

The modern scientific physician: 6. The useful property of a screening regimen

Olli S. Miettinen

The modern scientific physician faces challenges in conceptualizing the desired, useful properties of diagnostics and interventions, especially as to what measures of the respective useful properties (s)he rationally is to deploy in practice. But (s)he is, at least, quite clear on what diagnostics and interventions are — if escaping the confusion that the advent of multidisciplinary ‘technology assessment,’ ‘outcomes research’ and ‘cost-effectiveness analysis’ has tended to cause.

As for screening, by contrast, (s)he may be quite confused about the very *concept* of this already. Is it application of an initial diagnostic directed to a particular illness in the absence of any overt manifestations suggestive of that illness, and thus the pursuit of very uncertain, most tentative ‘rule-in’ diagnosis of latent illness by this means? the pursuit of the definitive-diagnosis counterpart of this — of early rule-in diagnosis in this ‘conclusive’ sense? or the pursuit of early diagnosis of the latter type coupled with early intervention? Or, is screening in itself an intervention, as it is now commonplace to claim? Regardless, is screening a clinical as well as a community-medicine concept, or one of community medicine only?

In a situation like this, medical dictionaries are supposed to supply the answer — of the form of genuine definitions,

and with content founded on knowledge and learned reasoning. One eminent dictionary has it that screening is “examination or testing of a group of individuals to separate those who are well from those who have an undiagnosed disease or defect or who are at high risk.”¹ According to another, it is “examination of a group of usually asymptomatic individuals to detect those with a high probability of having a given disease, typically by means of an inexpensive test.”² Appalled, as usual, at the form of definitions in medical dictionaries, the scientific physician nevertheless gleans some substance: by one of these definitions screening appears to be deployment of an initial diagnostic, pursuit of definitive rule-in diagnosis by the other; by only one of these definitions is it inherently directed to persons in whom the targeted illness, if present, remains latent; by neither definition is it an intervention, nor is intervention involved; and it appears to be solely a community-medicine (“group”-medicine) concept by both definitions. Confusion thus is manifest in medical dictionaries also, even if unadmitted.

Thinking about the concept of screening critically, the scientific physician notes, for orientation, the usual context of clinical diagnosis: the presence of an illness-manifestational ‘complaint.’ And while it is clear to him/her that

screening is, in the main at least, a diagnosis-related concept, it is equally clear that its diagnosis-related referent is not this situation — one in which it is *a priori* clear that some illness is present, so that the diagnostic challenge is differential-diagnostic.

Thus, diagnosis-related “screening” (s)he understands to refer to the situation in which there is *only nonmanifestational prompting* for the pursuit of diagnosis. With this type of prompting there is *a priori* concern for the possible presence of a particular single illness or a particular set of illnesses, the latter of *nondifferential*, mutually independent concern (to ‘rule in,’ for early intervention, before overt manifestations; or to ‘rule out,’ for occupational or insurance purposes, for example). (S)he notes also that in the general domain of no overt manifestations prompting the pursuit of diagnosis, there can be prognostic concern to screen — to assess the person’s status as to a latent indicator of the risk of contracting a particular illness in the future.

As for diagnosis-related screening, (s)he naturally focuses more specifically on that in which the concern is to achieve *rule-in diagnosis of latent illness* — early diagnosis in this meaning — with a view to early intervention. In this context the diagnostic process — the application of the *screening regimen* — quite naturally begins with an initial diagnostic test (in principle possibly a set of tests, physical and/or laboratory). This diagnostic is deployed with the express idea that if its result is negative (as defined for the purpose), then the pursuit of early diagnosis of the illness stops; and if positive, then the work-up toward rule-in diagnosis continues — with further stopping points possible in the regimen, and with ‘diagnosis’ (rule-in diagnosis) of the illness the final alternative possibility.

Given that the use of the initial diagnostic is but the first element in the clinical regimen aimed at early diagnosis, the proper *clinical concept* of screening naturally is that of pursuing early diagnosis, that is, rule-in diagnosis of a targeted illness when it still is latent, before it becomes patent. As only the initial diagnostic normally can be applied on the community level, it is natural for the *community-medicine concept* to be restricted to the use of the initial diagnostic — meaningless without the rest of the clinical regimen available by referral.

As for the properties of an early-diagnosis regimen (whether internal to clinical medicine or involving community-level application of the initial diagnostic), the *useful property* is implicit in the very aim of the process, just as are its counterparts in the respective contexts of diagnostics and interventions. The regimen’s intention-related performance — usefulness — is quantitatively a matter of the resulting ‘*diagnostic shift*’: how much earlier are the rule-in diagnoses achieved under the regimen (whether due to the regimen or as interim, symptom-prompted diagnoses in repetitive screening), relative to no screening. This is a matter of the diagnosed cases’ distribution according to indicators such as stage and stage-conditional tumour size in cancer screening, in comparison with the corresponding distribution in the absence of screening.

For the thus-quantified useful property, the counterpart

of a diagnostic’s informativeness and an intervention’s effectiveness, no term very naturally suggests itself. The regimen is supposed to lead, potentially, to the detection of latent illness, to be potentially ‘detective’ of it. So, perhaps the term for the regimen’s useful property is “*detectiveness*.” A diagnostic, it may be noted, is not generally supposed to provide for potential detection of an illness; it is detective only insofar as it can produce a pathognomonic result, highly specific for the presence of the targeted illness. (As for a result that is highly specific to the absence of the illness at issue, might a suitable term for this be “*eugnomonic*”?)

The *utility* of the attained diagnostic shift is prone to depend on the cases’ distribution according to other prognostic indicators as well. The critical questions in this context, specific to subtypes of the diagnosed cases, concern the diagnosed cases’ significance in terms of their future course with, and also without, the aimed-for early intervention.³ The screening-associated diagnostic shift together with the appropriate significance parameters imply the effectiveness gain from screening-associated early interventions, relative to interventions (late) in the context of no screening.^{4,5}

Just as there now prevails the medically — and logically — alien idea that application of a diagnostic in ordinary diagnosis is an intervention, so there is, even more eminently, the idea that screening is an intervention, in cancer screening taken to have the useful property of having effectiveness in reducing ‘mortality’ — quite arbitrarily defined⁶ — from the cancer. From this conceptualization of screening, when accepted, flows the research-methodologic idea that randomized controlled trials constitute the most valid means to address the intended effect. The concept is, again, seriously malformed, and so is, of course, the research outlook that flows from this;^{4,5} and the practitioner is understandably confused.⁶ Concepts do matter, and malformed concepts mislead!

Dr. Miettinen is with the Department of Epidemiology and Biostatistics and the Department of Medicine, Faculty of Medicine, McGill University, Montreal, Que., and also with the Department of Medicine, Weill Medical College, Cornell University, New York, NY.

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Correspondence to: Dr. Olli S. Miettinen, Department of Epidemiology and Biostatistics, Faculty of Medicine, McGill University, 1020 Pine Ave. West, Montreal QC H3A 1A2; fax 514 398-4503; olli.miettinen@mcgill.ca