Medicare’s demonstration of competitive bidding for clinical laboratory services: what it means for clinical laboratories

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The purpose of Medicare’s Demonstration of Competitive Bidding for Clinical Laboratory Services is to determine whether competitive bidding can be used to provide quality laboratory services at prices below current Medicare reimbursement rates. Here, we present key features of the preliminary design for the demonstration. The following areas are covered: scope of the demonstration, bidding process, selection of winners, reimbursement, quality, and administration and monitoring. The role of the Health Care Financing Administration’s Laboratory Technical Advisory Committee is also described, and the future of competitive bidding in a Medicare managed care environment is evaluated. We close with some brief comments on how to succeed in competitive bidding for Medicare services.

During the past 2 years, Research Triangle Institute (RTI),3 under contract from the Health Care Financing Administration (HCFA), has conducted developmental work for a demonstration project that would use competitive bidding to set fees for Medicare Part B clinical laboratory services. This work has included research on the current state of the clinical laboratory industry (1) and development of a design plan (2) for the demonstration, which is known as the Demonstration of Competitive Bidding for Clinical Laboratory Services. Because competitive bidding has not previously been used to set Medicare fees for clinical laboratory services, clinical laboratories are naturally interested in how the demonstration would work. Here, we briefly describe the preliminary plan for the demonstration, which RTI prepared for HCFA.

The preliminary nature of the plan should be emphasized. The plan has been presented to HCFA, but HCFA has made no final decisions on when the demonstration will take place, where the demonstration will be located, or whether the final design of the demonstration will be revised. Some of the plan’s features discussed below—such as the partial exclusion of hospital outpatient tests, the number and nature of quality indicators, and the number of demonstration tests—may be subject to modification as HCFA refines the plan in preparation for implementation. Moreover, the plan was developed before passage of the Balanced Budget Act of 1997 (BBA 97 (3)), which contains a number of provisions regarding Medicare competitive bidding demonstration projects. These provisions will undoubtedly supersede some of the recommendations in the preliminary plan. We present the plan with its original recommendations. Where appropriate, we discuss probable changes to the plan necessitated by BBA 97.

HCFA is currently analyzing how the design of the demonstration project needs to be modified in response to BBA 97. Therefore, although the competitive bidding demonstration project appears to be a priority at HCFA, it is too early to know when the demonstration will be implemented.

Although the plan is preliminary, we believe that it is still a useful document for laboratories interested in competitive bidding for Medicare clinical laboratory services. The plan attempts to address the key issues of scope, participation, fee determination, and quality that have concerned many laboratories since competitive bidding for Medicare laboratory tests was first proposed. In addition, we believe that many of the features of the design are likely to be included in the final demonstration plan with relatively little revision.
Purpose and Context of the Demonstration

The purpose of the demonstration is to determine whether competitive bidding can be used to provide quality laboratory services at prices below current Medicare Part B reimbursement rates. The bidding will result in a new fee schedule for selected laboratory procedures in the demonstration area. Medicare currently uses an administered fee schedule for Part B clinical laboratory services that is based on laboratory fees that were in effect in the early 1980s. Although the fee schedule has occasionally been reduced for budgetary reasons, there is no guarantee that the current fee schedule bears any resemblance to the current underlying costs of different types of laboratory procedures. Competitive bidding is a potential mechanism to harness market forces so that the fee schedule better reflects underlying cost reductions or increases.

Within the broader context of Medicare reform, it is worth noting that the demonstration is not singling out the clinical laboratory industry. Reductions in Medicare spending were a key ingredient in the bipartisan push for a balanced budget during the summer of 1997; ultimately, BBA 97 included $115 billion in reductions in expected Medicare spending over the next 5 years. These reductions are going to affect every segment of Medicare services, not just clinical laboratories. In addition, many policymakers believe that the government has not kept up with the vast innovations in healthcare financing and purchasing that have occurred in the private sector during recent years. In response to this criticism, HCFA plans to implement several demonstration projects that will attempt to harness competition and market forces to set Medicare prices. Currently, demonstration projects have been proposed for managed care services and durable medical equipment, as well as for clinical laboratory services.

Plan Development

The following process was used to arrive at the recommendations contained in the plan. After conducting research on the current state of the laboratory industry (1) and reviewing the design of a Medicare competitive bidding demonstration that was proposed in the 1980s (4–6), RTI developed a list of key design issues. For each issue, RTI presented design options and discussed the advantages and disadvantages of each option before making recommendations. HCFA project staff reviewed RTI’s recommendations and in some cases disagreed. In such cases, RTI and HCFA collaborated to reach the recommendations presented here.

Design Features

The key features of the preliminary design are summarized below.

SCOPE OF THE DEMONSTRATION

The scope of the demonstration provides broad guidelines on the sites, procedures, and types of tests included in the demonstration. The preliminary plan for the scope of the demonstration has five major features. First, a statewide Medicare carrier jurisdiction would be used to define the demonstration area. This provision may be superseded by BBA 97, which calls for Medicare demonstrations of competitive bidding to include up to three metropolitan statistical areas (MSAs). MSAs consist of large urban areas and surrounding counties.

Second, the demonstration would set fees in the demonstration area for 107 clinical laboratory procedures designated as demonstration tests. In selecting this list, we included most common and/or automated clinical laboratory tests. A few common procedures that require detailed interpretation, such as Pap smears and anatomic pathology tests, were excluded from the list of demonstration tests. The remaining list of demonstration tests accounts for ~80% of Medicare Part B test volume and allowed charges.

Third, the demonstration would cover demonstration tests that originate as test specimens in the demonstration area. The rationale for this feature is that the demonstration should measure the costs of providing services to beneficiaries within the demonstration area. Thus, a specimen drawn in the demonstration area would be included in the demonstration even if the resulting test is actually performed by a laboratory located outside the demonstration area. This recommendation may have to be reconsidered in light of the provision in BBA 97 limiting demonstrations to MSAs. This limitation raises administrative issues about how to identify specimens originating within MSA borders.

Fourth, all Part B demonstration tests originating in the demonstration area would be included in the demonstration, with the exception of patient tests provided by hospital outpatient laboratories. In making this recommendation, we distinguished between patient tests, where the patient is actually considered a hospital outpatient, and nonpatient or outreach tests, where a hospital outpatient laboratory performs the test on a specimen drawn from a patient who receives no other hospital services. Nonpatient tests are fairly close substitutes for independent and physician office laboratory tests; therefore, we included all of these types in the demonstration. In contrast, for patient tests, it may be most efficient to have the hospital perform both outpatient procedures, such as ambulatory surgery, and accompanying ancillary services, such as laboratory tests. Because patient testing frequently needs to be performed on a stat basis, we recommended excluding these tests from the demonstration.

Fifth, the demonstration would last 2 years and include two bidding cycles. Fees set in the first bidding cycle would be in effect for 1 year. The bidding process for the second cycle may be modified to take advantage of
lessons learned during the first cycle. Laboratories would gain experience during the initial bidding cycle and apply this experience during subsequent bidding cycles. As a result, the second bidding cycle may provide better evidence on the long-run effects of competitive bidding on fees. This recommendation will have to be modified in light of BBA 97, which calls for a 3-year demonstration. This change should be relatively easy to incorporate.

BIDDING
This section describes the key features of the bidding process. Laboratory companies with over $200 000 in total Medicare Part B laboratory allowed charges and over $100 000 in demonstration test allowed charges in the demonstration area would be required to bid in the demonstration. This feature recognizes that neither preparing nor evaluating competitive bidding is without costs. To a large extent, the per-bid costs of bid preparation and evaluation are fixed costs that do not vary substantially with a bidder’s expected volume or allowed charges. Therefore, the overall costs of bidding and evaluating bids may be reduced by limiting required bidding to the largest laboratories. With a fixed cost of bidding, the average cost of required bidding per test would be relatively low for large laboratories.

Other laboratories would be offered the option to choose whether or not to bid. In the absence of such an option, laboratories that are not required to bid might perceive that their prices are being set unfairly because they are not allowed the opportunity to participate in the bidding process.

Bidding laboratories would submit bids for each demonstration test. As described in the next section, winning laboratories would be selected on the basis of their composite bid for all demonstration tests. Calculation of the composite requires laboratories to submit bids for all tests. On the basis of a detailed analysis of laboratory claims from Tennessee, we believe that virtually all of the laboratories that would be required to bid under a $200 000 cutoff perform or are capable of performing at least 75 demonstration tests.

Bidding laboratories would also be required to provide information on their capacity and geographic service area. As described in the next section, this information would be used in selecting winners to ensure that the demonstration does not adversely affect beneficiary access to laboratory services.

Bidding laboratories need not provide statewide coverage. Instead, the designated service area of the laboratory may be as small as a single county or as large as the entire state. We believe it would be counterproductive to require laboratories to provide statewide coverage. As part of our research, we performed a case study of laboratory geographic coverage in Tennessee in 1994. We found that only the two largest laboratories in the state provided statewide coverage. The next two largest laboratories would have had to add coverage to about one-third of the counties in the state to achieve statewide coverage, and the remaining laboratories would have had even greater difficulty providing statewide coverage. Moreover, managers of smaller laboratories that we interviewed were very concerned about bidding competitions that require laboratories to provide statewide or even nationwide coverage. According to one independent laboratory manager, small laboratories are being “devastated” because requests for proposals from managed care organizations (MCOs) are generally written so that small laboratories cannot bid, because of requirements for statewide or nationwide coverage. Many of the MCO contracts that required statewide or nationwide coverage included provisions to select a single winning laboratory. With a single winner, the winning laboratory naturally needs to be able to serve the entire services area. Such requirements are not necessary for the demonstration because multiple winners would be selected.

During bidding, laboratories would be asked to identify demonstration tests that they would not perform and explain their plans for responding to requests for these tests. Subcontracting and other referrals would be subject to existing HCFA regulations.

As part of their bid, laboratories would also provide information on ownership; location of affiliated laboratories and drawing stations in the demonstration area, as well as affiliated out-of-state laboratories; CLIA certification; and quality. This information would enhance bid evaluation. Laboratory companies would be required to submit a single bid for all laboratory affiliates. The information on ownership would be used to link laboratories under common ownership. The location information would provide some evidence of the ability of the laboratory to cover its stated geographic service area. The quality information would be used to ensure that winning laboratories meet applicable quality and performance standards. Quality issues are described in greater detail in a later section.

HCFA would reserve the right to conduct negotiations or a second round of bidding if evaluation of the initial bids indicates that program objectives could be advanced by doing so. Negotiations or the second round of bidding would be limited to laboratories submitting favorable bids in the initial round. In making this recommendation, we considered both a one-round bidding design and a design with multiple rounds of bidding or negotiations. With a one-round bidding design, required bidders submit a single bid. Using only the information contained in these bids and the evaluation criteria, HCFA would select winning laboratories. Under a bidding design with negotiations or a second round of bidding, all required bidders submit an initial bid. HCFA would evaluate the initial bids and select the set of bidders with the most attractive bids. Some or all of the selected laboratories would respond to HCFA questions during negotiations or a second round of bidding.

Both options have advantages and disadvantages.
With a single round of bidding, bids can be evaluated more easily, laboratories face clear-cut evaluation criteria, and low initial bids are encouraged. On the other hand, one-round bidding works best if there is a single dimension of bidding (e.g., price). For the demonstration, bids would have at least three dimensions (capacity, geographic coverage, and price). With negotiations or a second round of bidding, HCFA would have greater flexibility in satisfying multiple evaluation criteria. Because of this advantage, we recommend that HCFA retain the option of negotiations or a second round of bidding.

Bidding would be subject to existing antitrust laws and regulations prohibiting collusion and anticompetitive behavior. HCFA does not have the jurisdiction to determine whether bidding behavior is procompetitive or anticompetitive. Instead, either the Federal Trade Commission or the Department of Justice would make this determination.

SELECTING WINNERS

Once bidding has ended, HCFA would evaluate bids and select winning laboratories. This section describes the winner selection process. Although laboratory bids would ultimately determine the new fee schedule for individual demonstration tests, calculation of the new schedule would not occur until after winners are selected. Therefore, discussion of fee determination and other reimbursement issues is held off until the next section. The key features of the winner selection process are described below.

HCFA would select multiple winners. Selecting multiple winners has several advantages over selecting a single winner:

- Being named a winner does not guarantee a laboratory that it will receive business. Because physicians could choose among several laboratories, winning laboratories would still need to compete to attract business from physicians. This competition would tend to increase quality and improve laboratory service above the level that would be offered by a single winner in a winner-take-all competition.
- Fewer laboratories would suffer losses of Medicare market share.
- If a winning laboratory goes out of business, beneficiary access would be less disrupted if other winning providers remain.

The bids by one laboratory for individual procedures would be weighted and summed to form a single composite bid. The composite bids would be arrayed from lowest to highest, and the array would be used in conjunction with other criteria to determine the pivotal bid. Weights would be based on the expected share of demonstration volume for each demonstration test in the entire demonstration area. The composite bid could then be interpreted as the average price for the expected market basket of demonstration tests.

The pivotal bid, which separates winners from losers, would be selected so that the group of laboratories with bids below the pivotal bid collectively has sufficient capacity and geographic coverage to satisfy HCFA criteria. HCFA would adopt a flexible selection rule that explicitly considers capacity and geographic coverage but does not set specific targets on the distribution of bids, the overall number of winners, or the pivotal composite bid.

Capacity and geographic criteria would be considered when selecting winners. These criteria would ensure that beneficiaries have sufficient access to laboratory services during the demonstration. The capacity criteria would be set so that winning laboratories collectively have enough capacity to absorb volume reductions by losing and non-bidding laboratories. We proposed the following minimum criteria for geographic coverage:

- At least three winning laboratories would be selected in large metropolitan counties.
- At least two winning laboratories would be selected for other metropolitan counties and most rural counties.
- At least one winning laboratory would be selected for other rural counties.

These minimum criteria are designed to encourage laboratory competition in most counties, while reflecting the fact that some small rural counties are currently served by few laboratories that would be required to bid in the demonstration. As mentioned, BBA 97 specifies that Medicare demonstrations of competitive bidding will occur in MSAs. This provision will mitigate concerns that competitive bidding would reduce access to laboratory services in rural counties.

Finally, HCFA would set a maximum acceptable composite bid that is less than or equal to the composite bid that would be obtained using the current fee schedule. However, bids for individual procedures would be allowed to exceed the current fee for that procedure. It is common in competitive bidding auctions to set a minimum or maximum acceptable bid. Such bids are known as the “reservation bid” for the agent conducting the auction. If the bids received are not better than the reservation bid, the agent has the right to reject all bids. The composite fee obtained from HCFA’s current fee schedule represents a natural reservation fee: HCFA would have little incentive to proceed with the demonstration if it produced average fees higher than the current fee schedule. Within the current fee schedule, fees for some procedures may be set above costs, whereas fees for other procedures are set below costs. To the extent that competitive bidding sets relative prices that better reflect relative costs than the current fee schedule, fees currently set below cost for procedures may rise.

PAYMENT METHODOLOGY

The new fee schedule for individual demonstration tests would be set after the pivotal bid (the bid that separates winners and losers) is selected and winning laboratories are determined. The fee for an individual procedure...
would be set equal to the average of the adjusted bids by winning laboratories for that procedure. The adjustment would ensure that all winning laboratories are paid the same price and all winning laboratories are paid an average fee that is equal to or exceeds their composite bid. Winning laboratories would receive the new fee schedule.

Laboratories that bid and lose would receive a percentage reduction from the new fee schedule. The percentage reduction would be based on the ratio between the composite bid of that laboratory and the pivotal composite bid. The goal of competitive bidding is to set fees close to their true costs. To encourage bidders to offer a price close to the true cost, HCFA must use a penalty or discount when calculating the fees for losing laboratories. In the absence of a penalty, winning laboratories and losing laboratories would receive the same fee for the demonstration tests, and winning laboratories would receive no benefit for winning. With no reward for winning, laboratories have no incentive to bid low to become a winning laboratory. It follows then, that the stronger the penalty, the greater the incentive for laboratories to bid aggressively. The strongest penalty—and the most commonly used in competitive bidding—would exclude losing laboratories from receiving reimbursement for demonstration tests. Our proposed penalty is more lenient, reflecting the experimental nature of the demonstration and the fact that the stronger penalty may run counter to Medicare freedom-of-choice provisions. However, BBA 97 now gives HCFA the option to exclude losers from receiving reimbursement during competitive bidding demonstrations. Thus, HCFA could—but is not required to—exclude losing laboratories from providing demonstration tests. HCFA will have to decide whether to use its new authority to exclude losing laboratories.

“Passive” laboratories (laboratories that are not required to bid and do not bid) would receive the new fee schedule as long as they do not exceed ceilings on total laboratory and demonstration test allowed charges. Because passive laboratories are not required to bid and their small size might make them less able than larger laboratories to absorb penalties, we recommended that passive laboratories not be penalized in the same manner as losing laboratories. However, because passive laboratories bear neither the cost of bidding nor the risk of being named a losing laboratory, we recommend placing a ceiling on the amount of allowed charges that these laboratories can receive at the full winning fee schedule rates. These ceilings would force laboratories that are not currently required to bid but that expect to grow substantially to decide whether to submit bids. The ceilings would also apply to laboratories newly entering the area and to startup laboratories. Once the ceilings are reached, passive laboratories would be reimbursed at reduced rates for subsequent tests.

Laboratories that are required to bid and choose not to bid would be ineligible for Medicare reimbursement for demonstration tests. In the demonstration, HCFA is testing an alternative method for setting fees for clinical laboratory services. During the demonstration, HCFA is giving all Medicare-eligible laboratories the opportunity to continue to provide laboratory services. For the demonstration to be perceived as fair, laboratories that decline to participate in the bidding process should not expect to continue as providers of laboratory services during the demonstration.

Finally, the existing fee schedule would continue to apply to non-demonstration tests.

QUALITY

One of the key objectives of the demonstration is to ensure that competitive bidding does not affect the quality of laboratory services received by Medicare beneficiaries. In this section, we describe the mechanisms that would be used to ensure and monitor quality during the demonstration.

The demonstration would rely on the CLIA regulatory system already in place. All laboratories providing services in the demonstration area would be subject to CLIA regulations as currently enforced. There would not be any forms of enhanced CLIA monitoring, for two reasons. First, the demonstration would not be generalizable to a national program if conducted under such conditions. Second, obtaining funding for such activities is likely to be difficult, given the resources already devoted to HCFA.

Winning and losing laboratories would report on several indicators of pre- and postanalytic quality every quarter. Indicators include:

- frequency of wrong tests performed,
- number of lost samples,
- number of delayed reports, and
- number of missed or late pickups.

As part of the bidding, laboratories would designate a quality-control individual to serve as a point of contact for HCFA, as well as for physicians and beneficiaries. Having one contact person would greatly facilitate communication between the laboratory and HCFA, as well as between laboratories and physicians. The person’s name, address, and telephone number would be published in physician education materials.

HCFA would maintain a toll-free hot line to receive complaints from beneficiaries, physicians, laboratories, and other interested parties. The hot line would make available, during designated hours, a live individual to take complaints, give out information about participating laboratories, and if necessary, refer callers to other information sources. The hot line would benefit both HCFA and laboratories. HCFA can use the complaints as a record of potential laboratory deficiencies. In addition, HCFA can relay these complaints to the quality-control individual at the laboratories, allowing the laboratories to respond immediately.

Finally, with multiple winners, laboratories would still be competing to attract business. This competition would
help maintain quality levels. If physicians are not happy with the service or quality aspects of a given laboratory, they would have alternative choices under the multiple-winner format, thereby giving winning laboratories strong incentives to maintain quality.

ADMINISTRATION AND MONITORING
During the demonstration, the carrier and the fiscal intermediary in the demonstration area would process all demonstration claims, apply demonstration reimbursement rules, and conduct usual fraud-and-abuse activities. In addition, the carrier and fiscal intermediary are likely to be involved in physician and beneficiary education activities.

HCFA would use an information campaign to identify winning laboratories to physicians. Educational materials released before issuance of the request for proposals would focus on providing general information about the demonstration and its implications for physicians. The materials issued after winners are selected would continue to present general information about the demonstration. However, they would focus primarily on identifying winning laboratories, providing information on how to contact winning laboratories for service, and otherwise assisting physicians who decide to change laboratories as a result of the demonstration.

Although they are less likely than physicians to actually choose their laboratory, beneficiaries have a fairly high level of anxiety about changes in Medicare programs. Beneficiary education materials would be designed to inform beneficiaries about the demonstration and reduce any anxiety that they may have. The materials would stress that

- Medicare needs to reduce program expenditures,
- beneficiaries would continue to pay no out-of-pocket costs for laboratory tests,
- physicians would still have a choice of laboratories, and
- existing quality standards would be maintained.

If winning laboratories go out of business or decide to stop serving parts of their stated geographic coverage area, HCFA would take steps to avoid access deterioration in underserved areas. If necessary, HCFA would name additional winning laboratories to ensure that access does not deteriorate.

Role of the Laboratory Technical Advisory Committee
During research and development of the preliminary plan, HCFA and RTI have been assisted by members of the laboratory community who have served on our Laboratory Technical Advisory Committee (LTAC). The purpose of the LTAC is to provide us with information during the research, design, implementation, and maintenance periods of the demonstration project. We presented this preliminary plan to the LTAC and have received their comments on it. There is certainly not universal acceptance among members of the committee that the demonstration project is needed. In fact, many members would probably prefer that competitive bidding go away. Nevertheless, the LTAC has provided us with very valuable information. Ultimately, HCFA will take final responsibility and make the final decisions regarding the design and conduct of the demonstration.

Competitive Bidding in a Managed Care Environment
The Medicare demonstration project is designed to set Medicare Part B fees for the fee-for-service sector. This raises the issue of how competitive bidding would work in a Medicare managed care environment. Indeed, some have asked why Medicare is considering reforms in fee-for-service laboratory reimbursement, given the rapid increase in Medicare managed care. It is true that managed care in Medicare is growing very quickly: Medicare enrollment in health maintenance organizations (HMOs) went up ~1.4% in November 1997, which translates into a very rapid annual rate of increase. Despite that, only 16% of Medicare enrollees are currently in HMOs, and the percentage varies tremendously from state to state. In states such as California and Arizona, over one-third of Medicare beneficiaries are in HMOs, but in states such as Tennessee, just 1% of Medicare beneficiaries are in HMOs (7). The fee-for-service section of Medicare remains large and will continue to be large for some time to come.

Looking ahead, the movement to Medicare managed care will not eliminate the need for competitive bidding. Laboratories are likely to encounter competitive bidding or very similar negotiations with Medicare MCOs. Direct contracting between laboratories and MCOs, similar to that between laboratories and MCOs for private business, will probably be common. There will probably be relatively little government oversight of these contracts and little oversight of the requirements in the contracts. There are also likely to be more exclusive contracts between an MCO and a laboratory. These contracts may involve larger service areas than those that we have recommended for the demonstration project. Some of these contracts are likely to feature capitation, and they may feature bundling of Medicare and private business. Therefore, competitive bidding in Medicare managed care contracts is probable, only it will not be directed by HCFA.

How to Succeed in Competitive Bidding
Laboratories can take several steps now to prepare for competitive bidding, whether it be for the Medicare demonstration or for private contracts. These steps are not necessarily easy to perform, but they can help laboratories prepare to succeed in competitive bidding.

First, to prepare for competitive bidding, a laboratory must know its costs for individual procedures. Laboratories will have to develop a system, if they do not already have one, so that they can confidently say how much each individual test costs.

Second, when people see a new reimbursement system, the immediate focus is to try to out-think and
outsmart the system. We are sure that laboratories will be very good at trying to outsmart the system, but the bottom line in competitive bidding ultimately is going to be based on the overall cost level of the laboratory. Therefore, a laboratory may be better off putting its effort into reducing costs and maintaining low costs rather than trying to figure out the best bidding strategy.

Third, in our interviews with laboratory managers, almost all believed that laboratories that won current managed care contracts had really overestimated the importance of pull-through. That is, laboratories offered very low prices to MCOs in the expectation that they would get more profitable tests from the physicians and perhaps from Medicare, and in many cases laboratories now believe that the pull-through has not materialized. Physicians are now being required to send out their tests to several different laboratories. They may not like it, but they are doing it. Just because a laboratory gets a physician’s Medicare business does not mean it is going to get the rest of his or her business. Therefore, when a laboratory bids, it should make sure it is going to do well on its Medicare tests, if that is what is being bid.

Fourth, a laboratory should choose its service area to maximize its efficiency. A laboratory has to decide whether it can really serve the entire state or whether its costs are competitive in just a single area.

Finally, we believe quality differences between laboratories are and should be important in competitive bidding, but laboratories are going to have to be able to not only say that they have quality but also to measure it and measure it in ways that are meaningful to the buyer.

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References