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Preference-Based Assessments

Willingness to Pay for Diagnostic Technologies: A Review of the Contingent Valuation Literature

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ABSTRACT

Objectives: To understand how people value information from diagnostic technologies, we reviewed and analyzed published willingness-to-pay (WTP) studies on the topic. **Methods:** We searched PubMed for English-language articles related to WTP for diagnostic laboratory tests published from 1985 through 2011. We characterized methodological differences across studies, examined individual- and technology-level factors associated with WTP, and summarized median WTP values across different diagnostic tests. **Results:** We identified 66 relevant WTP studies. Half focused on oncology, while others analyzed infectious diseases (n = 11, 16.1%) and obstetric or gynecological conditions (n = 8, 11.7%), among others. Most laboratory tests included in studies were biological samples/genetic testing (n = 44, 61.1%) or imaging tests (n = 23, 31.9%). Approximately one third of the analyses (n = 20, 30.3%) used discrete-choice questions to elicit WTP values. Higher income, education, disease severity, perceived disease risk, family history, and more accurate tests were in general associated with higher WTP values for diagnostic information. Of the 44 studies with median WTP values available, most reported a median WTP value below $100. The median WTP value for colon or colorectal cancer screening ranged from below $100 to over $1000. **Conclusions:** The contingent valuation literature in diagnostics has grown rapidly, and suggests that many respondents place considerable value on diagnostic information. There exists, however, great variation in studies with respect to the type of technologies and diseases assessed, respondent characteristics, and study methodology. The perceived value of diagnostic technologies is also influenced by the study design and elicitation methods.

Keywords: contingent valuation, diagnostics, review, willingness to pay.

Introduction

Predictive testing, one of the fastest growing areas of health care, has been shown to be one of several important drivers of health cost increases in the United States [1,2]. In moving toward cost-conscious care, the value of screening and diagnostic tests has been central to policy discussions [3]. Many studies have examined the value of test information by using a conventional cost-effectiveness framework [4]. Under this framework, information from diagnostics is typically valued exclusively for its ability to improve medical decision making and subsequent outcomes. In practice, however, patients may value information from a diagnostic test whether or not the information effects treatment change [5,6]. For example, test information may reduce uncertainty and provide reassurance, assist in life-planning decisions, and benefit future treatment decisions among the patient's family.

Contingent valuation, a standard economic measure of willingness to pay (WTP) for health interventions, offers researchers flexibility to investigate how people value a wide range of health benefits. WTP for a specified health improvement is defined as the maximum amount of money an individual could pay for the health improvement and still consider himself or herself better off [7]. WTP valuation can be used in cost-benefit analysis by estimating the cost of the intervention against the WTP values of the indicated improvement [8,9]. Those instances in which the WTP value is greater than the cost of the invention provide evidence of consumer surplus [10]. Observers in the field have identified challenges in measuring and using WTP values, including framing effects and ethical objections to asking people directly to value health improvements. Still, the WTP literature in health care has grown over the past few decades, with applications to different disease areas, treatment modalities, and survey methods [9,11–15].

In particular, the applications of WTP estimation have emerged for diagnostic testing. Our review examines the perceived value of test information beyond the conventional

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cost-effectiveness framework, focusing on the direction and magnitude of preferences reported in WTP analyses. We also investigate the methods used to capture preferences and examine methodological differences across studies to better understand discrepancies in WTP values. Our goal was to understand how people may value diagnostic tests and how the WTP value varies with individual factors (e.g., age, income, and disease history) and test characteristics (e.g., accuracy). Finally, we discuss how this information can be used to help capture more completely the value of diagnostic technologies, and the implications for clinical and policy decisions.

Methods

We searched for studies using the PubMed database in January 2012 by inputting the following terms: (willingness to pay OR contingent valuation) AND diagnostic (n = 500) (Fig. 1). All English-language articles published from 1985 through 2011 were eligible for screening (n = 486). We screened all articles' titles and abstracts for potential inclusion. We then obtained and reviewed the citation list of those articles considered for potential inclusion to ensure completeness of the PubMed search. Of these 486 abstracts, we excluded 368 studies that were cost-effectiveness analyses/cost-utility analyses/cost-benefit analyses (n = 191), did not assess a diagnostic technology (n = 96), did not report any WTP value (n = 42), were reviews, editorials, or methods (n = 30), or were not eligible for other reasons (e.g., comprised only study protocols) (n = 9). Finally, we obtained the full text of the identified publications (n = 118) and manually screened the text to select studies that reported an original WTP estimate for a diagnostic technology. After review of the full text, an additional 52 articles were excluded, leaving a final sample of 66 studies.

Each WTP article was abstracted by using a standard data auditing form, which contained three major sections: 1) methodology (e.g., publication information, intervention, type of diagnostic, disease classification, sample, mode of administration, and elicitation methods); 2) median/mean WTP values; and 3) factors associated with the WTP estimate. We first characterized methodological differences across studies. Then, we examined individual- and diagnostic-level factors associated with WTP. Finally, we summarized WTP values across different diagnostic technologies on the basis of studies that reported median values.

We also examined whether the WTP studies used one of four commonly used elicitation methods: 1) discrete-choice questions, 2) bidding game, 3) payment card, and 4) open-ended questions. Discrete-choice questions (also referred to as close-ended, dichotomous-choice, or binary questions) present respondents with a WTP value, which they either accept or reject, often followed by additional follow-up discrete-choice questions to identify a distribution of WTP values. A bidding game presents respondents with an initial amount, which they may either accept or reject and then bid up, or down, in defined increments until their maximum WTP values are reached. By asking a series of questions with yes/no bids, the bidding game method may be considered an iterative version of the discrete-choice method. In contrast to the iterative nature of the bidding game method, the payment card method presents simultaneously a range of bids and asks respondents to circle the amount representing the most they would be willing to pay. Finally, in an open-ended questionnaire, respondents are asked directly for their maximum WTP value, without presenting respondents any possible values.

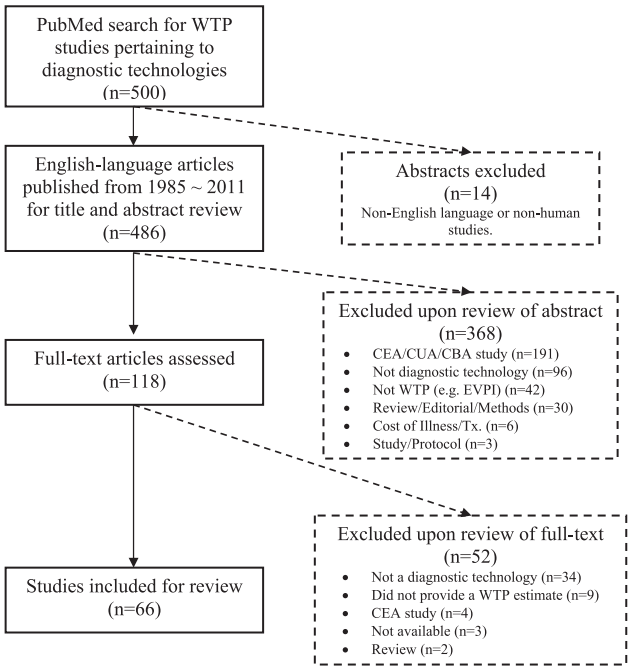

Fig. 1 – Flowchart of the systematic review process.

Results

The number of published WTP studies pertaining to diagnostic tests has grown rapidly over time, increasing from 3 published from 1985 to 1993 to 23 from 2006 to2011 (Table 1). Half of diagnostic WTP studies have focused on oncology, 16.1% pertained to infectious diseases, and 11.7% focused on obstetric or gynecological conditions. Most laboratory tests were biological samples (e.g., blood, tissue, and urine)/genetic testing (n = 44, 62.0%) or imaging (n = 23, 31.0%). Biological samples and/or genetic tests were especially well represented among WTP studies pertaining to oncology, infectious disease, obstetrics-gynecology, and neurology (Table 2). Furthermore, imaging tests were frequently used in oncology and obstetrics/gynecology studies, but not for infectious disease or endocrinology.

Methodological Differences in WTP Valuation

Mode of administration

Table 1 summarizes methodological differences across the 66 WTP studies. The most common mode of administration was self-administered questionnaires (36.4%), followed by Web-based instruments (15.2%), in-person interviews (13.7%), telephone surveys (13.6%), and mail surveys (7.6%).

Elicitation methods

Approximately one third (30.3%) of the studies used discrete-choice questions, followed by payment cards (15.2%), bidding games (13.6%), and open-ended questions (10.6%) (Table 1). Other studies used more than one contingent valuation method in the elicitation process [6,16–20] or compared WTP values derived from different approaches [21–26].

Survey respondent and sample size

Most studies used a sample of patients or at-risk populations (49.3%), or respondents from the general population (34.5%) (Table 1). Parents served as proxy respondents for children for WTP elicitations if children were the subjects of the diagnostic test [8,27–29]. Other studies compared WTP responses from different sample populations, such as patients, physicians, managed care organization executives, or the general public [30–34].