Φυσική ιστορία της νόσου, επίπεδα πρόληψης, πληθυσμιακή στρατηγική και στρατηγική υψηλού κινδύνου

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ΙΑΤΡΟΣ ΔΗΜΟΣΙΑΣ ΥΓΕΙΑΣ ΚΑΙ ΚΟΙΝΩΝΙΚΗΣ ΙΑΤΡΙΚΗΣ
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ΠΑΝΕΠΙΣΤΗΜΙΟ ΠΑΤΡΩΝ

Natural History of Disease, Levels of Prevention, Population Strategy and High-Risk Strategy

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From Risk to Prevention

The Natural History of Disease and Modern Prevention Strategies

Why Prevention Matters

The patient in front of you is only one part of the prevention problem

Clinical prevention + population prevention

Learning Outcomes

- Map interventions onto the natural history of disease
- Distinguish prevention levels by timing, target and purpose
- Compare high-risk and population strategies
- Explain the prevention paradox
- Design complementary clinical and population actions

Opening Case • Before Disease?

52-year-old man • asymptomatic

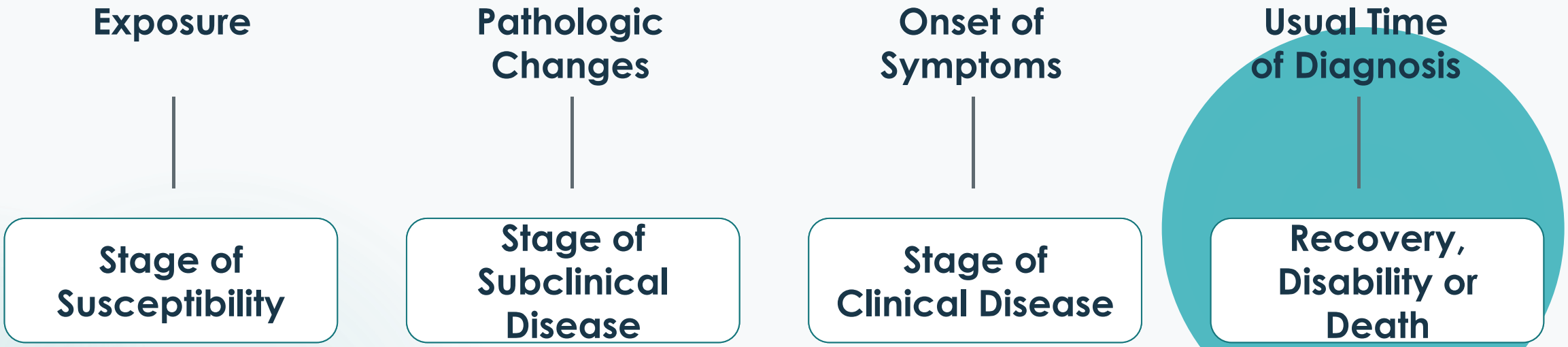
BP 146/92 mmHg • BMI 31 kg/m²

Smokes 15 cigarettes/day

No known cardiovascular disease

Where, exactly, does prevention begin?

Natural History of Disease



Natural history = progression of disease over time in the absence of treatment

Adapted from CDC. Principles of Epidemiology in Public Health Practice, 3rd ed., Fig. 1.18.

The Clinical Horizon

Biological change may precede symptoms and usual diagnosis

The clinical horizon is disease-specific

Where Can Prevention Intervene?

PRIMORDIAL
risk emergence

PRIMARY
disease onset

SECONDARY
early disease

TERTIARY
complications

QUATERNARY PREVENTION • cross-cutting protection from unnecessary / harmful medical intervention

Prevention taxonomy synthesised from preventive-medicine literature; quaternary framing informed by Martins et al., Eur J Gen Pract. 2018.

Prevention Levels • A Teaching Framework

Taxonomies vary across frameworks

Focus on timing • target • intended outcome

Primordial Prevention

Before conventional risk factors become established

Target conditions that generate risk

Often policy, systems or environmental action

Primary Prevention

Before disease onset

Aim: reduce incidence

Vaccination and effective reduction of causal exposures

Secondary Prevention

Selected asymptomatic or early disease

Aim: earlier effective intervention

Screening is useful only when the full pathway produces net benefit

Tertiary Prevention

Established disease

Prevent complications, recurrence and disability

Disease control and rehabilitation remain prevention

Quaternary Prevention

PREVENTIVE TECHNOLOGY

Test • diagnosis • treatment

EVIDENCE

Benefits • harms • uncertainty

PERSON

Values • preferences • context

GOOD PREVENTIVE PRACTICE → less iatrogenic prevention

Conceptual synthesis informed by Tesser et al. A conceptual framework for good preventive practices. Cad Saude Publica. 2024; DOI:10.1590/0102-311XPT068123.

One Disease • Multiple Opportunities

Cardiovascular disease as a worked example

Primordial → Primary → Secondary → Tertiary

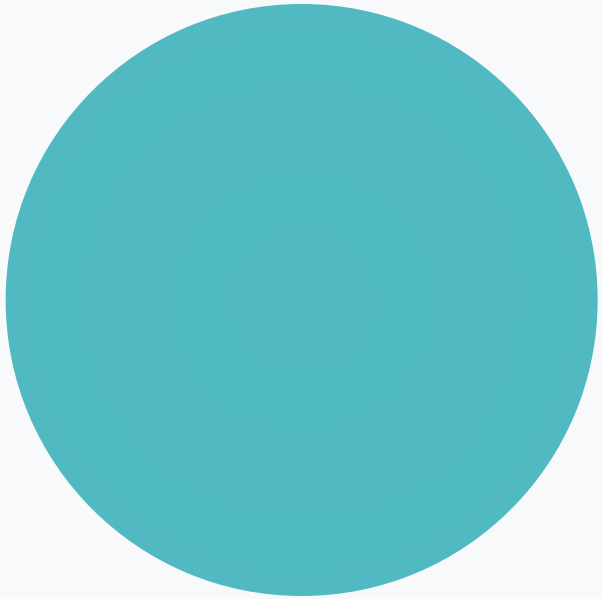
Quaternary lens across all stages

Retrieval Check

RETRIEVAL CHECK

Classify:

- **Smoke-free law**
- **HPV vaccination**
- **Cancer screening**
- **Cardiac rehabilitation**
- **Unnecessary imaging**



From Individual Risk to Population Burden

Few people × very high risk

versus

Many people × moderate risk

Where do most cases arise?

The High-Risk Strategy

Identify individuals with elevated absolute risk

Offer targeted preventive intervention

Familiar to clinical medicine

Strengths of the High-Risk Approach

Greater expected benefit per selected person

Personalised decisions and shared decision-making

Useful when risk is concentrated in an identifiable minority

Limits of the High-Risk Approach

Why targeting only the highest-risk group can miss population burden



Risk threshold = decision boundary, not a biological discontinuity

Conceptual adaptation of Geoffrey Rose's high-risk vs population strategy.

The Population Strategy

Population strategy in contemporary practice

TOBACCO control

ALCOHOL policy

HEALTHY DIET

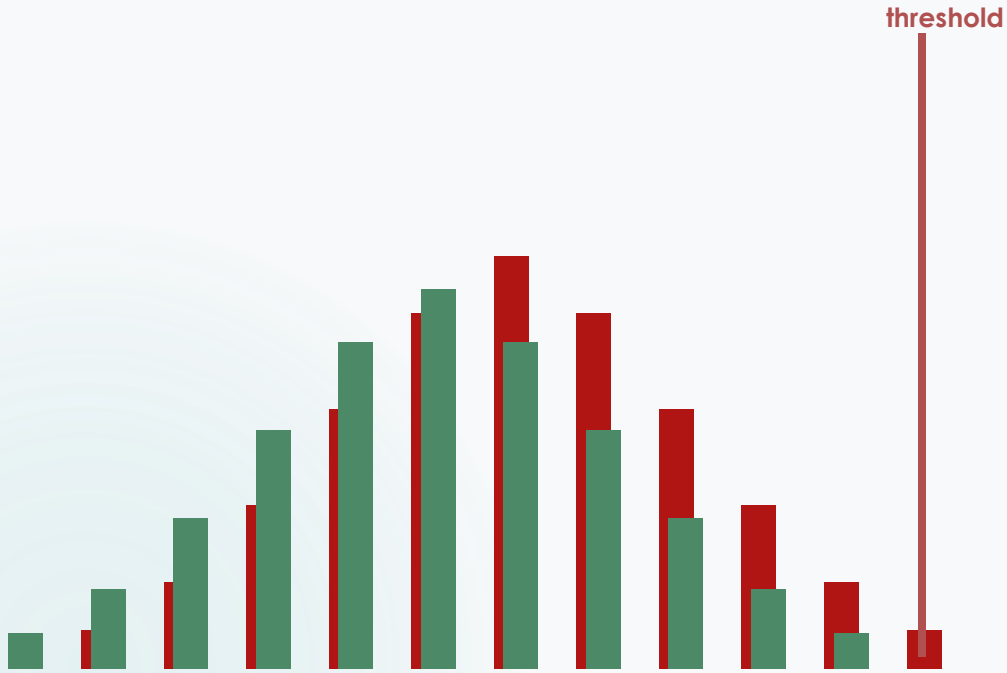
PHYSICAL ACTIVITY

Policy + systems + environments can shift exposure across an entire population

Source framework: WHO. Tackling NCDs: Best Buys and other recommended interventions. 2nd ed. 2024 (CC BY-NC-SA 3.0 IGO).

Shifting the Risk Distribution

A small shift in the whole distribution can change the number above a high-risk threshold



BEFORE → AFTER

modest mean shift

fewer people above threshold

Teaching figure adapted from Geoffrey Rose's population strategy; schematic, not empirical data.

Who Benefits?

A population measure can create a large total health gain

while the absolute benefit to each of many individuals is small

The Prevention Paradox

POPULATION

LARGE
TOTAL BENEFIT

INDIVIDUAL

SMALL
ABSOLUTE BENEFIT
FOR MANY

THE PREVENTION PARADOX

Conceptual framework: Geoffrey Rose. The Strategy of Preventive Medicine. Oxford University Press.

High-Risk vs Population Strategy

	HIGH-RISK	POPULATION
Target	Selected high-risk individuals	Whole population / broad groups
Intensity	Higher per selected person	Lower/modest per person, broad reach
Mechanism	Risk identification + targeted action	Shift exposure / risk distribution
Key limitation	Misses cases outside selected group	Small individual benefit; equity/acceptability matter

Synthesis based on Geoffrey Rose; contemporary interpretation informed by preventive-medicine literature.

Do We Have to Choose?

POPULATION

Lower baseline exposure
Broad reach
Structural action

HIGH-RISK

Greater intensity
Absolute-risk targeting
Clinical follow-up

EQUITY LENS • Who is reached? Who benefits? Who may be left behind?

Combined-strategy interpretation: Rose framework + contemporary equity considerations.

Case Challenge • Two Levels

Return to the 52-year-old patient

(BP 146/92 mmHg • BMI 31 kg/m², Smokes 15 cigarettes/day, No known cardiovascular disease)

Name one high-risk clinical action

Name one population action addressing the same risk

Which could shift the population distribution?

Downstream → Midstream → Upstream

UPSTREAM

conditions generating risk

MIDSTREAM

individual risk

DOWNSTREAM

disease & complications

Strong prevention systems connect all three levels

Teaching synthesis linking population and clinical prevention; not an empirical figure.

What Should the Future Doctor Do?

- Recognise preventive opportunities across the disease course
- Use absolute risk without reducing the patient to a score
- Recommend interventions with favourable benefit–harm balance
- Recognise when population action is necessary
- Connect clinical practice with public health

Retrieval • Five Messages

Prevention spans the disease continuum

Levels describe timing and purpose

High-risk strategies target susceptible individuals

Population strategies shift risk distributions

Modern prevention usually combines both perspectives

Key References

CDC. Principles of Epidemiology in Public Health Practice, 3rd ed. Natural History and Spectrum of Disease.

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