Field of dreams

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In W.P. Kinsella's *Field of Dreams*, a mysterious voice tells Iowa farmer Ray Kinsella to "Build it and he will come." Ray interprets this as a command to build a baseball diamond in his cornfield, believing that if he does, Shoeless Joe Jackson and the 1919 Chicago White Sox will appear to play. After a superficial economic evaluation, Ray ploughs up several acres of farmland and diverts his energy into baiting ghosts. By anyone's reckoning, it's a questionable resource utilization decision. I suspect that, if Ray had been a physician, he would have built a chest pain unit.

Don't get me wrong. Chest pain units (CPUs) are a great concept. High-risk patients with unstable angina or myocardial infarction should go directly to inpatient beds, but patients lacking clear indications for admission pose a huge diagnostic dilemma for emergency physicians. Now, rather than agonizing over them, we can plug them into a CPU for an intensive 9- to 12-hour evaluation involving serial ECGs and marker assays, continuous ST segment monitoring, echocardiography, stress testing, and radionuclide scans. Physicians like this approach. It eliminates the need to use judgement and it reduces medicolegal angst.

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Build it and they will come. The concept worked in Ray's cornfield and it's working for us — but it's working too well! When your tool is a hammer, everything looks like a nail, and when your tool is a CPU, everything looks like an acute coronary syndrome. Across North America, CPUs are applying a stunning array of tests indiscriminately to all comers. This approach is comforting for physicians but it is fatally flawed; it disregards the principle that different patients require different testing strategies based on their pre-test likelihood of disease. While it's true that unbridled testing may enhance sensitivity, at the same time it reduces specificity, and when imperfect tests are used to screen very low risk patients, most of the resulting positive tests are actually false positives.

To illustrate, let's view the CPU as a diagnostic test that is 99% sensitive and 90% specific (actual parameters unknown and probably variable between centres). If we evaluate 10,000 patients — 5% who have disease — the CPU is an excellent negative predictor, with only 5 "false negative" work-ups (Table 1). Unfortunately, it is a poor positive predictor, and most (950) of the 1445 positive work-ups will be falsely positive. If, like some real world CPUs, we evaluate populations with lower prevalence of disease (e.g., 2%), then even more of the positives will be false positives. This is a problem because false positive tests lead to invasive diagnostic and therapeutic cascades that can only cause harm — only harm because the patients, by definition, do not have the disease we are testing for.

Table 1. Performance of a hypothetical CPU with sensitivity 99%, specificity 90% and disease prevalence (pre-test likelihood) 5%

	Disease	No disease	Total
Positive test	495	950	1445
Negative test	5	8550	8555
Total	500	9500	10000

Cost is also an important issue. Most authors conclude that, because CPU evaluation is cheaper than coronary care unit (CCU) admission, CPUs are cost-effective. This logic works if the standard practice is to admit all low risk patients to a CCU, but it may not work in Canada, where low risk patients are likely to be discharged from the ED after limited investigation. In Canada, widespread adoption of a "CPU approach" would likely lead to higher costs and longer ED times. This is acceptable if it translates into improved patient outcomes, but there's no good evidence that it does.

I've wanted a CPU for a long time and I still do. Chest pain units, used judiciously for selected patients, could be an important advance in emergency care. But if we think we can just build a unit, run everyone with chest pain through it, and see tangible benefits, then we're dreaming.

Hey! Guys! Get off that field!

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