition first described by Omran in 1971 [1], the present period is defined as "the age of degenerative and man-made diseases." In other words, the major diseases managed by primary care physi-

cians (PCPs), as well as general practitioners and family physicians worldwide, are noncommunicable diseases (NCDs), such as cardiovascular diseases, diabetes mellitus, and cancer [2]. NCDs are generally controllable rather than curable [3,4], so more emphasis is placed on continuity of care with the provision of adequate information to patients [5] and the prevention of adverse drug events [6] than on curative treatment.

PCPs expend considerable effort in preventing NCDs by modifying environments likely to cause diseases, improving lifestyles to facilitate health promotion [7], providing vaccinations, and conducting screening tests for the early detection of diseases [8]. Based on the definition of medical screening proposed by Wald [9], the major aim of screening is to identify individuals at a meaningful level of risk for a specific disorder.

However, it is sometimes uncertain whether screening can

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prevent early deaths by detecting certain diseases in their early stages [10,11]. In addition, screening tests are not applied to symptomatic patients, but to people who feel healthy [8,12], such that PCPs should consider harms, such as overtreatment caused by overdiagnosis and false-positive results and psychological stress, including the anxiety placed on screenees [13-16]. Moreover, ethical issues have been raised regarding screening tests that are performed without adequate evidence of their merits and demerits [17,18]. Although recent publications on screening tests have suggested tailored screening tests that consider the values and preferences of screenees [13,19,20], the aim of this paper was to develop action plans for PCPs in responding to guide their responses to the results of screening tests.

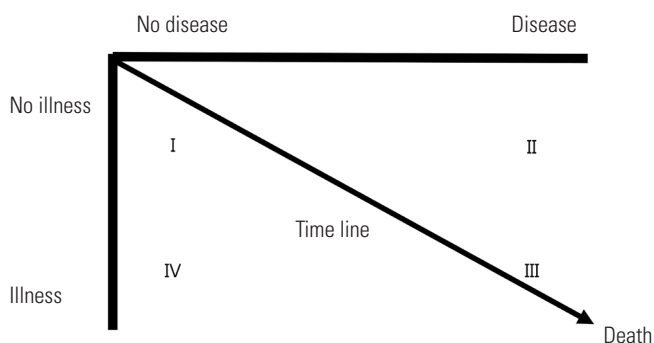
## BODY

PCPs choose appropriate screening tests for each healthy individual, and must interpret the results correctly. In order to accomplish this, analytical frameworks for screening should be established. Numerous frameworks have been introduced according to the natural history of various diseases [8,21,22], based on the concept of secondary prevention introduced by Leavell and Clark in 1940s [23]. A troublesome situation for PCPs is when a screening test gives a negative result, and the PCP has to reduce the harms of screening, but the screenee does not accept this course of action [16]. The prevention concept defined by Leavell and Clark does not address such situations [24-26]. In contrast, the concept of quaternary prevention (QP), introduced by Jamouille and Roland in 1995 [27], points out that all medical processes are not inherently beneficial to the patient and therefore embraces efforts to reduce

harmful impacts on healthy individuals who visit PCPs. They defined QP as ‘the actions taken to identify a patient or a population at risk of overmedicalization, to protect them from invasive medical interventions, and to provide methods of care that are both scientifically and ethically acceptable’ [27-29]. Among four domains of prevention defined based on interrelationships between patients and doctors, the quaternary level of prevention refers to a situation in which a patient feels ill but the doctor concludes that no disease is present (Figure 1) [26-28]. Therefore, this article summarizes situations that PCPs encounter during screening tests according to the concept of QP, and suggests measures to face such situations.

### Situations Encountered by Primary Care Physicians and Changes in Prevention Levels

Jamouille and Roland [27] introduced four levels of prevention corresponding to different types of interactions between medical service consumers and providers, centered on the lifelong timeline from birth to death. Whereas the prevention levels of Leavell and Clark were proposed according to the natural history of diseases with particularly syphilis natural story [24], the prevention levels articulated by Jamouille and Roland are based on the relationships between patients and providers and emphasize variations across the life cycle of consumers [29] (Figure 1, Table 1). In particular, the fourth level of QP occurs when a PCP decides that no disease is present although the patient feels ill [26-28]. The introduction of this fourth level corresponded very well with real-world develop-



**Figure 1.** Fuzzy limits in provider (disease) vs. patient (illness) situations. The arrow indicates nebulous and non-clear-cut scenarios in lifetime.

**Table 1.** Differential aspects of prevention levels between Leavell and Clark [23] vs. Jamouille and Roland [27]

Aspects	Leavell and Clark	Jamouille and Roland
Based on	Natural history of a target disease	Lifelong timeline
Diseases that fit the model well	(Infectious) diseases	Ongoing illness
Shape of paradigm	Epidemic triangle	Circular wheel
Mechanism	Host-agent-environment equilibrium	Gene-socio-environmental interactions
Underlying condition	Behaviors or habits	Susceptible genes, culture, or resources
Main targets	Infectious organisms	Modifiable lifestyles, self-care, and health beliefs
Related environments	Socioeconomic status, occupational conditions	Socioeconomic status, occupational conditions, medical insurance, healthcare delivery system

ments towards the control of overmedicalization [29]. Moreover, as shown in Figure 1, the boundary between the presence and absence of disease are fuzzy, and the accuracy of such boundaries is subject to discussion. In other words, vagueness is the rule in health care [30] because the illness behavior of patients is conditioned by health beliefs [31], and boundaries between disease and illness are not always clear [32], particularly in mental health [33]. Thus, prevention levels may vary according to the treatment offered by providers, the demands for medical services by consumers, and variations across the life course, even for the same consumer.

In order to understand how prevention levels change according to consumers' situations and their timelines, scenarios that PCPs may encounter during screening for breast cancer are listed in Table 2. Since a human being begins life from birth, the first level is the primary level, which includes genetic factors. The level of prevention varies widely according to the purposes of patients' visits and the potential for several concurrent medical conditions to be present within one person [34] as multi-morbidity is increasingly the norm in the management of chronic diseases in general practice [35].

### Primary Care Physicians' Action Plans According to Screening Results

Despite serious doubts about the accuracy and efficiency of screening [10], and some confusion about the recommendations [36,37], cancers including breast, uterine cervix, colon,

and stomach are regularly screened for in the normal-risk population, according to cancer screening guidelines [38]. How a PCP should interpret and manage screening results according to the prevention level of screenees is organized in Table 3.

Preferentially, screening test results are divided into true or false, as determined by the provider who decides the prevention level of the consumer [39]. If the results come out as true positive (TP) or true negative (TN) and the consumer accepts the decision of the provider (TP1, TN1), medical judgements and shared decision-making are not hard. However, when the decisions made by the provider and the patient are different [40], even if the results come out as true negative (TN2), the patient-doctor relationship may encounter difficulties [41]. Therefore, while implementing efforts to prevent overtreatment and informing consumers of the possibility of screening errors, PCPs should try to establish and maintain trust.

For false positive (FP) and false negative (FN) results, when the consumer and provider agree on the results (TP1, FN1), they should make efforts towards "sharing decision-making" [42]. However, in situations when they decide differently (TP2, FN2), the patient-doctor relationship is likely to encounter difficulties [17]. In the case of FN2, PCPs consider to shorten screening intervals. In the case of TN2, PCPs should make their best efforts to prevent overdiagnosis and overtreatment with unnecessary screening tests [43]. In particular, stopping the screening process may be an important decision for many older adults [44].

**Table 2.** Some hypothetical scenarios experienced by a primary care physician (PCP) regarding a screening mammography (SM) and the shifting levels of prevention suggested by Jamouille and Roland [27]

Types <sup>1</sup>	Hypothetical scenarios	Shifting levels of activities	Hypothetical next paths
1 <sup>2</sup>	A prompt treatment for a painful breast mass	III -> III	-> I, III, or death
2 <sup>3</sup>	Prompt management of a mass found by the SM as recommended by the PCP	I -> II -> III	-> I, III, or death
3 <sup>4</sup>	Reassurance with watchful waiting and avoiding overtreatment of a benign lesion found by the SM as recommended by the PCP	I -> II -> IV	-> I
4 <sup>5</sup>	Prompt treatment of an evidently dangerous mass found by chance	I -> II -> III	-> I, III, or death
5 <sup>6</sup>	Valid evaluation for a palpable mass found by chance, such as an incidentaloma	II -> IV	-> I, III, or death

<sup>1</sup>Complexity arises from the interaction of doctor and patient knowledge in different situations; In each case, poor communication skills, inattention, and/or lack of process control could make the patient remain in category IV; that is, insecure and worried.

<sup>2</sup>The patient knows he/she has a problem (III) and the doctor accepts and provides care for it (III); The problem resolves (I), remains chronic (III), or the patient dies.

<sup>3</sup>The patient is asymptomatic and healthy (I), and undergoes screening (II); The doctor finds and provides care for a disease (III); The patient recovers (I), the problem remains chronic (III), or the patient dies.

<sup>4</sup>The patient is asymptomatic and healthy (I), and undergoes screening (II); The problem found is benign and the problem resolves (I), or the patient does not believe it has resolved and remains sick or worried (IV); Reassurance and good communication allow the patient to feel healthy (I).

<sup>5</sup>The patient is asymptomatic and healthy (I), and undergoes screening (II); Early diagnosis is made by chance (II); the doctor finds and provides care for a disease (III); The patient recovers (I), the problem remains chronic (III), or the patient dies.

<sup>6</sup>The patient has an ongoing health problem (III); The doctor unexpectedly finds a new problem unknown to the patient; that is, an incidentaloma (II) that induces anxiety in the patient (IV); Either the problem was in fact trivial and after explanation the patient does not worry anymore (I), or the patient becomes severely ill and is cared for (III); The patient recovers (I), the problem remains chronic (III), or the patient dies.

**Table 3.** Action plans for primary care physicians (PCPs) according to the result of a screening or diagnostic test by levels of prevention

Level	Consumer	Provider	Positive result of a screening test		Negative result of a screening test	
			Inter-pretation	Action plan of the PCP	Inter-pretation	Action plan of the PCP
I	Feel well	Rule out no illness	FP1	Delivery of bad news Explanation of the limits of medicine Shared decision-making process for the next steps Partnership in the management of the disease	TN1	Explain the concept of negative results as well as false negatives and the uncertainty of the doctor Explain how to remain healthy
II	Feel well	Rule out illness	TP2	Delivery of bad news in a different relationship with the patient Sharing the limits of screening test Conducting tests for the final diagnosis	FN2	Discuss the limit of screening test Encourage and monitor regular screening tests if appropriate Repeat the screening within the next interval if appropriate
III	Feel ill	Rule out disease	TP1	Patient and doctor agree on the disease discovered Providing proper treatment	FN1	Conduct new tests for the final diagnosis Prevent and identify adverse events If the test is negative, no treatment actions are necessary If further testing is useless, introduce palliative care
IV	Feel ill	Rule out no disease	FP2	Sharing the limits of the test asked under pressure of the patient Discussing further testing while protecting against overscreening	TN2	Empowering with protection against over-treatment In-depth communication about the subjective feeling of illness Explain doctors' ignorance regarding inexplicable human suffering Be careful about false negatives (missed diagnosis) Master your own anxiety, the following standard guidelines about emotionally demanding patients Use time and trust to maintain a healthy doctor-patient relationship

FP, false positive; TN, true negative; TP, true positive; FN, false negative; 1, situation that patient and doctor agree; 2, situation that patient and doctor disagree.

## CONCLUSION AND SUGGESTION

The previous discussion has summarized how the prevention levels proposed by Jamouille and Roland may vary according to the demands of consumers, using the example of screening tests for cancer. Additionally, suggestions have been made for how PCPs should interpret and manage screening test results.

This simplification of the process improves PCPs' insights into screening tests for preventing chronic diseases. It also underscores the depth of the complexity that PCPs must deal with [40], as well as the necessity of training future PCPs in communication skills and appropriate shared decision-making [45].

This framework also contributes to improvements in the doctor-patient relationship by facilitating the consumer's understanding of medical uncertainty [45]. In addition, establishing proper strategies for screening tests that are carried out in primary care contexts through the implementation of QP is

supportive of population-health approaches [46].

Nonetheless, immediately prior to the final diagnosis of a disease, providers should avoid binary constraints in shared decision-making, even if consumers demand a more certain decision. Instead, PCPs should provide accurate information on the characteristics of NCDs and the advantages and disadvantages of screening tests using decision aids [18,46,47].

Currently, the concept of screening tests has moved away from the terms of compliance and adherence and toward the concept of cooperation and participation or empowerment, which refers to how consumers understand suggested screening tests and make decisions based on their values [48]. Therefore, it is increasingly suggested that screening tests should be customized to fit individual characteristics instead of being based on guidelines [19,20].

As indicated by the fact that the epidemic of thyroid cancer in South Korea resulted from unnecessary screening [49],

screening tests should not be done in some circumstances [39]. Further studies based on the concept of prevention levels proposed by Jamouille and Roland are required to develop strategies to prevent NCDs, including cancers. In addition, expanded studies on developing strategies for patients with multiple morbidities in primary care clinics are necessary.

## CONFLICT OF INTEREST

The authors have no conflicts of interest with associated the material presented in this paper.

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