

REPORT  
ON  
BUSINESS ADMINISTRATION  
ISSUES AT THE NORK MARASH  
MEDICAL CENTER

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## **Introduction**

This report is the deliverable of the business administration issues review project that the Center for Business Research and Development (CBRD) at the American University of Armenia (AUA) conducted on behalf of the Steering Committee of the American University of Armenia/Nork Marash Medical Center Project.

Senior management at the Nork Marash Medical Center (NMMC) indicates that the weakness of the overall accounting and management information system (MIS) is a primary contributor to the financial difficulty the NMMC is experiencing. Further, it is the main reason managers are unable to readily obtain accurate information for planning purposes. As such, the NMMC is considering the design and implementation of an improved accounting and MIS system.

CBRD conducted a review of the existing accounting system, the relevant laws and procedures, and the internal reporting practices. In addition, analysis of the existing financial management information system and forecasting methods was conducted.

This report contains an analysis and a set of recommendations, aimed at rectifying the weaknesses identified.

Successful businesses require three inter-related management information systems for analysis and control of:

1. Physical flows of outputs and inputs – Materials Management
2. Financial flows of revenues and expenditures - Accounting/Financial System
3. Demand for final products - Pricing and Marketing system)

At NMMC, all three systems need substantial improvement.

This report is organized to address each system one at a time, presenting an analysis of current situation, and recommendations for improvement.

A full list of the recommendations is given, in summary, along with an estimation of their implementation costs.

## Physical Flows – Materials Management

### *Current Situation*

NMMC's outputs are diagnostic and surgical procedures and post-operative care. Inputs include physicians' services, equipment, and disposable supplies and materials. Outputs at NMMC appear to meet Western standards for quality and quantity, although objective measures of quality and quantity are lacking<sup>1</sup>. Quality measures (e.g. infection rates, recovery length) are not collected on a systematic basis, nor are they compared to similar Western measures. While the gross number of surgical procedures is well-documented, there is no summarization by types of procedures. As a result, it is impossible to relate inputs to specific outputs.

A more serious problem is the control of inputs. The acquisition of inputs (whether through donations or purchases) is documented, however, the disposition of these inputs in the production process is not controlled. In particular, supplies and materials are allocated to different departments on an informal, demand basis<sup>2</sup>. There is no attempt to track the use of materials to particular patients or to particular categories of surgical procedures. Rather, departments simply calculate the depletion of materials at the end of each week or month, and request replenishment from the stock of central inventory supplies. Attempts to reconcile stock depletion with departmental use have proven unsuccessful<sup>3</sup>.

Inventory control through the pharmacy is more formal, departments ordering drugs are then charged for their use against departmental budgets. However, department use of drugs is again not tracked to individual patients or procedures.

Under the current system, there is no way to relate the use of inputs to outputs. Consequently, there is no formal method for determining the physical cost of specific surgical procedures. Given the pricing policies of NMMC, there is an informal measure of physical inputs. Department heads provide a "guesstimate" of physical costs based on their experience. The "guesstimates" are then used as the basis for pricing specific procedures. Unfortunately, there is no attempt to reconcile the "guesstimates" with the actual aggregated physical costs reported by each department.

In principle, physical information systems can be constructed using paper flows and manual checking of documents. Indeed, some sort of paper trail is necessary for internal and external auditing, even if the collected information is computerized for later analysis. However, direct or timely input of inventory flows into a computer database allows for efficient inventory control. Based on estimates of future demand<sup>4</sup>, the computer can easily match target levels of inventory with

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<sup>1</sup> The administrative assistant reports that she conducts some quality studies (e.g. infection rates) for the surgery department, but these studies are considered "in-house" and are not made available to other departments or the administration. There is no continuous or systematic monitoring of quality

<sup>2</sup> The inventory supplies are distributed by the head nurse on the basis of requests from departments. It appears that no records are kept when supplies leave the storeroom. Departments conduct periodic (weekly or monthly) inventory checks of departmental supplies, which form the basis for new requests for inventories from the storeroom

<sup>3</sup> A year ago, a full inventory accounting was made of the materials in the main and auxiliary storeroom. These inventory levels were matched against requests from departments. The exercise revealed that departments were using more supplies than existed in the storerooms. Because the discrepancy could not be resolved, the administration stopped comparing inventory levels to department requests/use records.

<sup>4</sup> Basically, the head nurse decides when inventory levels are low, based on her subjective experience.

current inventory levels. Projected inventory needs can be matched with anticipated acquisitions and delivery schedules.

Currently, there is no formal method for forecasting inventory needs<sup>5</sup>. This results in excessive inventories of some supplies, and unanticipated shortages of other supplies.

A related problem is the use of physicians' services. Because physicians and nurses are salaried employees of NMMC, they are treated as a "fixed cost." Their services are not monitored by procedure or time spent on procedures and other activities. This makes it impossible to allocate their services to specific procedures, or to measure productivity. If there is a significant change in the demand for specific procedures, there is no method for estimating the need for additional physicians or for estimating the extent of excess capacity. Moreover, there is no basis for creating salary differentials based on documented differences in productivity<sup>6</sup>.

### *Recommendations*

- 1. Development and implementation of an inventory control system – Materials Management System**
- 2. Development and implementation of a patient-tracking system – Healthcare Information Systems**
- 3. Analysis of input use for specific procedures.**
- 4. Development and implementation of a system for tracking physician and nurse utilization use in specific procedures.**

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<sup>5</sup> For example, inventories are being used from supplies accumulated during the Soviet period. Replacement needs have not been forecast, despite expensive replacement costs.

<sup>6</sup> NMMC has a policy of paying all senior staff members the same salary, all nurses the same salary, and all custodial staff the same salary. The main administrator summarily dismissed our suggestion that salary differentials be created on the basis of productivity, or to create staff incentive structures.

## **Financial Flows**

### *Current Situation*

We are not aware of any Armenian hospital (except for the Trauma Rehabilitation Center operated by the International Federation of the Red Cross and Red Crescent Societies) that employs a sophisticated management information system. If NMMC designs a generic MIS system tailored for Armenian information needs, such a program can be marketed to other Armenian hospitals, creating a new revenue center and making NMMC the leader in introducing modern management techniques into the Armenian medical system.

The current system used by the Ministry of Health to price “state orders” suffers from the same data problems as currently experienced by NMMC. General use of a consistent MIS system will create a new database that can be used by the Ministry of Health for more accurate costing and public budgeting. Such a database will also provide information essential for any insurance scheme.

Three primary areas of concern were identified related to Financial Flows:

- 1) Cash Flow Model – Accounting Information System
- 2) Financial Managers
- 3) Auditing

### ***Cash Flow Model – Accounting Information Systems***

The most important component of every financial information system is a cash flow model. Ideally, a cash flow model should:

- A) Account for the financial cost of all variable inputs associated with a specific procedure, by departments. Accounting should be done on a daily, or at least weekly, basis. If donated items are included as operating income, use of donated items should be expensed.
- B) Account for all revenues received, by surgical procedures, including cash payments received on a credit basis.
- C) Account for all expenditures and revenues not associated with surgical procedures, e.g. interest income, administrative expenses, rents, etc.
- D) Allow for the creation of pro forma documents<sup>7</sup>.

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<sup>7</sup> Pro forma documents include cash flow statements, income statements, balance sheets, quarterly tax reports and other documentation required by the Armenian government. These statements are all calculated by hand, sometimes with clear inconsistencies between two sets of documents. For example, the revenues reported on cash flow statements do not correspond to revenues reported on income statements. While explanations are possible (e.g. the treatment of donated items as income), there is no clear way to reconcile the documents. Moreover, the documents are not computer generated, although they are printed by computer as Word documents. Because linked spreadsheets aren't used, changing one number does not automatically create new sets of totals. A change in one entry requires a burdensome process of recalculation by hand. As a result, it is not surprising that the administration fails to attempt serious sensitivity analysis.

- E) Allow for forecasts of future expenditures and revenues, based on estimates of demand and historical patterns of ‘production’<sup>8</sup>.

Comprehensive cash flow models require computerization of financial data. Currently, no accounting systems are computerized, and no cash flow model exists. Cash flow statements are created by hand, on a quarterly basis. The accounting office cannot provide even monthly statements on the financial position of the hospital, without extensive labor and unacceptable delays. If the economist needs information from accounting, for preparing budgets or financial analyses, the economist must personally visit accounting and manually copy the relevant data.

A computerized financial system will allow for the automatic generation of pro forma documents, provide transparent documentation of the ongoing financial position of the hospital, and provide the data necessary for financial planning.

There is no shortage of Western-style accounting programs and generic business cash flow models. However, accounting programs designed for hospitals are driven by the demands of the Western third-party payment system, and are not appropriate for NMMC. And generic business programs need substantial modification for a hospital environment. No existing programs permit the generation of pro forma documents required by the Armenian government.

Rather than adapt an existing program, we feel that it will be most cost-effective to design a customized cash-flow model specifically for NMMC, but suitable for other Armenian medical institutions. Because of training needs, we suggest a model based on EXCEL or ACCESS, or another familiar platform.

The purpose of a computerized cash-flow model is not just to collect data. Collection of data without financial analysis of the data is a rather useless exercise. Financial data must be easily available to the hospital administration and financial officers. This requires a computerized link between the cash flow model and the data users, or a local area network (LAN). It also requires a computerized link between the cash-flow model and the physical flows (which means the LAN should cover the ‘inventory computer’ as well), since physical flows provide the basis for variable cost data.

### *Recommendations*

- 5. Installation of computer facilities, and creation of a local area network covering accounting, hospital administration (including “the economist”), and inventory control.**
- 6. Design and implementation of a customized cash-flow model – Accounting Information System.**

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<sup>8</sup> Forecasting is critical for financial planning. Data provided by NMMC on revenues is probably accurate. But costs are assigned by a simple averaging process. Total operating costs of NMMC are simply divided by the number of patients, without any attempt to differentiate patients by procedures. Thus, the average cost per patient in 1999 was \$2,340. There were 125 full-paying Armenian adults, so costs are estimated at (125 x 2,340) 292,000. There were 85 patients from abroad, so costs are estimated at (85 x 2,340) 199,000. This averaging process obscures the differences in costs per procedure, and the composition of procedures among different target groups. It makes true demand forecasting unreliable, if not impossible.

## *Financial Managers*

Data analysis is crucial for business planning. Data analysis is typically the function of the chief financial officer. At present, NMMC does not have a chief financial officer. Financial decisions are made by the head administrator, with input from “the economist.” Unless the head administrator makes a specific request for information, the economist does not make any attempt at independent financial analysis<sup>9</sup>.

The responsibility of a chief financial officer is to anticipate the financial needs of an institution. While the officer must certainly respond to administrative inquiries, it is equally if not more important to independently ask questions that are not asked by the administration. That is, the financial officer must identify problems and solutions before the administration is aware that the problems exist. The financial officer must have enough independence to reveal problems and advocate unpopular positions.

For example, NMMC faces chronic fiscal deficits. These deficits are the direct result of the administrative pricing policy. Procedures are priced at historical average variable cost plus a portion of administrative overhead. However, few patients pay the full price. Even assuming that estimated costs are correct and the administrative mark-up covers the actual administrative costs, failure of patients to pay full price necessarily results in costs exceeding revenues. The economist is asked to compute historical costs, but is not encouraged to point out the fiscal effects of the adopted pricing policy. A financial officer must have the incentive and power to forcefully advocate pricing policies that maintain fiscal integrity.

Consider another example. NMMC has a policy of restricting wage payments to no more than 40% of costs. Clearly, there is no incentive on the part of staff to reduce costs, since cutting costs potentially reduces salaries. The economist is asked to prepare a budget, but is not allowed to point out the inverted incentive structure of the wage policy.

## *Recommendations*

- 7. Create a new position, “chief financial officer”, with specific responsibility for monitoring the financial position of NMMC, identifying financial problems, anticipating financial problems, and suggesting solutions to financial problems.**
- 8. Provide training to both the administration and the financial officer on various techniques of financial analysis, especially financial forecasting.**

## *Auditing*

Auditing is the function of checking the accuracy of information developed by the cash-flow model and the physical flow control system. Currently, there is no system of auditing at NMMC. There is no internal auditor, and no external audits have been conducted outside of tax inspections. Auditing is essential to assure that management control procedures and systems are working effectively.

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<sup>9</sup> The economist has two main duties: budget preparation, and evaluation of state-order patients. She is not required to perform any systematic financial analysis.

*Recommendations*

- 9. Create the position of “internal auditor” perhaps combined with responsibilities as the computer system administrator.**
- 10. Once the new system is in place and has a history of successful operation, adopt a schedule of regular external audits.**

## **Demand Analysis**

### *Current Situation*

Controlling the demand for surgical and diagnostic procedures is critical to financial forecasting. Demand is sensitive to price, and understanding this sensitivity<sup>10</sup> requires a variety of prices that can be matched with historical experience. The current pricing and data collection policies of NMMC make any demand or marketing analysis difficult and unreliable.

At NMMC, consumer prices are based on historical averages, but since little reliable historical cost data exist that are specific to procedures, costs are informally estimated by the department heads. Physical input estimates are loosely translated into financial costs and an administrative cost is added (no attempt is made to allocate administrative costs by input cost, time, or price. Rather, a flat administrative fee is added to each procedure). The final cost is estimated by adding salaries, such that professional salaries are 35% and administrative salaries are 5% of the final estimated cost. No justification for the salary component is offered, except vague historical experience and tradition<sup>11</sup>. There is no analysis to determine if the estimated salary costs, multiplied by the number of procedures, actually equals total salary. Indeed, there is no analysis to determine if the estimated unit procedure costs, multiplied by the number of procedures, actually equals historical costs of operation.

Since there are chronic deficits, there is reason to believe that costs are not properly estimated. However, the source of the deficits is more likely associated with the prices that are assigned based on the cost estimates. The policy of NMMC is to perform procedures free for children (or at state order third-party rates), at a single price just equal to estimated historical average cost for Armenian adults, and at prices that subsidize these free services for foreign nationals. Their marketing plan is to increase the number of procedures performed on foreign nationals, based on a vague hope that such an increase will eliminate deficits.

The flaw of this pricing policy is the single price charged to Armenian adults. Apart from NMMC, Armenian health care is provided on a “double-pay” basis, where consumers pay a flat fee to the hospital and additional “fees” to the physicians and health care staff. The double-pay system allows

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<sup>10</sup> While the incidence of underlying medical problems may be random among the population, the overall demand is predictable. However, not all patients with heart conditions seek medical treatment. The price of treatment seems to be a major consideration for potential patients. The economist cited an example where NMMC raised the price of a procedure, and determined that the demand for that procedure was reduced. Because demand fell, the economist concluded that prices could not be raised. What the economist did not understand was the concept of “elasticity.” Although demand fell, the revenue collected from the reduced number of patients paying the higher price was actually higher than before (i.e. at current prices, demand for services is inelastic)

When this was pointed out, the economist said that it didn’t matter, because fewer patients meant higher costs, thus offsetting the higher revenues. Attempts to explain the difference between fixed costs and variable costs were unsuccessful.

<sup>11</sup> The salary figure of 40% was a recurrent theme of our discussions. Apparently, the policy of NMMC is to limit total salaries to no more than 40% of total costs, perhaps a holdover from Soviet budget practices. Since prices are computed such that 40% is allocated to salaries, salaries are always predicted as 40% of revenues. However, since costs exceed revenues, salaries are always less than 40% of costs. The economist indicated that NMMC is making efforts to reduce salaries still further as a percent of costs, which logically means increasing costs compared to revenues.

As noted before in the text, if salaries are restricted to a fixed percentage of costs, staff has no incentive to reduce non-salary costs.

for consumers to limit their use of physician services, based on their willingness to pay for physician service levels. Moreover, it allows for physicians to price discriminate on the basis of patient income. Actual prices paid by consumers on the double-pay system vary widely, allowing consumer demand to be efficiently exploited. The single-pay policy of NMMC sharply reduces the potential revenue that can be generated from domestic demand<sup>12</sup>. Adults with high incomes receive substantial consumer surplus, while adults with low ability to pay find services rationed.

NMMC recognizes the problem of rationing for low income patients, and has a policy of providing care for all patients, even if they cannot afford the stated procedure price. This means that NMMC subsidizes some adult procedures, such that the actual average revenue received for procedures is less than the stated single price. Since the single-price is equal to average cost, this results in predictable and chronic losses. Increasing the demand for procedures by adult Armenians simply increases the deficits incurred.

We want to stress that a single-pay policy is not by itself the underlying fiscal problem. American hospitals have a single-pay system: patients are charged the same, single-price for each service consumed. But patients consume different types and levels of services, so that the final price paid for each procedure is differentiated by actual costs incurred. For example, American hospitals charge a single-price daily room rate, but patients who stay in the hospital for long periods pay a higher total price than patients who have shorter recovery periods. NMMC has a single-price for the entire hospital experience, which is unrelated to actual services used by the patient.

A serious problem also arises from the use of historical cost to determine average costs. Donated equipment is valued at market prices, and is included in income flows. But the use of donated equipment and materials is not added to cost estimates, since no cash outlay was required. Depreciation of donated fixed equipment is not added to average cost estimates. The replacement cost of donated materials is not added to average cost estimates<sup>13</sup>.

For materials purchased, only historical cost is used. For example, if a drug is purchased at 10 dollars, but the market cost has now risen to 30 dollars, internal accounting treats the use of the drug as a cost of 10 dollars, not at the current market replacement cost. If market prices are rising, historical average cost underestimates the current market cost. If prices are inflexible, actual costs will consistently exceed historical costs, adding to revenue shortfalls<sup>14</sup>.

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<sup>12</sup> Although the Armenian double-pay system is subject to abuse, it is an efficient means of price discrimination. It allows for consumer surplus to be extracted from high income patients with inelastic demands, and permits expansion of services to lower income patients. In general, price discrimination increases profits, as long as discriminatory prices cover marginal costs of production. The single-pay system at NMMC eliminates price discrimination and potential abuse, but also limits profitability.

NMMC can reintroduce modified price discrimination by (1) charging for actual services rendered, or (2) excluding some services from the base pricing, and making them available on a demand basis. For example, a base price might include a recovery period of five days. Patients exceeding this stay could be charged an additional daily rate. The problem is not a single-pay system; the problem is charging a single price for all patients, irrespective of anticipated variable costs.

<sup>13</sup> Donated materials and equipment are treated as income for tax purposes. However, because there was no cash outlay, no accounting cost is assigned to their use. This results in an overstated tax income without offsetting expenses. The problem is NOT the Armenian tax laws, but rather the accounting policies of NMMC.

<sup>14</sup> The use of an accounting convention, e.g. LIFO or FIFO, helps solve the problem of inflationary inventory replacement costs.

*Recommendations*

- 11. Thoroughly review the pricing policy, to determine the feasibility of shifting from average cost pricing to marginal cost pricing.**
- 12. Using a patient-tracking system, evaluate the feasibility of charging patients for actual use of hospital services and materials.**
- 13. If average pricing is used, compute the historical deficit and allocate this deficit to the cost of different procedures, such that average costs include an explicit subsidy component.**
- 14. Adopt a LIFO (Last In, First Out) inventory accounting system.**
- 15. Include physical depreciation of donated and purchased fixed equipment in cost estimates used for pricing decisions.**

## Summary of Recommendations and Estimated Costs

Recommendations can be grouped into four categories with respect to the investment required to implement.

1. Hardware for computerization of physical and financial flows;
2. Software for computerization of physical and financial flows;
3. Training on software use and analytical techniques for data generated by software; and
4. Human Resources.

### *Hardware*

- Installation of computerized inventory control (**Recommendation #1**)
- Installation of computer facilities, connected by a local area network (**Recommendation #5**)

Currently, NMMC is using 5 computers. Two are being used for patient records, one in the main reception area and one in the children's ward. One is located in the AUA project room, and is being used by an administrative assistant. Two are located in the doctors' area. One is used for a medical database and the occasional game playing, while the other is used for materials inventory records<sup>15</sup>.

We recommend a minimum of five additional computers, located in (1) the chief administrators office, (2) the accounting office, (3) the economist's office, (4) the materials inventory storeroom, and (5) the drug store. Should NMMC add the recommended new staff, additional computers will be needed for the financial officer and the internal auditor. Also, CBRD, in a separate report, is strongly recommending the hiring of one full time marketing manager, who will also be requiring a computer that is part of the LAN. If funds permit, it would be helpful to install a computer in the cashier's office.

A complete list of computer types, auxiliary equipment needs, and cabling needs (for a LAN system) is provided in the appendix.

Estimated costs are **\$7,000 to \$10,000**

### *Software*

- Development of inventory control system (**Recommendation #1**)
- Development of patient-tracking system (**Recommendation #2**)
- Development of tracking system for physician and nurse use (**Recommendation #4**)
- Development of a cash-flow model (**Recommendation #6**)

Programming needs for inventory are relatively simple. Supported by an appropriate paper trail, inventory items must be listed along with dates of purchase and purchase price (or replacement market value for donated items). As inventory items (materials, drugs, equipment) are distributed to departments, the system must track location, and eventual use.

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<sup>15</sup> The computer used for inventory records is privately owned by Dr. Hovakimian, and is not the property of NMMC.

Estimated Costs:	
Design:	\$500
Programming:	\$500
Total Cost:	<b>\$1,000</b>

The tracking systems are essentially paper systems, assigning an identification number to each patient and procedure, and recording materials use, time spent on procedures by surgical and support personnel, and time spent in different departments (e.g. intensive care, general recovery). Tracking can be easily integrated into the inventory control system.

Estimated Costs:	
Design:	\$250
Programming:	\$150
Total Cost:	<b>\$400</b>

A cash-flow model is the most important software need. Assuming that a generic model is designed, which is suitable for any Armenian medical institution, NMMC will be able to market this model to other hospitals and clinics, thus recovering the developmental costs.

Estimated Costs:	
Design:	\$2,000
Programming:	\$1,500
Total Cost:	<b>\$3,500</b>

Total Costs for all software development should not be more than **\$5,000**<sup>16</sup>. If the programs are marketed by NMMC to other medical centers, these costs can be partially or totally offset by the revenues received thereby.

### *Training*

- Provide training on various techniques of financial analysis (**Recommendation #8**)

The administrative assistant currently handling inventory data is computer literate, and should be able to be trained on the inventory and tracking systems quickly. She can then train additional staff as required.

Estimated training cost: **\$250**.

Training in the use of the cash-flow model will require development of an instruction manual and several training sessions, followed by monitoring of performance. Because the cash-flow model will generate both Western-style and Armenian pro forma documents, the end users should be familiar with both accounting systems. The chief accountant is already scheduled to receive

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<sup>16</sup> Programming costs could be significantly decreased by using unemployed programmers eager for work. However, we recommend the use of professional programmers willing to assist in the modification of systems during the first year.

training in international accounting standards. We would recommend that this training be extended to the economist and head administrator. If the positions of financial officer and auditor are added to the NMMC staff, as we strongly recommend, the individuals chosen should be familiar with both accounting systems.

The basic use of the cash-flow model can be learned quickly. Assuming that staff is familiar with Western accounting practices, three or four training sessions should be sufficient.

Estimated basic training costs: **\$400.**

Training in the analytical use of the data generated will take longer. Current personnel were trained in the Soviet system, and are unfamiliar with even the most basic economic/financial concepts and analytical techniques. Training of current staff by an external consultant would require the equivalent of a basic course in financial analysis.

Estimated cost: **\$5,000.**

We feel that it would be more cost effective to add the position of financial officer, and to allow the financial officer (and possibly the internal auditor) to provide in-house training on a continuous basis. The training required externally would be collaboration between the system designer and the financial officer (and internal auditor).

Estimated cost: **\$1,000.**

With appropriate training, NMMC can leverage the investment in training so that there is no additional cost for our analytical recommendations:

- Systematically Analyze of Input Use for Specific Procedures (**Recommendation #3**)
- Thoroughly review the pricing policy, to determine the feasibility of shifting from average cost pricing to marginal cost pricing (**Recommendation #11**)
- Evaluate the feasibility of charging patients for variable services (**Recommendation #12**)
- Allocate deficits to cost estimates (**Recommendation #143**)
- Adopt a LIFO inventory accounting system (**Recommendation #14**)
- Include physical depreciation in cost estimates (**Recommendation #15**)

### *Human Resources*

- Hire a Chief Financial Officer (**Recommendation #7**)
- Hire an Internal Auditor (**Recommendation #9**)

We feel strongly that the staff at NMMC needs an analytically trained financial officer. There is no need for a medical or hospital specialist; indeed, we recommend that the financial officer be from outside the Armenian medical system. The financial officer should be considered a senior administrator, working in partnership and not totally subordinate to the main administrator.

Unfortunately, the salary policy at NMMC is to pay all senior staff the same salary, \$420 per month, net (about \$600 per month, gross). It is unclear whether a capable financial analyst can be found at this non-competitive wage level. However, we will assume that an entry level MBA can be hired.

Estimated cost: **\$7,200 per year.**

We also recommend an internal auditor, hopefully with sufficient computer expertise to double as a computer systems manager. Again, this needs to be a senior administrative position.

Estimated cost: **\$7,200 per year**

*Investment Summary – Year 1*

Hardware	\$10,000
Software:	\$ 5,000
Training:	\$ 1,400
Human Resources:	<u>\$14,400</u>
 TOTAL	 \$30,800

## Concluding Remarks

As a medical center, NMMC produces a quality product that is highly competitive throughout the CIS countries. But as a business, NMMC lacks modern management systems and pursues pricing policies that undermine its competitive advantage. NMMC must make the difficult transition from a Soviet-style **hospital** to a modern **business** providing quality medical services.

Part of this transition is a change in psychology. Hospital administrators must begin thinking like businessmen, balancing their humanitarian urges against the fiscal discipline required by market forces. Development of a business psychology is not easy; indeed, if the American experience is a guide, it is likely to be strongly resisted by the medical community.

The Armenian medical system is collapsing. The depressed economy makes it inevitable that hospitals and clinics will be closed, state-order subsidized services will be curtailed, and medical services will decline in both quantity and quality<sup>17</sup>. If NMMC is to avoid becoming a casualty of this general collapse, it must take steps now to preserve its fiscal integrity. It must begin anticipating and planning for the future.

NMMC has taken the first step - it has recognized that there is a problem, and is seeking solutions. Solutions must be based on facts. Many of our recommendations are designed to provide NMMC with the facts, the data needed for fiscal planning. Analytical use of these facts will require staff training and the addition of a business-oriented fiscal officer. Implementation of the findings of such analyses will require hard choices, choices that are especially difficult for a medical establishment that is obsessed with conserving obsolete, inefficient, and counterproductive practices inherited from the Soviet system.

Perhaps the most disturbing aspect of our study has been the attitude that “it can’t be done that way in Armenia.” While sensitive to Armenian cultural values, our response is simple: It must be done that way in Armenia, and it will be done that way in Armenia. Armenia has already changed. Armenia will continue to change. If NMMC hopes to survive, it must change as well. Our recommendations will provide NMMC the facts and the analytical justifications needed for change. But ultimately, survival requires NMMC administrators to have the resolve and courage to make changes.

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<sup>17</sup> The Ministry of Health plans to close approximately half of the current clinics and hospitals, by auctioning state-order contracts to a limited number of facilities. Also, due to budgetary limitations, it plans to reduce the number of state-order procedures and recipient categories.

## **Complete List of Recommendations**

1. Development and implementation of an inventory control system – Materials Management System
2. Development and Implementation of a patient-tracking system – Healthcare Information System
3. Analysis of input use for Specific Procedures.
4. Development and implementation of a system for tracking physician and nurse use in specific procedures.
5. Installation of computer facilities, and creation of a local area network covering accounting, hospital administration (including “the economist”), and inventory control.
6. Design and implementation of a customized cash-flow model – Accounting Information System
7. Create a new position, “chief financial officer”, with specific responsibility for monitoring the financial position of NMMC, identifying financial problems, anticipating financial problems, and suggesting solutions to financial problems.
8. Provide training to both the administration and the financial officer on various techniques of financial analysis, especially financial forecasting.
9. Create the position of “internal auditor” perhaps combined with responsibilities as the computer system administrator.
10. Once the new system is in place and has a history of successful operation, adopt a schedule of regular internal audits
11. Thoroughly review the pricing policy, to determine the feasibility of shifting from average cost pricing to marginal cost pricing.
12. Using a patient-tracking system, evaluate the feasibility of charging patients for actual use of hospital services and materials.
13. If average pricing is used, compute the historical deficit and allocate this deficit to the cost of different procedures, such that average costs include an explicit subsidy component.
14. Adopt a LIFO (Last In, First Out) inventory accounting system.
15. Include physical depreciation of donated and purchased fixed equipment in cost estimates used for pricing decisions.

## APPENDIX

### Detailed Budget for Computers & Related Equipment / Setting up a LAN (in US\$)

Item	Qty	Cost Spectrum			
		Cheapest	—————>		Most Expensive
Cable - Building I	340m	170	170	170	170
Cable - Building II	130m	65	65	65	65
Combo Ethernet card	1	15	15	15	15
Ethernet card PCI	11	220	330	605	770
Ethernet card ISA	1	15	15	15	15
BNC T-Connector	2	1	1	1	1
BNC 50 m terminator	2	1.2	1.2	1.2	1.2
Jack RJ-45	40	24	24	24	24
Hub 16 port	1	480	480	480	480
Hub 8 port with BNC	1	55	55	55	55
Server	1	520	520	520	520
Workstations	7	2730	2940	3150	3150
Monitors	8	1304	1360	1480	1560
<i>Total<sup>18</sup></i>		5600.2	5976.2	6581.2	6826.2

According to the plan of the distribution of the computers in the clinic, this report assumes 12 workstations and one file server will be inserted in the local network of the clinic. Diagram A (on pg. 17) shows a representation of the computers and their relationship in the network.

5 of the 12 workstations already exist in the clinic and are operating as non-connected computers (without network facility). They are shown in the dark color.

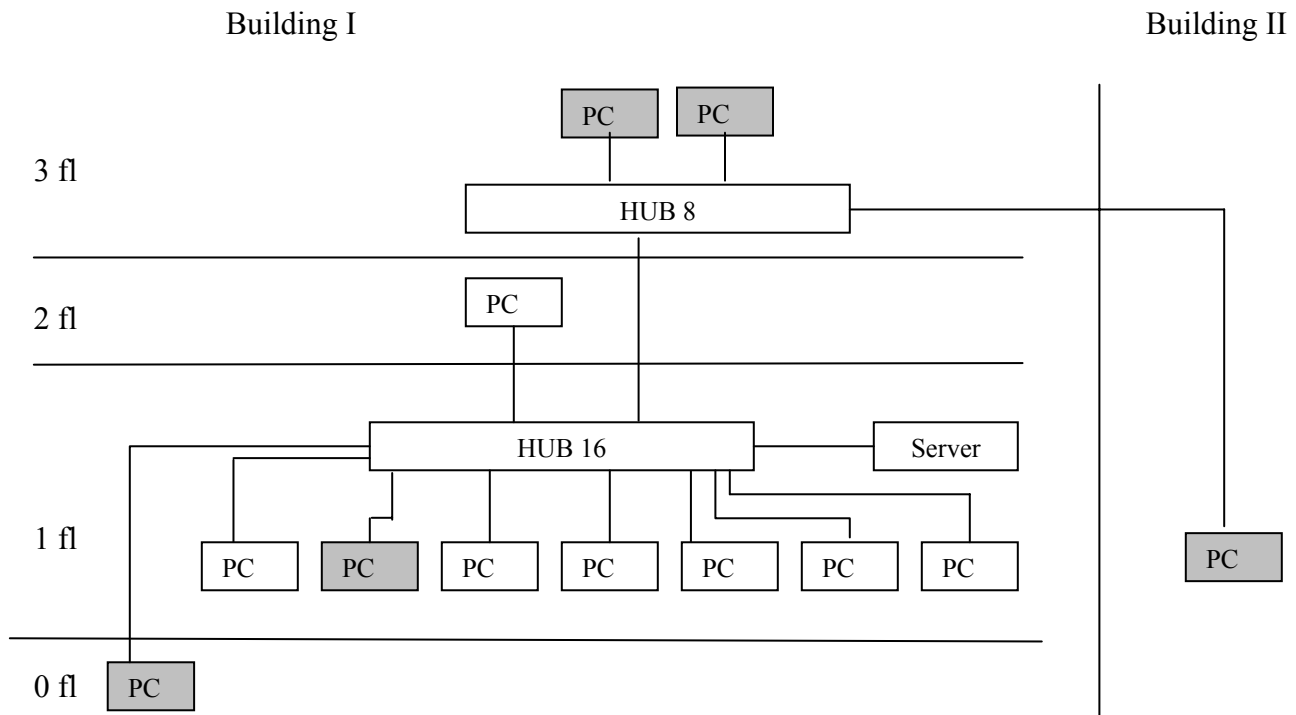
12 computers (11 workstations and 1 server) are in Building I (the main building), and one is in Building II (the pediatric section).

Conditional plans of the two buildings of the clinic are diagram by floor at the end of this Appendix.

On each floor there are rooms where computers and network equipment are to be installed. The rooms are numbered conditionally for the calculation of the necessary network cable.

<sup>18</sup> Note: These figures do not include prices for any peripherals, such as UPSes, printers etc., nor does it include installation costs. The \$10,000 figure in the main budget was arrived at taking this into consideration, and should be sufficient to cover all the computer hardware needs

Diagram A



The selection of the rooms for the installation of the network equipment is dictated by the following:

- For the present time it is the place where the computers are concentrated the most. This will minimize the outlay of the cable.
- It will insure the connection with the essential length between net's segments of the two buildings.

The connection between Buildings I and II should be carried out overhead with the help of coaxial cable. Coaxial cable should be put through the rubber tube for keeping the cable safe from atmospheric impact. The cable should be fixed with rope for protecting the cable from mechanical influence.

Coaxial cable should connect the network card of the computer in the room 11, Building II (see floor plans) with the BNC port of the HUB in room 9, Building I. The length of the cable should not be more than 180 m. This kind of configuration of this part of the network will allow the future development of the net's segments in Building II and in Building I by only setting up additional network equipment without changing the wires of the cable.

The connection of the computers in Building I should be carried out by the UTP cable of the fifth category.

**The type and the length of the cable is presented below:**

Cable UTP cat.5

**From To**

Room 3- Room 6 80 m  
Room 3- Room 1 50m  
Room 3- Room 2 8m  
Room 3- Room 3 4m+4m  
Room 3- Room 4 8m  
Room 3- Room 5 16m  
Room 3- Room 8 30m  
Room 3- Room 9 80m  
Room 3- Room 10 30m  
Room 3- Room 9 4m+25m

**Total 340m\*\$0.5=\$170**

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Cable Coaxial 75om

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**From To**

Room 9- Room 11 130 m\*\$0.5

**The specification of the accessories for the installation of the network are presented below:**

Item	Qty.	Cost per unit
Combo ethernet card for PCI bus (with BNC )	1	\$15
Ethernet card for PCI bus	11	\$20,\$30,\$55,\$70
Ethernet card for ISA bus	1	\$15
BNC T-connector	2	\$0.5
BNC 50om terminator with ground	2	\$0.6
Jack RJ-45	40	\$0.6
HUB 16 port	1	\$480
HUB 8 port with BNC	1	\$55

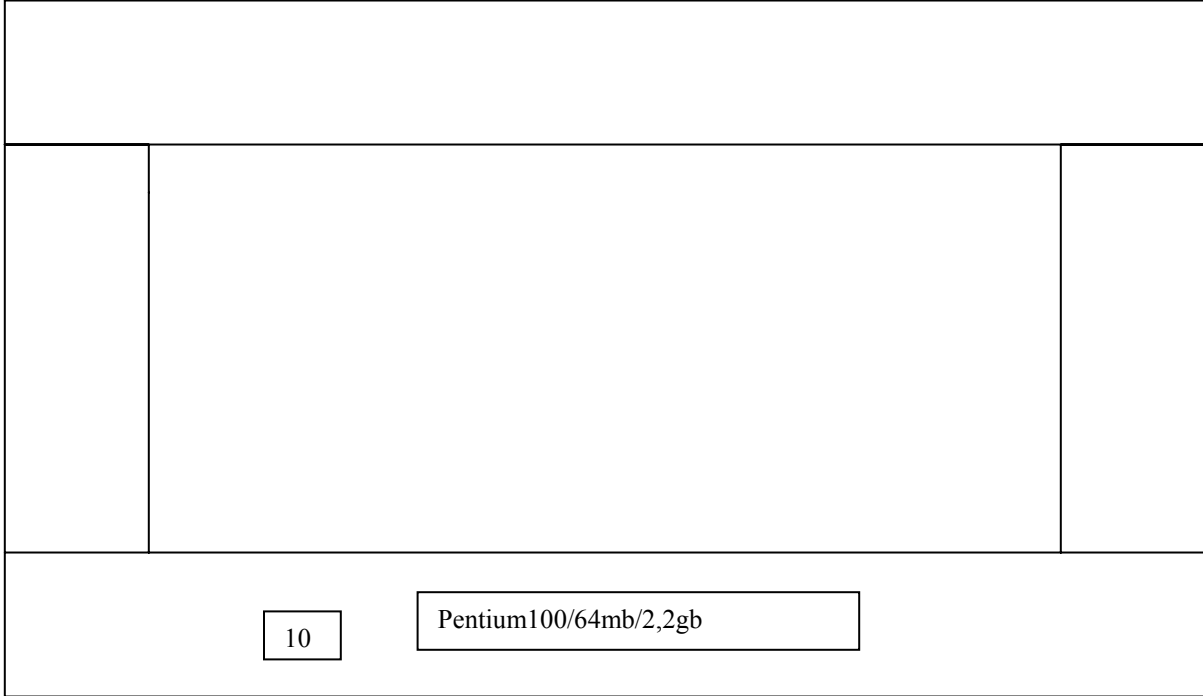
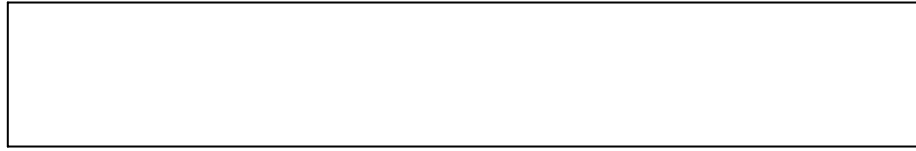
**The specification of computers and monitors that necessary to buy is presented below:**

Item	Qty	Unit Price	Potential source
Workstations (Celeron 433-600 or AMD K6-2 500)	7		
Server (PentiumIII 550)	1		
Monitors (14" or 15" Sumsung or ViewSonic)	8		
AMD K6-2 500Mhz/32mb/10,2gb,4mb AGP	1	\$390	Firm BYTE
Celeron 433/32mb/14,3gb/4mb,S3	1	\$420	Firm CIT
Celeron II 600/32mb/10,2gb/4mb AGP/	1	\$450	Firm BYTE
Pentium III 550	1	\$520	Firm BYTE
Monitor 14"	1	\$163-\$170	
Monitor 15"	1	\$185-\$195	

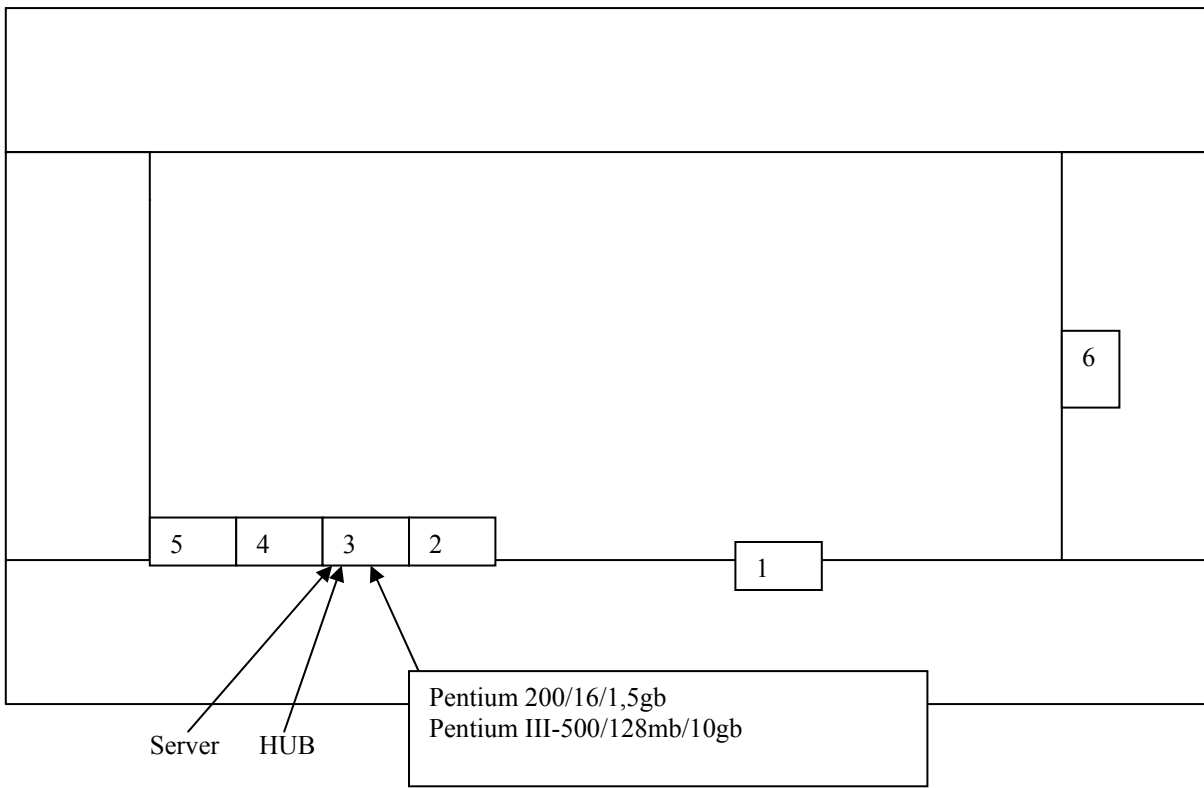
Room Nos. (Floor Plans begin from next page)

1. Director
2. Economist
3. Administrative Assitant 1
4. Accounting 1
5. Accounting 2/Other
6. Cashier/Other
7. Engineering/Other
8. Supplies disposal/Head Nurse
9. Administrative Assitant 2/Inventory Control
10. Reception, Adults' Section
11. Reception, Pediatric Section

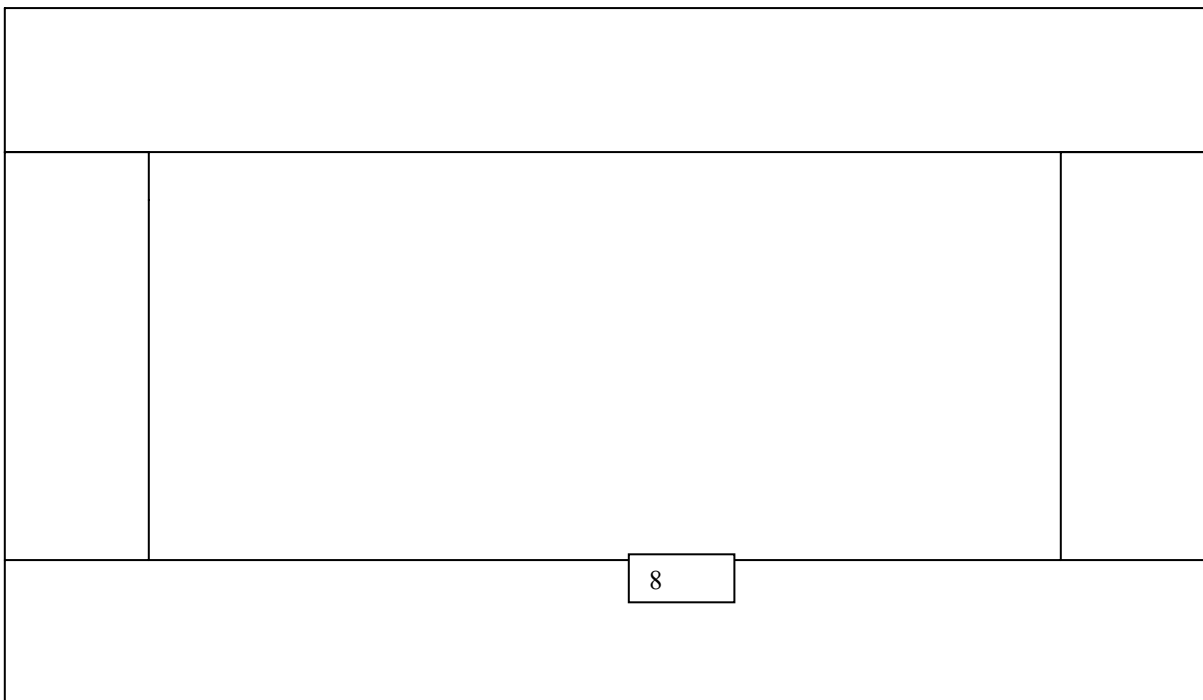
**“0” floor**



**"1" floor**



**“2” floor**



**"3" floor**

