

A Comprehensive Cost Analysis of Medicare Home Oxygen Therapy

A Study for the American Association for Homecare

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Executive Summary

A national study of the costs and resources required for providing home oxygen therapy for Medicare beneficiaries was conducted for the American Association for Homecare. Seventy-four (74) oxygen services providers delivering services to more than 1.7 million Medicare beneficiaries and more than 600,000 beneficiaries receiving medical oxygen at home, completed a detailed survey, which identified the costs and resources used in providing oxygen services. Survey findings demonstrated that oxygen systems (equipment) alone represent only 28 percent of the cost of providing medically necessary oxygen to Medicare beneficiaries. Oxygen therapy in the home also requires preparing and delivering equipment, delivering supplies and maintenance of oxygen equipment, assessing, training and educating patients, obtaining required medical documentation and providing customer service for beneficiaries, other related services, and operating and overhead costs, which taken together represent 72 percent of the cost of home oxygen therapy for Medicare beneficiaries. These services are essential components of providing oxygen therapy to the more than 1 million Medicare beneficiaries who rely on this treatment.

Introduction

The total costs of services for providing medical oxygen therapy in the home have not been well documented; however, it is known that multiple items contribute to these costs. In addition to the cost of equipment, the cost of providing oxygen therapy to homecare patients includes costs such as patient intake, preparation and delivery, scheduled and unscheduled maintenance, patient

assessment, training and education, ongoing patient support, including costs associated with oxygen fills, disposable supply items and delivery, related services and compliance with Federal and State regulations, including Food and Drug Administration (FDA) and Department of Transportation (DOT) requirements. Limited documentation of these components and their costs has led to misunderstanding by policymakers about the resources required to provide home oxygen equipment and services for Medicare beneficiaries.

A clear understanding of the costs for home oxygen therapy is particularly important because of policy changes made by the Deficit Reduction Act of 2005 (DRA), which changed the method of reimbursement for home oxygen under the Medicare program. The DRA requires that patients take ownership of home oxygen equipment after 36 months of rental. The changes assume that the ongoing costs of services required for home oxygen therapy are low and can be essentially disregarded in determining Medicare reimbursement. The DRA changes also assume that the overseeing of key services required for home oxygen therapy can in some manner become the responsibility of home oxygen patients, who require oxygen therapy for such illnesses as chronic obstructive pulmonary disease (COPD), congestive heart failure (CHF), respiratory failure, ALS and other serious diseases.

In order to more completely document the costs for providing home oxygen to Medicare beneficiaries, the American Association for Homecare (AAHomecare) commissioned a study by Morrison Informatics, Inc. (MII), to determine the costs of providing oxygen to Medicare homecare patients. MII conducted a national survey of provider members of AAHomecare to collect comprehensive financial and resource use data associated with providing home oxygen to Medicare beneficiaries. The survey captured detailed activity-based cost data from providers

representing more than 600,000 Medicare home oxygen beneficiaries, or approximately 60% of the estimated 1 million total Medicare population receiving such services.

Methods

The *Homecare Oxygen Service Provision Survey* was developed and sent in March 2006 to members of AAHomecare, an organization that includes homecare providers of all sizes operating in all 50 states. The survey contains detailed questions on the costs and resources for providing oxygen to Medicare homecare patients for the most current year-to-date time period available (Appendix A). Major cost categories contained in the survey include: total oxygen system cost; patient intake, obtaining required medical documentation and providing customer service for beneficiaries; preparation and return processing of equipment; equipment delivery, set-up and instructions for the patient; scheduled and unscheduled delivery and equipment maintenance; maintenance supplies and disposables; patient assessment and compliance monitoring; and other operating and overhead costs. The survey collected data on the average time, materials and cost for each survey item within a category for providing home oxygen and oxygen equipment to home oxygen patients for each homecare provider. Detailed explanations of each survey question are contained in the survey (Appendix A).

Home Oxygen Provision Survey Results

1. Survey Participants

A total of 78 provider organizations completed the survey; 74 usable surveys were obtained (four surveys were not usable because of missing data). The 74 completed surveys represent results from providers serving 1.7 million Medicare beneficiaries, of whom 600,000 receive oxygen equipment. This represents a substantial proportion of all Medicare beneficiaries receiving home

oxygen equipment. Providers responding to the survey provide services to an average of 24,000 Medicare beneficiaries per year and an average of 8,000 oxygen equipment Medicare beneficiaries per year (Table 1).

Table 1: Organizations Responding to the Oxygen Service Provision Survey

Total number of provider organizations responding to survey	74
Total number of Medicare beneficiaries YTD serviced by providers	1,750,723
Total number of oxygen equipment Medicare beneficiaries YTD by providers	607,484
Average number of Medicare beneficiaries YTD per company	23,982
Average number of oxygen equipment Medicare beneficiaries YTD per company	8,209

2. Survey Results

The overall average per-patient, per-month cost and resource use data from each survey item can be found in Appendix B. In addition to total oxygen equipment costs, including stationary, portable and backup unit costs, the major cost components of providing oxygen to patients at home include: the cost of obtaining patient information and related medical documentation necessary for patient intake; labor related to initial preparation of equipment; equipment delivery and set-up time; costs associated with scheduled and unscheduled maintenance and repair; ongoing patient support, including costs associated with oxygen fills, disposable supply items and delivery; vehicle costs associated with deliveries, maintenance and other in-home patient support services; costs of ongoing patient assessment, training, education and compliance monitoring; and other necessary operating and overhead costs. The average provider cost of each major cost component is shown in Table 2 and the relative proportional contribution of each major cost component to the total direct cost is shown in Figure 1.

Table 2: Overall per-Patient per-Month Costs for Major Cost Components of Home Oxygen Provision

Cost Component	Average Cost Per-Patient Per-Month
1. SYSTEM ACQUISITION ¹	\$55.81
2. INTAKE AND CUSTOMER SERVICE ²	\$12.66
3. PREPARATION, RETURN, DISPOSABLES, AND SCHEDULED MAINTENANCE ³	\$25.24
4. UNSCHEDULED REPAIRS AND MAINTENANCE ⁴	\$6.10
5. PATIENT ASSESSMENT, TRAINING, EDUCATION AND MONITORING ⁵	\$17.54
6. DELIVERY ASSOCIATED WITH PREPARATION, RETURN, DISPOSABLES, AND SCHEDULED MAINTENANCE ⁶	\$42.26
7. OTHER MONTHLY OPERATING AND OVERHEAD ⁷	\$41.59
8. TOTAL DIRECT COST BEFORE TAXES	\$201.20

¹ The amount includes acquisition costs for stationary, portable and backup units, conserving devices, ancillary equipment and accessories, and oxygen system contents (liquid and gaseous oxygen).

² The amount includes labor associated with patient intake functions, ongoing customer service (patient inquiries, scheduling of deliveries/maintenance/clinical visits, accommodating patient travel plans), and initial and renewal prescription processing.

³ The amount includes labor associated with equipment preparation (testing, cleaning, and repair), equipment set-up and maintenance upon return, initial patient instruction, cost of disposable and maintenance supplies, and labor costs associated with scheduled preventive equipment maintenance.

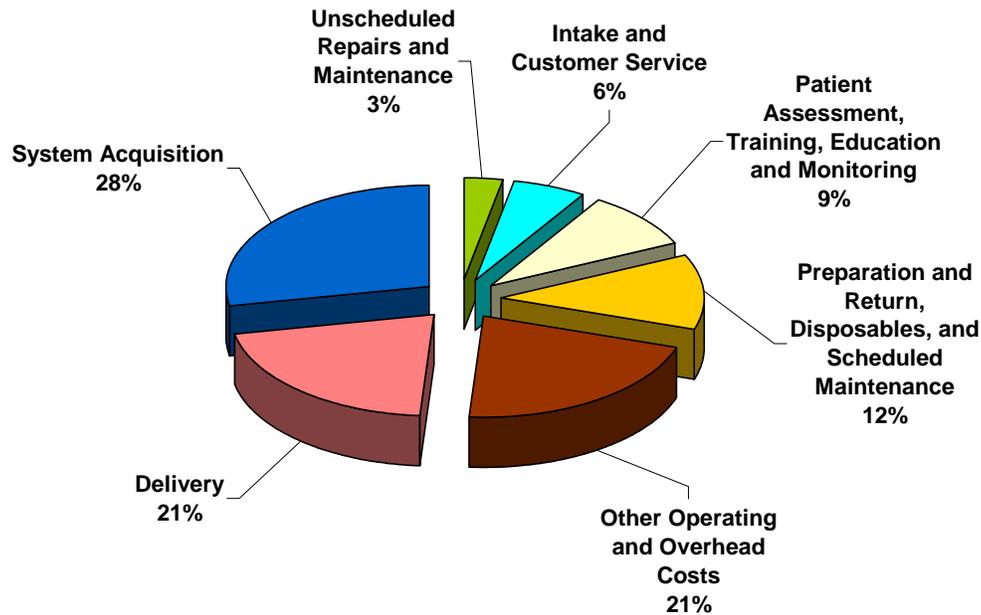
⁴ The amount includes labor and vehicle costs associated with unscheduled equipment repair and maintenance.

⁵ The amount includes labor and travel costs associated with clinical visits by respiratory care practitioner, in-home patient assessments (including home environment safety assessment and oxygen therapy plan of care), training, education and compliance monitoring.

⁶ The amount includes delivery costs associated with oxygen fills (liquid and gaseous oxygen), preparation, return, disposables and scheduled maintenance.

⁷ The amount includes rent and other facility costs, administration, insurance, legal, regulatory compliance, MIS systems/controls, communications systems, employee training, accreditation, supplies, billing and compliance functions.

Figure 1: Home Oxygen Services Cost Component Proportions



3. Discussion

The purpose of this study was to determine, for homecare providers, the relative cost of the components of providing home oxygen to Medicare beneficiaries. The *Homecare Oxygen Service Provision Survey* did not collect data on specific components of *other operating and overhead* costs, which contributed a large proportion (21%) of the total cost of providing home oxygen. The components of *other operating and overhead* costs include costs associated with rent and other facility costs, administration, insurance, legal, regulatory compliance, MIS systems/controls, communications systems, employee training, accreditation, supplies, and billing and compliance functions. Because the values for other operating and overhead costs reported by the survey respondents were collected on an aggregate basis, further study of these

components will be necessary to better understand the nature of these expenses. The reported provider average total cost of providing oxygen, oxygen equipment and services, per patient is \$201.20 per month.

The costs of providing oxygen and oxygen equipment for Medicare beneficiaries consist of multiple components, including *total oxygen equipment costs, patient intake and obtaining required medical documentation and providing customer service for beneficiaries, preparation and return processing of equipment, equipment delivery, set-up and instruction of the patient, scheduled and unscheduled delivery and equipment maintenance, maintenance supplies, disposables and deliveries, patient assessment and compliance monitoring, and other operating and overhead costs*. The cost of oxygen equipment represents only 28 percent of the total cost of providing oxygen to Medicare beneficiaries. Many, if not most, of the other costs of providing home oxygen have not been carefully documented and recognized by policymakers, and have been assumed to be low and easily obtained when providing home oxygen services. Data from the *Homecare Oxygen Service Provision Survey* demonstrate that providing homecare oxygen requires multiple interdependent tasks which are essential to assure continuous and consistent oxygen services for Medicare beneficiaries. These required tasks are performed by providers to assure adequate oxygen services for Medicare beneficiaries. It is not clear how these services would be performed for beneficiaries if Medicare coverage of the required services were not provided.

Conclusions

A national study of the costs and resources required for providing home oxygen therapy for Medicare beneficiaries was conducted for the American Association for Homecare. Seventy-

four (74) oxygen services providers delivering services to more than 1.7 million Medicare beneficiaries and more than 600,000 beneficiaries receiving medical oxygen at home, completed a detailed survey, which identified the costs and resources used in providing oxygen services. Survey findings demonstrated that oxygen systems (equipment) alone represented only 28 percent of the cost of providing medically necessary oxygen to Medicare beneficiaries. Oxygen therapy in the home also requires preparing and delivering equipment, delivering supplies and maintenance of oxygen equipment, assessing, training and educating patients, obtaining required medical documentation and providing customer service for beneficiaries, other related services, and operating and overhead costs, which taken together represent 72 percent of the cost of home oxygen therapy for Medicare beneficiaries. These services are essential components of providing oxygen therapy to the more than 1 million Medicare beneficiaries who rely on this treatment. Further reductions in Medicare reimbursement for home oxygen as a result of the 36-month cap, the CPI freeze and the effects of competitive bidding will be problematic for home care providers and may jeopardize the quality of home care oxygen services given to Medicare beneficiaries.

Appendix A: Oxygen Service Provision Survey Items

1. The total number of Medicare beneficiaries served during the most recent one-year period
2. The total number of Medicare oxygen equipment beneficiaries during the most recent one-year period

A. EQUIPMENT ACQUISITION (Stationary, Back-up and Portable Equipment)

1. Stationary system average acquisition cost
2. Home back-up unit average cost (cylinder, stand, regulator, flow meter)
3. Portable system average acquisition cost, including conserving devices
4. Equipment salvage / trade-in average value for stationary and portable
5. Total equipment average acquisition cost
***** $A1 + A2 + A3 - A4$ *****
6. Average useful equipment life in months
7. Average monthly equipment acquisition cost
***** $A5 / A6$ *****
8. Total oxygen contents average cost per month, all systems
9. Average cost of debt %
10. Average monthly financing charge - equipment acquisition
***** $(A1+A2+A3-A4) \times A9 / 12$ *****
11. Average monthly acquisition cost of system
***** $A7 + A8 + A10$ *****
12. Average number of stationary systems required in stock
to support every 10 units in the field
13. **TOTAL SYSTEM AVERAGE COST PER MONTH**
***** $A11 + (A7 + A10) \times (A12 / 10)$ *****

B. CUSTOMER SERVICE AND PATIENT INTAKE

1. Estimated annual intake time per patient, in minutes (Complete **Patient Intake Worksheet**)
2. Ongoing customer service time, in minutes, per patient per month
(patient inquiries, scheduling of deliveries/maintenance/
clinical visits, accommodating patient travel plans, etc.)
3. Annual prescription renewal preparation and processing time, in minutes per patient
4. Labor cost per hour - Customer Service Representative
 - a. Average hourly wage rate
 - b. Fringe benefits as a % of wage rate
 - c. *Labor cost per hour*
***** $B4a \times (1 + B4b)$ *****
5. **AVERAGE TOTAL MONTHLY COST OF INTAKE AND CUSTOMER SERVICE PER PATIENT**
***** $((B2 + (B1 + B3)/12) / 60) \times B4c$ *****

C. PREPARATION BEFORE DELIVERY

1. Average labor amount per unit (teardown, testing, cleaning, reassembly, bagging, boxing, loading), in minutes
2. Repair labor necessary as a result of problems encountered during pre-delivery preparation:
 - a. Percentage of units requiring repair
 - b. Average labor amount per unit (diagnosis and repair), in minutes
 - c. Average repeat preparation labor amount per unit (testing, cleaning, etc.), in minutes
 - d. Total weighted average repair labor per unit, in minutes
***** $(C2b + C2c) \times C2a$ *****
3. Total weighted average preparation and repair labor per unit, in minutes
***** $C1 + C2d$ *****
4. Labor cost per hour - Equipment Technician
 - a. Average wage rate
 - b. Fringe benefits as a % of wage rate
 - c. Average labor cost per hour
***** $C4a \times (1 + C4b)$ *****
5. AVERAGE TOTAL COST OF PREPARATION PER UNIT
***** $(C4c / 60) \times C3$ *****

D. VEHICLE COST PER MILE

1. Acquisition and repair cost:
 - a. Average vehicle acquisition cost per month (fully outfitted) - lease
 - b. Average maintenance & repair cost per vehicle per year
 - c. Average insurance & registration cost per vehicle per year
 - d. Average odometer miles per vehicle per year
 - e. Average vehicle acquisition, maintenance & repair cost per mile
***** $((D1a \times 12) + (D1b + D1c)) / D1d$ *****
2. Gasoline cost per mile:
 - a. Average miles per gallon
 - b. Average gasoline cost per gallon
 - c. Average gasoline cost per mile
***** $D2b / D2a$ *****
3. TOTAL VEHICLE COST PER MILE
***** $D1f + D2c$ *****

E. DELIVERY / SETUP / PICKUP COST

1. Average round trip travel time, in minutes
2. Average in-home setup time, in minutes
3. Average in-home client instruction time (Complete Patient Education Worksheet)
4. Average in-home pickup time, in minutes
5. a. Average service technician wage rate per hour
b. Fringe benefits as a % of wage rate
6. Labor cost - delivery, setup, pickup
***** $(E1 \times 2 + E2 + E3 + E4) \times (E5a \times (1+E5b)) / 60$ *****
7. Average round trip miles
8. Average vehicle cost - delivery, setup, pickup
***** $E7 \times D3$ *****
9. TOTAL AVERAGE DELIVERY / SETUP / PICKUP COST PER PATIENT
***** $E6 + E8$ *****

F. EQUIPMENT MAINTENANCE UPON RETURN

1. Average labor amount (preparation plus filter change), in minutes
2. Repair labor necessary as a result of problems encountered during pre-delivery preparation:
 - a. Percentage of units requiring repair upon return
 - b. Average labor amount per unit (diagnosis, repair), in minutes
 - c. Average repeat preparation labor amount per unit (testing, cleaning, etc.), in minutes
 - d. Total weighted average repair labor per unit, in minutes
***** $(F2b + F2c) \times F2a$ *****
 - e. Total weighted average preparation and repair labor per unit, in minutes
***** $F1 + F2d$ *****
3. Average wage rate, including fringe benefits
4. AVERAGE TOTAL COST OF MAINTENANCE PER UNIT UPON RETURN
***** $F3 / 60 \times F2e$ *****

G. AVERAGE MONTHLY COST TO PREPARE, DELIVER AND RETURN

1. Average total cost for delivery and return
***** $C5 + E9 + F4$ *****
2. Average number of months in service, per patient
3. AVERAGE MONTHLY COST TO PREPARE, DELIVER AND RETURN
***** $G1 / G2$ *****

H. ROUTINE, IN-HOME DELIVERY, DISPOSABLE AND SCHEDULED MAINTENANCE COSTS

1. Maintenance Supplies:
 - a. Gross particle filters
Quantity used per year
Price, each
 - b. Pre-felt filters
Quantity used per year
Price, each
 - c. Hepa filters
Quantity used per year
Price, each
 - d. Intake filters
Quantity used per year
Price, each
 - e. *Average monthly maintenance supplies cost*
***** (Sum 1a thru 1d) / 12 *****
2. Disposable Supplies:
 - a. Humidifier bottles
Quantity used per month
Price, each
 - b. Tubing
Quantity used per month
Price, each
 - c. Tubing Connectors
Quantity used per month
Price, each
 - d. Nasal Cannulas
Quantity used per month
Price, each
 - e. *Average monthly disposable supplies cost*
***** (Sum 1a thru 1d Totals) *****
3. Routine, in-home delivery and scheduled maintenance labor and vehicle costs:
 - a. Average vehicle cost per mile ***** D3 *****
 - b. Average round trip miles ***** E7 *****
 - c. Average round trip travel time, in minutes ***** E1 *****
 - d. Average time to perform scheduled/preventive equipment maintenance, in minutes ***** C2c *****
{including filter cleaning/replacement, oxygen purity testing, alarm battery testing, PSI check on
back-up unit, liter flow compliance with Rx, and in-home repair of unit}
 - e. Average time to perform gaseous and/or liquid fills, in minutes ***** C2c *****
 - f. Service Technician wage rate per hour plus fringes ***** E5a x (1+E5b) *****
 - g. Number of scheduled/preventive equipment maintenance visits per year
 - h. Number of oxygen contents delivery visits per year (including gaseous and/or liquid fills)
 - i. *Average monthly routine maintenance labor and vehicle cost*
** (H3a x H3b + (H3c/60 x H3f) x ((H3g + H3h) - H3g) / 12 + ((H3d / 60) x H3f x H3g) / 12 + ((H3e / 60) x H3f x H3h) / 12 **
Note: Formula assumes that preventive maintenance visit occurs simultaneously with a delivery of oxygen fills
4. **AVERAGE TOTAL MONTHLY ROUTINE DISP AND SCHEDULED MAINT COSTS PER PATIENT**
***** H1 + H2 + H3 *****

I. COST OF UNSCHEDULED MAINTENANCE

1. Average vehicle cost, round trip ***** D3 x E6 *****
2. Service Technician labor cost per hour ***** E1 x H3e *****
3. Repair / Maintenance labor cost ***** F2b x F4 / 60 *****
4. Average # of calls per month per 10 units in service
5. Vehicle and delivery cost per unit per month
***** (I1 + I2 + I3) x (I4 / 10) *****

J. COST OF PATIENT ASSESSMENT

1. Average number of clinical visits per year by RCP
2. Average round trip travel time, in minutes
3. Average in-home patient assessment time per visit, in minutes
 - Include time for home environment safety assessment - storage and maintenance
 - Include time for home environment safety assessment - administration
 - Include time for development of oxygen and equipment in-home care plan
4. Average in-home follow up and compliance monitoring time per visit, in minutes
 - Include weekly calls to patients to determine requirement for portable oxygen
 - Include compliance monitoring conducted in the home at least once per month
 - Include time for contacting physician whenever there is a question about the oxygen order or a change in patient status or care plan
5. a. Average RCP wage rate per hour, excluding benefits
- b. Fringe benefits as a % of wage rate
6. Average vehicle reimbursement per visit for RCP (at federal rate per mile of \$0.445)
7. AVERAGE TOTAL COST OF PATIENT ASSESSMENT PER PATIENT PER MONTH
***** ((J2 + J3 + J4) x ((J5a x (1 + J5b)) / 60) + J6) x (J1 / 12) *****

K. TOTAL MONTHLY DIRECT COST BEFORE OVERHEAD AND PROFIT

***** A13 + B5 + G3 + H5 + I5 + J7 *****

L. OVERHEAD COSTS

1. Overhead Factor - Overhead costs as a % of Direct Costs
{Rent, Facility, Administration, Insurance, Legal, MIS Systems/Controls, Regulatory Compliance, Communications Systems, Training, Accreditation, Supplies, Billing and Reimbursement Functions}
2. Estimated average monthly overhead cost per patient

M. TOTAL MONTHLY COST

***** K + L2 *****

N. PROFIT SUMMARY

1. Average Medicare Reimbursement per patient - Stationary and Portable Oxygen
2. Less: Write-offs, Hardships, etc. (%)
3. Net Reimbursement per patient per month **** N1 + N2 ****
4. Less: Average Total Costs to Supplier Per Patient
5. Average Net Profit Per Patient Before Taxes **** N3 + N4 ****

O. Net Profit Margin Before Taxes

***** N5 / N1 *****

PATIENT INTAKE (Minutes per-patient per year)

- A. Verification of beneficiary eligibility, claims management, and claims submission
- B. Collect and record physician information
- C. Receive, document and process order for oxygen and oxygen equipment
- D. Verification of the following:
 - 1. Patient demographic information
 - 2. Patient possession of a valid Medicare number
 - 3. Patient emergency contact information
 - 4. Caregiver and/or conservator information
 - 5. Secondary insurance information
 - 6. Qualifying diagnosis
 - 7. Estimated total time for verification per year per patient**** D1 + D2 + D3 + D4 + D5 + D6 ****
- E. Input patient data in computer at service center
- F. Schedule delivery
- G. Contact physician to verify order, demographic information and license number
- H. Verify physician UPIN with independent database
- I. Coordinate or verify the existence of independent blood oxygen saturation study or ABG test
- J. Obtain physician-signed certificate of medical necessity (CMN)
- K. *Average estimated annual total intake time per patient*
**** A + B + C + D7 + E + F + G + H + I + J + K ****

PATIENT EDUCATION (Minutes per-patient per episode)

- A. Supplier required training of patient and caregiver
- B. Contracted interpreter services, if applicable
- C. Patient and/or caregiver instruction in assembly and operation of oxygen and equipment
- D. Oxygen safety training
- E. Patient and/or caregiver training on "troubleshooting" possible equipment problems
- F. Patient and/or caregiver instruction on proper infection control in the home
- G. Patient and/or caregiver instruction on safe handling and storage of medications
- H. *Average total intake time per patient*
**** A + B + C + D + E + F + G ****

Appendix B: Overall per Patient per Month Costs for Home Oxygen Providers

Survey Item	Average
A1.Stationary system average acquisition cost	\$706.23
A2.Home back-up unit average cost (cylinder, stand, regulator, flow meter)	\$152.32
A3.Portable system average acquisition cost, including conserving devices	\$471.09
A4.Equipment salvage / trade-in average value for stationary and portable	\$40.11
A5.Total equipment average acquisition cost	\$1,288.63
A6.Average useful equipment life in months	60.44
A7.Average monthly equipment acquisition cost	\$23.23
A8.Total oxygen contents average cost per month, all systems	\$17.77
A9.Average cost of debt %	0.07
A10.Average monthly financing charge - equipment acquisition	\$7.76
A11.Average monthly acquisition cost of system	\$48.76
A12.Average number of stationary systems required in stock to support every 10 units in the field	2.53
A13.TOTAL SYSTEM AVERAGE COST PER MONTH	\$55.81
B1. Estimated annual intake time per patient, in minutes (From the Patient Intake Worksheet)	166.36
B2. Ongoing customer service time, in minutes, per patient per month (patient inquiries, scheduling of deliveries/maintenance/ clinical visits, accommodating patient travel plans, etc.)	28.73
B3. Annual prescription renewal preparation and processing time, in minutes	43.07
B4a. Labor cost per hour - Customer Service Representative Average wage rate	\$13.52
B4a. Labor cost per hour - Customer Service Representative Fringe benefits as a % of wage rate	0.22
B4a. Labor cost per hour - Customer Service Representative Labor cost per hour	\$16.55
B5. AVERAGE TOTAL MONTHLY COST OF INTAKE AND CUSTOMER SERVICE PER PATIENT	\$12.66
C1. Average labor amount per unit (teardown, testing, cleaning, reassembly, bagging, boxing, loading), in minutes	36.70
C2a. Repair labor necessary as a result of problems encountered during pre-delivery preparation: Percentage of units requiring repair	0.10
C2b. Repair labor necessary as a result of problems encountered during pre-delivery preparation: Average labor amount per unit (diagnosis and repair), in minutes	37.09
C2c. Repair labor necessary as a result of problems encountered during pre-delivery preparation: Average repeat preparation labor amount per unit (testing, cleaning, etc.), in minutes	30.54
C2d. Repair labor necessary as a result of problems encountered during pre-delivery preparation: Total weighted average repair labor per unit, in minutes	6.70

