

October 11, 1989

In the late 1950s and early 1960s, Dr. Richard Thie and Bob Patrick used to consult on an informal basis with John Kirkland over the drapes regarding respiratory problems associated with the heart surgical patients. They would occasionally go down to the postoperative area to help out. About the same time, neuroanesthesia participated with neurology in a cooperative arrangement to manage patients in the neuro postoperative area who were suffering from tetanus or some other neuromuscular disease. They would make frequent trips down to the unit on a more irregular than regular basis. The trips would get longer and longer, and I remember Jack Michenfelder making a comment, back in the early 1960s, that you could keep one physician busy just going around talking to the other physicians about the problems they had with acid base, oxygenation, and ventilation. Dick Thie's lab, which included a blood gas electrode at that time, was used to making measurements of oxygenation and acid base because no clinical lab existed that could give values on arterial blood. A role model for anesthesiologists was developing at that time at Massachusetts General with a group of anesthesiologists providing critical care and respiratory care in a separate unit in Massachusetts General.

In 1967, Drs. Alan Sessler and Paul Didier and two nurse anesthetists chose to leave the operating room practice and serve as a consultative service to other physicians regarding problems associated with oxygenation and mechanical ventilation. They inherited an embryo oxygen service which included approximately six non-physician members; bought a couple sets of blood gas analyzers and some pulmonary function equipment; and provided consultative services in two hospitals with blood gas laboratory backup,

pulmonary function service, sputum induction, chest physical therapy, developed invasive monitoring skills and mechanical ventilation, and some limited physical therapy services in the ICU. In 1973, they organized a school for respiratory therapy in cooperation with the Junior College in an attempt to serve their own needs.

The Division of Respiratory Care grew from the six non-physician members we inherited in 1967 to approximately 190 in less than 25 years. Drs. Sessler and Didier were soon joined by some of their colleagues from anesthesia to provide a continuity in this consultative service and internal medicine consultants were invited to join them on rounds and to participate in this consultative service under a very loose structure. They were soon joined by resident staff from various disciplines. It was not until 1980 that that service was really formalized under the name of the Critical Care Service (CCS) with its own budget and its own training program for residents but also for fellows in critical care.

The CCS now is composed of four FTEs from Anesthesia and four from Internal Medicine. The 4 from Anesthesia is made up of approximately 8 anesthesiologists who contribute to various components of this FTE composition. Many other members from the Department of Anesthesiology participate in outside operating room activities such as emergency room pediatric intensive care unit (ICU) and the cardiac surgical intensive care unit, who are not part of the CCS or the Respiratory Care Division. During the evolution of the CCS, ICUs were designed, built, equipped, changed, relocated, and opened over the years to where we now have a medical, surgical, and a coronary care unit at Rochester Methodist

Hospital; and at Saint Marys Hospital we have medical, surgical, cardiovascular surgical, coronary care, neonatal intensive care, pediatric, and neuro ICUs. They all have anesthesia consultant participation under various arrangements at different intensities.

The respiratory care service, as it was first organized in the 1960s, had very little official recognition. In the 1970s it was recognized as a Service in the Mayo Clinic organizational structure. It was recognized as a full Division of the Department of Anesthesiology in 1980. The Division provides educational experiences for physical therapy students, respiratory therapy students, nurse anesthetist students, and a whole host of residency training programs. The team approach to resuscitation, code 45, in the Institution was developed under the guidance of Drs. Didier and Sessler. They were, of course, joined later on by cardiology, surgery, and internal medicine. Until 1988, it was the primary responsibility of the Anesthesiology Department. Now it really has become the game of cardiologists outside of the operating room.

Services provided by the Division of Respiratory Care in 1988 included 30,000 chest physical therapy treatments, 20,000 days of mechanical ventilation, 25,000 days of hemodynamic monitoring, 2,000 pulmonary function studies, and 130,000 samples analyzed for arterial blood gas and acid base.

Anesthesiologists serve as medical directors for many of the ICUs, but the Critical Care Service only provides primary care responsibility in one unit, the 3A unit, otherwise it is a co-primary or a consultative service. One anesthesiologist serves as the medical director for the

whole Division of Respiratory Care which represents 200 paramedical people. He has the awesome responsibility of training the paramedical people and auditing the medical necessity for the services that are ordered.

Bernard Gilles, CRNA
Coordinator
Respiratory Care Services
Mayo Clinic

BG/js

THE HISTORY OF THE RESPIRATORY SERVICE AT MAYO MEDICAL CENTER

B. Gilles, CRNA, RRT

In 1967, Drs. Alan Sessler and Paul Didier and nurse anesthetists, Renae Casperson and Bernie Gilles, left the operating room to organize the Respiratory Service. They inherited from the BMR Lab the then-existing inhalation therapy service with the personnel and equipment.

In 1968, the Respiratory Service opened third Alfred intensive care unit. They were joined with Internal Medicine/Thoracic Disease physicians, Drs. William Douglas, Matthew Divertie, and Douglas Gracey.

Requests from physicians for chest physical therapy (CPT) procedures were addressed by approaching Physical Medicine to provide the service. Physical Medicine passed, and so the Respiratory Service sent Renae Casperson to Boston, Massachusetts to learn CPT procedures as outlined by the manual published by Brompton Hospital in England. She returned with a very effective, rigid protocol for CPT which had clear, well-defined indications for the use of CPT.

Dr. Sessler saw the need to change tracheostomy tubes, and set up a procedure for changing tracheostomy tubes twice per week based on review of the literature and information regarding infection control. That procedure remains in place to this time.

After lengthy discussion about institutional approach to resuscitation, a Code 45 system with a well-trained, mobile team was implemented. This system of communication and response is still copied here and in many institutions across the country.

In 1969, we purchased our first Puritan Bennett model MA-1, which was considered one of the highlights in respiratory care. It was the first volume-oriented ventilator that could be used as an assister. Although the arguments for the use of volume-oriented ventilation is still questioned by many, it was the model ventilator which other manufacturers copied for the next 20 years.

In 1970, James Chihak and Orvis Dahl became registered as a result of the efforts of Dr. Fred Helmholtz.

Dr. Michael Marsh arrived from Australia on a special one-year appointment.

Myron Ricks left the operating room to join the respiratory care group.

As a result of the quest for pulmonary function studies on hospital-based patients who could not travel downtown for their pulmonary function studies, the Division developed and implemented a lung volume pulmonary function study using helium dilution as the basis. This was viewed for a long time with a high level of suspicion by the downtown pulmonary function areas as nitrogen washout as defined by Dr. Ward Fowler had been the method of choice in the Mayo Clinic.

Rowena Morrison joined us as a trained chest physical therapist from Belfast, Ireland. At the same time, the Department of Physical Medicine and Rehabilitation asked if their students could come and spend time with us to learn the techniques of CPT. Ms. Morrison, who was a physical therapist, served as a role model for those students and began a long, 20-year affiliation with the School of Physical Medicine, providing their students with an opportunity to learn the techniques of CPT.

1971 saw the closing of the window for grandparenting of on-the-job trained personnel into the certification examination. Dr. Helmholtz and his colleagues renewed their efforts to bring that group of persons up to the level of successfully challenging the certification exam. Eight of the 12 individuals who were eligible were successful in challenging the examination.

Lester Clapp, who had spent considerable time in the research lab at the Medical Sciences Building, joined us in the Blood Gas Laboratory operation when his chief investigator left the Clinic.

In 1972, the Respiratory Therapy Division employed PEEP on an Emerson ventilator for the first time. The PEEP device was constructed in the home from a peanut butter jar and a series of copper pipes with the water level adjusted to provide the requested level of PEEP.

Bud Polk, a nurse anesthetist joined us from the operating room, which brought the level of nurse anesthetists to five. It became apparent that we were not going to be able to afford or attract nurse anesthetists to provide the technical service requested by the physicians, nor were we going to be successful in hiring respiratory therapy graduates from around the country. A decision to start a school in cooperation with the junior college after a year of planning and identification of Dr. Didier as the Medical Director. We introduced the class in January 1973. This class consisted of seven students, six who remain current in the field and two of them are still on staff at Mayo.

Tom Holtackers, a registered physical therapist, joined us as the preceptor for the physical therapy students. He stayed with us for the next 20 years to help develop policies and procedures regarding CPT.

In 1973 the first class of respiratory therapists graduated.

In 1974 the clerkship program, which was an advanced educational program in respiratory therapy, was established. Because of the requirements for the registry oral examination, it was necessary to spend a year in clinical service before being eligible to sit for the exam. It was decided that there was not an excess of departments available for the students to gain that kind of experience. We established a third-year program to allow students to practice those things that they had learned and make them better able to successfully challenge the oral exam.

Dr. Marsh returned from Australia to come on staff.

Up until this time, Mrs. Lorraine Linton, whose care was the responsibility of Thoracic Medicine, required a significant amount of CPT, coughing, and secretion removal. Dr. Black asked us to take over that responsibility using the graduates from our program. This was a landmark in respiratory care at Mayo because it was the first opportunity our therapists had to closely interact with a patient who had life-threatening conditions, where attention to detail was important for survival. Those students who did not have an opportunity to interact with Mrs. Linton would have a deficiency in their overall training.

Dr. Marsh introduced the use of pulmonary artery catheters in the intensive care unit. The Mayo Clinic acquired its first Baby Bird. This was the first and forerunner of the mechanical ventilation using intermittent ventilation as a mode. This particular design of ventilation for newborns remains to this date the most popular and most effective means of managing very small children on mechanical ventilation.

In 1975 we purchased our first Siemens 900 series model B ventilator. We kept it in 3A for a prolonged evaluation period and made the decision that that was the volume-oriented ventilator that we would purchase to replace the Birds that were being used throughout the hospitals.

In 1975 the Respiratory Therapy Training Program received full accreditation from the Joint Review Committee for Respiratory Therapy Education. It was decided to recruit an educator in respiratory therapy to guide the program. Jeff Ward was successfully recruited in 1976.

Dr. Phil Westbrook, who was marketing pulmonary function services at the time, convinced us to set aside our helium dilution technique for lung volumes and to buy into the MR-1 outreach pulmonary function services. We became two of their busiest customers at Methodist and Saint Marys Hospital.

Dr. Rungson Sittapong, who had been working with us for a number of years, became interested in phrenic nerve pacing. Our first candidate was a young boy from Iowa, who had suffered a high spinal cord injury and was ventilator dependent, and was our first successful phrenic nerve pacer.

In 1977 we purchased 20 Siemens 900 series model B ventilators and withdraw the Bird Mark VIIs in the 3D area. I remember Dr. Jim Pluth expressing concern with that move as it left the surgeons without a ventilator that they were comfortable with and that we did not do a very good job of teaching the surgeons in 3D how to use the Siemens ventilator.

There was interest in doing cardiac outputs on patients with pulmonary catheters in place. A request was submitted to Surgery to provide that service through their technicians. The Surgery Department denied their request, and it was necessary for us to develop our own techniques. Dr. John McMichan was instrumental in organizing the hemodynamics for the

In 1979, after very heavy marketing by manufacturers, we acquired several transcutaneous oxygen monitoring for use in the neonatal unit. This system of monitoring was very labor intensive, but reasonably responsive to changes in oxygenation. They have been almost completely replaced by pulse oximeters today.

In 1980, as a result of the changes in essentials for training respiratory therapists, Jeff Ward was appointed Program Director of the Respiratory Therapy Training Program. Shirley Johnson assumed the role of clinical coordinator.

We opened 11-1 Methodist in 1980.

Pediatric respiratory care was established at Saint Marys Hospital. Dr. Fred Kleinberg had asked us to participate in the transport of his sick newborns. We told him that he would have to teach us the things he wanted us to be able to do and give us an opportunity to practice those on a day-to-day basis. He invited us into his intensive care unit. This has developed into a very satisfactory relationship.

We had been using the Verifow ventilator at the Methodist. In 1980, we decided to convert to the Siemens model Bs, and later to the model C volume-oriented ventilator.

In 1981, the Critical Care Service (CCS) was officially established with its own cost center and its own budget. Some of the procedures that were originally credited to the Respiratory Therapy Division were now used to support the cost center for the CCS.

In 1982, the 4MB Unit opened. It was the first intensive care unit that had been designed from the ground up since the 3A Unit opened in 1968. It provided for support space for respiratory therapists and remains the model for the continuing transfer of intensive care units in the long-range building plans for Saint Marys Hospital.

Rex Marley, one of the last of the respiratory therapists, left his position of supervisor of respiratory therapy at Saint Marys. Dennis Thackeray was appointed to that position. We were moving away from nurse anesthetists as supervisors of respiratory therapists.

After six years in the developmental phase, a computer system, the Respiratory Information System (RIS), was brought up at Saint Marys.

The Division opened the Blood Gas Lab in the operating room at Saint Marys Hospital.

Respiratory therapists were placed in PAR at both hospitals.

With the resignation of Bud Polk, the last remaining nurse anesthetist outside of myself, who left to return to the OR, John Wheeler was appointed supervisor of the respiratory therapists at Methodist.

After considerable evaluation of hardware available from the Beckman Corporation, nutritional assessment was offered as a clinical service, first at Saint Marys and later at Methodist.

The Oximetric fiberoptic catheters were introduced through the efforts of Dr. John McMichan.

11-1 Methodist was remodelled. After a long, indepth study of monitors available in the future of monitors and monitoring companies, Hewlett Packard monitors were installed.

The outpatient services of sputum induction and gastric washing was transferred from the Department of Gastroenterology and Medicine to Respiratory Care and relocated in the basement of Rochester Methodist Hospital. This was our first endeavor at outpatient services.

In our usual behavior of expediency, we purchased for use in our intensive care units a number of infusion pumps. It proved to be an overwhelming problem of keeping track of the pumps and billing the patient for the cassettes and the rental of the pumps. At the first opportunity, we returned this service to the Pharmacy in both hospitals.

In 1983, a certification examination in pulmonary function was established by the National Board for Respiratory Care. All the respiratory therapists working in the pulmonary function lab participated and were successful in challenging the first level pulmonary function exam.

THE HISTORY OF THE RESPIRATORY SERVICE AT MAYO MEDICAL CENTER

B. Gilles, CRNA, RRT

Oxygen therapy was a service of the Section of Clinical Metabolism in the early history of Mayo Clinic. Walter Boothby authored much of the literature in the 1930s, outlining indications and methods of administering oxygen therapy. The use of tents, cannulas, catheters, and face masks were developed between the 1920 and 1940. Numerous articles appeared in the 1930s advocating high concentration of oxygen, 70 to 80 percent, for angina due to myocardial infarction, pneumonia, and pulmonary edema. There appears cautions of using high concentrations of oxygen for continuous although in order to avoid the toxic effects but all of it seems somewhat vague. Humidification and heat removal from oxygen tents were addressed in the literature.

The 1940s, World War II, saw the development of IPPB for conditions other than apnea. The growth of IPPB as a therapy spawned the development of many valves to turn flow on and off. Bennett and Bird were two of the pioneers with many discussions by physicians of which machines delivered the most therapeutic flow characteristics. Each developed time cycling mechanisms, the Bird Mark 7 and the Bennett PR2; then added flow to create subatmospheric pressure in the circuit during exhalation--an early beginning of the argument if you can do it, you should build it in because someone will discover a need for it.

Mechanical ventilation at Mayo in the 1950s was the responsibility of the nursing staff and was done in tank respirators. Physical Medicine was responsible for the tanks and would deliver one when needed, however slow. The Respiratory Therapy Department never took charge of the tank respirators, they just faded away. However, we did look after the carass which was part of the care of Mrs. Lorraine Litton who was early on the responsibility of Thoracic Medicine. Doctor Helmholtz worked with Dr. Kirkland in the early '60s to use the Bird Mark 7 in postop ventilation of some open heart surgery patients. At the same time, some bag and box ventilators were being used in surgery by anesthesiologists first in neuro and then in cardiovascular. In the 1960s, 2DN was identified as an area to ventilate patients suffering from severe tetanus or Guillain-Barre. Dr. Howard Terry and Myron Ricks were involved in setting this up. Dr. Richard Thie, Department of Anesthesia, had been doing work in the lab developing a technique for measuring oxygen content using the oxygen electrode, similar to a technique of Myron Labor in Massachusetts General. Drs. Moffett and Sessler became interested in blood gas analysis, acid base, status for their postoperative cardiac patients. An arrangement was made for me to learn to make the analysis and draw the samples. Dr. Thie made his research electrodes available for our use. I would go down in the morning and gather samples from postop patients, then analyze them, and return to the operating room where someone was looking after my patient with the results. Decisions were then made or modified based on the results of this analysis. It soon became apparent that this service could not be done as a part-time activity, and a request by Drs. Alan Sessler and Paul Didier to leave the operating room and set up a physician consultative service for patients in respiratory distress, modelled after the practice at Mass General by a group of anesthesiologists working there.

The time was 1967--the BMR lab original clinic metabolism turned over the inhalation therapy service to us along with the people and equipment. There were 12 persons receiving on-the-job training. Glen Ranfranz was the first registered respiratory therapist in the institution; one of only four in the state. Glen's registry number was in the mid 300s. Now there are over 40,000 registered therapists in the country. We took over a patient room at Saint Marys on 3 Joseph West and a patient room in the new hospital, Methodist. Technicians were sent to the Methodist on call from a base at Saint Marys; services provided at Saint Marys from 6 in the morning until 10 p.m. and until noon on Saturday. Evenings and Sunday service was provided by Saint Marys orderlies. The first change was to implement round-the-clock service, even though Methodist remained at an on-call status.

Nosocomial pneumonia was the _____ at that time. Regular cleaning of equipment was our first priority. We developed a processing routine through trial and error. I recall sending a load of clean, dry equipment to be sterilized in the Central Service at Saint Marys, only to have it come back melted into one solid lump in the bottom of the sterilizer cart. We have come a long way in 25 years. We now send to Saint Marys a load of equipment to be reprocessed, and they lose or destroy a significant amount of it.

Room humidifiers, a form of cool aerosoled water, were very popular at the time we took over. We had a large number of them. The chairman's strategy to discourage their use because they were dirty and a source of contamination was not to repair them. When they broke, no more were bought. We soon ran out, but the grief did not go away. That decision came back to embarrass him later in his career as chairman of the division.

The Bird Mark 7, which was the workhorse of the ventilators, was limited by design in the amount of force that it could generate. Gas under pressure, 50 pounds per square inch, flowing through an orifice with air entrainment by Venturi, we had difficulty reaching 40 cm of water in the ventilator circuit. We increased the driving pressure to 90 pounds per square inch with some improvement; and so when we piped in oxygen to 3DN, we put in both oxygen at 50 pounds per square inch and oxygen at 90 pounds per square inch. Even after we discarded the Bird Mark 7 for other ventilators, there remained a mind set that we needed 90 PSI oxygen for some time.

Pre 1967

No comment

1967

Anesthesia participates in respiratory care.

Inherit the inhalation therapy service from BM&R lab.

1968

3 Alfred Unit opens.
Chest physical therapy provided.
Trach tube change service.
Code 45 system implemented.

1969

Purchase our first MA-1.

1970

Orvis Dahl, Jim Chihak registered the arrival from Australia of Dr. Marsh.
Myron Ricks joined the group.
Development and implementation of a helium dilution in pulmonary function studies for hospital-based patients.
The employment of Rowena Morrison in chest physical therapy.

1971

Intense effort on the part of Dr. Helmholtz and associates to get the OJTs certified by the now National Board of Respiratory Care through the grandparenting window.
Lester Clapp joins the blood gas lab.

1972

First implementation of PEEP.
Bud Polk joins the group.
Decision to start a school of respiratory therapy to fill our need for growth.
Appointment of Dr. Didier as Medical Director.
Tom Holtackers joins the group.

1973

First class of respiratory therapist graduated.
Where are they now??

1974

Clerkship program is established.

Dr. Marsh comes back.

Black sting.

Use of PA catheters in the intensive care unit.

*Acquisition of the Baby bird.

1975

First Siemenn's model B was purchased, to be used in 3A only for evaluation.

1976

Jeff Ward joins Mayo.

MR-1.

Pulmonary function outreach.

Westbrook sting.

First phrenic nerve pacer is installed.

1977

Change out of the Bird Mark VIIs in 3D and replaced with all Siemenn's model B. Concern expressed at the time by Dr. Jim Pluth.

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John McMichan organizes hemodynamics for the service.

1979

Acquisition of transcutaneous PO₂ monitoring in the neonatal unit.

1980

Jeff Ward becomes Program Director of the Respiratory Therapy Training Program.

Shirley Johnson assumes the role of clinical coordinator.

1980 (Cont.)

11-1 opens at Methodist.

Pediatric respiratory care is established at Saint Marys.

Siemens were first introduced as ventilators at the Methodist.

1981

The Critical Care Service was officially established.

Some procedures originally credited to Respiratory Care Division now support the cost center 646.

1982

4MB opens.

Dennis Thackery appointed first supervisor of respiratory therapists, as a respiratory therapist himself. Prior to this, nurse anesthetists always served as supervisors in respiratory care.

Computer system was brought up at Saint Marys after six years in development.

Blood gas lab opened in operating room at Saint Marys.

Therapists were placed in PAR in both hospitals.

1983

Nutritional assessment as a clinical service.

Introduction of Oximetrix fiberoptic catheters.

Hewlett Packard monitors--a new generation installed in 11-1.

Sputum induction was transferred from the Department of GI to Respiratory Care and moved to the basement of Methodist Hospital.

A number of infusion pumps were purchased for our own use--later to be turned over to Pharmacy.

A certification in pulmonary function was established by the National Board of Respiratory Care with full participation of all respiratory therapists who were involved in pulmonary function measurements.

1984

Last class of clerkship graduated and the program was closed.

Establishment of the first supervisor in pulmonary function and respiratory therapy.

Establishment of a TEN service for postoperative pain by Tom Holtackers.

Participation by respiratory therapists in the transfer by helicopter of sick newborn infants to Mayo.

Provision of electronic urine measurement for patients in the ICU.

Introduction of pulse oximeters in the ICU.

Official establishment of the Equipment Committee to review and make suggestions regarding purchase of new equipment.

1985

*Introduction of dry heparin in the blood gas lab.

Replacement of the MR-1 with computerized pulmonary function equipment by Dr. Paul Enright.

A laboratory and surgery opened at the Methodist.

First jet ventilator was purchased.

Therapists began to be clothed in scrubs in ICUs.

Respiratory Information System (RIS) introduced into the Methodist.

A standard practice of ordering and delivering of chest physical therapy was implemented as a charge of the Clinical Practice Committee.

A task force to study the appropriateness of the Anesthesia Department running the blood gas labs was appointed.

1986

Purchase of the 7200 Puritan Bennett ventilator.

11-3 opened.

Introduction of single-patient use transducers as a result of pressures from Nursing and Infection Control with the promise to study the incidents of line-related bacteremias in the future.

1986 (Cont.)

Development of an inventory tracking system through the RIS.

Transfer of responsibilities of the blood gas lab to Laboratory Medicine and the Department of Anesthesia.

Development of workload reporting for the Respiratory Care Division.

1987

Glen Ranfranz retired. Mark Wignes appointed.

The appointment of a task force to select the ventilator for the future.

Cleaning of equipment at Saint Marys was transferred to Saint Marys Central Service.

APACHE severity scoring was introduced in several ICUs.

Establishment of a level II nursery at Methodist.

*Oxygen analyzers were placed on all mechanical ventilators.

The resuscitation responsibilities were transferred.

The Respiratory Care training program transferred to the Division of Education.

1988

Myron Ricks retired.

All CPR training transferred to the Division of Education.

Loss of nurse anesthesia students rotating through the Respiratory Care Service.

Hemodynamic services provided to the 2D Unit.

Management accounting was to audit the workload reporting tool.

Service of lung lavage transferred to operating room.

Introduction of nasal mask ventilation and nasal CPAP in neonatal ICU rebounded.

Development of electronic ordering of respiratory services at Saint Marys was implemented.

1990

2J ventilator unit opened.

Physical medicine services transferred from Division of Respiratory Care to the Division of Physical Medicine and Rehabilitation.

Staff level included 117 full-time persons at end of year.

Reorganization into six groups: medicine; surgery; pediatrics; pulmonary function; diagnostics; and two service groups, one at Saint Marys and one at Methodist

Development of a helicopter-specific pediatric isolette ICU transporter through cooperation of the Engineering Department.

Introduction of clinical study to measure airway resistance using occluded technique developed by Dr. Hubmayr.

FUTURE CONCERNS

1. Use of end-tidal CO₂ nasal prong pickup to monitor ventilation level and respiratory rate.
2. Introduction of 7200 ventilator for 7MB with ventilator interface capabilities to evaluate its value for the future.
3. Evaluation/internal review of the Mayo Clinic to evaluate the RIS for enhancement or replacement as it is now seven years old.
4. The development of a pulmonary mechanics measurement using esophageal balloon and airflow at the mouth.
5. How to address admission to hospital of increasing number of patients who are on their own ventilator, have their own CPAP devices, or have their own oxygen administration system.
6. Impact of the state registry on the practice of respiratory care at Mayo Clinic.
7. Philosophy for the future.

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DIVISION OF RESPIRATORY THERAPY
DEPARTMENT OF ANESTHESIA

In 1982, the Division added 10 full-time employees with the opening of the 4 Mary Brigh (MB) intensive care unit (ICU) and the new emergency room.

In 1984, we added one full-time person to the pulmonary function laboratory and two to the Methodist group because of increasing workload.

In 1985, the total numbers of respiratory therapy personnel, excluding the blood gas lab, was 111 persons.

In 1986, approval was given for five additional full-time employees with the opening of the new ICU in Methodist 11-3. The total at the end of 1986 was 110.26.

In 1987, we requested 4.2 additional personnel to increase our availability in the emergency room. That request was denied by the Clinical Practice Committee. At the end of 1987, we had 114.66 full-time persons on board.

In 1988, six full-time persons were added with the opening of the 6MB cardiac and lung transplant unit. At the end of 1988, Shirley Johnson and Jeff Ward were transferred to a separate cost center. At the end of 1988, a total of 114.56 personnel was on board.

In 1989, we requested one full-time individual with the opening of the long-term mechanical ventilation unit. At the end of 1989, we had 115.86 persons.

In 1990, there was a total of 117.56 persons at the end of the year; 2.5 of those were still overage from the four overage individuals hired from the June graduating class. We also lost Lester Clapp, Tom Holtackers, Cindy Miller, and Myron Ricks, who were transferred or when retired were not replaced.

In 1991, we have requested three individuals, one for the pediatric group due to the increased work in that area and two to support the long-term mechanical ventilation unit for which we markedly underestimated demand for services from that area when it was designed in 1989. It is my understanding at this date that this request has been approved. We will also request an additional eight persons and tie it to the opening of the 7MB ICU.

We have seen a 22 percent increase in hours of actual work performed from January 1986 to January 1991 with an 11 percent increase in staff.

Bernard Gilles, CRNA, RRT
Coordinator
Respiratory Care Services
Mayo Clinic

BG/js
STAFFING
2-6-91

NARRATIVE SUMMARY OF THE ANNUAL REPORT - 1971

In November, 1971, the Board of Governors approved Dr. R. A. Theye's request for the establishment of a section of Respiratory Intensive Care within the Department of Anesthesiology. The new section was created by combining the Methodist and St. Marys Hospital Respiratory Services into a single administrative unit with Dr. A. D. Sessler appointed as Head of Section. Prior to the formation of this section, the two Respiratory Services had functioned as a single cost-center although the staff personnel had their primary assignments in the St. Marys and Methodist Clinical Anesthesia sections.

This report summarizes events in the St. Marys and Methodist Respiratory Services during the first ten months of the year and in the newly formed section during November and December, 1971. The Respiratory Services and Inhalation Therapy Department increased their patient care services in 1971. The combined statistical information for the two hospitals appears in Appendix C.

In the area of education, Doctor Rehder has supervised research projects with Doctors Marsh and Sittipong. Doctors Didier and Sessler have participated in clinical teaching of 13 Anesthesia Residents, 7 interns, 4 Thoracic Disease Residents, 1 medical student and 1 visiting physician.

Doctor Helmholz, Doctor Didier and Mr. Bernard Gilles have made major commitments to the teaching of inhalation therapy to Clinic and hospital personnel at many levels and participated as instructors in regional and national efforts in the field of inhalation therapy and resuscitation.

In 1971 Mr. Bernard P. Gilles was appointed supervisor of all allied health personnel in the section. The increase in personnel has been commensurate with growth in services and income, and the numbers and categories of Inhalation Therapy and Respiratory Service personnel are tabulated in Appendix A.

Significant changes and projects accomplished during 1971 include: (1) The Respiratory Service moved into new facilities on the Third Floor of the Alfred Building at St. Marys in April; (2) A proposal for the establishment of a School of Inhalation Therapy in conjunction with the Rochester State Junior College was submitted in the spring of 1971. Dr. E. P. Didier will be the Medical Director of this school; (3) Approval was obtained for the Respiratory Service to function as a primary patient care service with part-time assignment of a consultant from the Section of Thoracic Diseases beginning in 1972; (4) A project involving pulmonary function testing of ventilator-dependent patients was conducted by Drs. Rehder, Sittipong and Sessler, and on the basis of these studies, a grant request was submitted to NIH; (5) Approval was obtained to expand the cleaning and repair spaces at St. Marys for Inhalation Therapy equipment; (6) The appointment of Dr. Rungson Sittipong as a consultant in the Department of Anesthesia beginning in July, 1972, with a 50 per cent time commitment in the Section of Respiratory Intensive Care, was approved by the Board of Governors.

NARRATIVE SUMMARY OF THE ANNUAL REPORT - 1971 (continued)

The Staff personnel assigned to the Section possess a combination of talents which provide the potential for effective work in investigation and education as well as patient care. (See Appendix A and individual consultant's reports). In 1972 we hope to include the following among our accomplishments; (1) Completion of the cleaning and repair facilities for Inhalation Therapy at St. Marys; (2) A review by Systems and Procedures of all Respiratory Intensive Care Section functions; (3) Opening of the School of Inhalation Therapy; and (4) Progress towards an ongoing program of clinical investigation. I believe we can look forward to the progress of the Section with optimism.

Respectfully submitted,

A. D. Sessler
Alan D. Sessler, M. D.
Head of Section of
Respiratory Intensive Care

ADS:pal

APPENDIX A

PERSONNEL SUMMARY--SECTION/DEPARTMENT OF Respiratory Intensive Care
Anesthesiology -1971

I. Consultants

<u>Effort</u> <u>Section</u>	<u>NAME</u>	<u>Advanced</u> <u>Degree</u>	<u>Academic</u> <u>Rank</u>	<u>Board</u> <u>Certification</u>	<u>Age</u>
65	A.D. Sessler, M.D.	-	Asst. Prof.-Anesth.	ABA	39
50	H.F. Helmholtz, Jr., M.D.	-	Assoc. Prof.-Physiol.		60
90	E. P. Didier, M.D.	-	Asst. Prof.-Anesth.	ABA	46
50*	K. Rehder, M.D.	-	Asst. Prof.-Anesth.	ABA	43
10	S.M. Muldoon, M.D.	M.S.	Consultant -Anesth.	ABA	36
	W.W. Douglas, M.D.**	-	Consultant -Int. Med.	ABIM (Pul.Dis.)	37
	M. Divertie, M.D.**	-	Assoc. Prof.-Int. Med.	ABIM (Pul.Dis.)	47
	R.D. White, M.D.***	-	Consultant -Anesth.	****	32

* Beginning July, 1971

** Assigned to Section, January, 1972

*** Assigned to Section for purpose of activities in Intensive Care

**** Has passed Part I of American Board of Anesthesiology in 1971, will take Part II in 1972

II. Interns, Residents, and Other Temporary Professional Personnel Assigned to the Section or Department

	<u>Number</u>	<u>1st Qtr.</u>	<u>2nd Qtr.</u>	<u>3rd Qtr.</u>	<u>4th Qtr.</u>
Interns	--	3*	4**	0	0
Residents	--	3	6***	4	5
Associate Consultants--					
Other	--				

* Two interns for seven weeks- one intern for six weeks

** Two interns for seven weeks- two interns for six weeks

*** One resident for seven weeks-two residents for six weeks-one resident for two months

III. Paramedical Personnel in the Section or Department two residents full time

1. Number on January 1, 1971 --

See Attached sheet

2. Number on December 31, 1971 --

APPENDIX A (Continued)

Number of Employees on November 1, 1971, and December 31, 1971

Supervisors	2
Assistant Supervisors	2
C.R.N.A.	1
Laboratory Technicians	2
Licensed Practical Nurses	6
Physical Therapist	1
Inhalation Therapy	22
Secretary	1
	<hr/>
Total	37

APPENDIX A
1974

PERSONNEL SUMMARY--DEPARTMENT OF ANESTHESIOLOGY
SECTION OF RESPIRATORY INTENSIVE CARE

I. Consultants

<u>% Effort</u> <u>1975 (Proj.)</u>	<u>Name</u>	<u>Advanced</u> <u>Degree</u>	<u>Academic</u> <u>Rank</u>	<u>Board</u> <u>Certification</u>	<u>Age</u>
.65	A. D. Sessler, M.D.	-	Assoc. Prof.-Anesth.	ABA	42
.10	R. A. Theye, M.D.	-	Prof., Chmn.-Anesth.	ABA	51
.45	H. F. Helmholtz, M.D.	-	Assoc. Prof.-Physiol.		63
.57	E. P. Didier, M.D.	-	Asst. Prof.-Anesth.	ABA	49
.09	K. Rehder, M.D.	-	Assoc. Prof.-Anesth.	ABA	46
.50	M. B. Divertie, M.D.	-	Assoc. Prof.-Int. Med.	ABIM (Pul.Dis.)	50
.50	W. W. Douglas, M.D.	-	Instructor-Int. Med.	ABIM (Pul.Dis.)	40
-	S. M. Muldoon, M.D.	M.S.	Instructor-Anesth.	ABA	38
.90	R. Sittipong, M.D.	-	Instructor-Anesth.	ABA	33
.90	H. M. Marsh, M.B.	-	Instructor-Anesth.	FFARACS	35
-	R. W. Adams, M.D.	-	Instructor-Anesth.	ABA	34
-	J. H. Tinker, M.D.	-	Instructor-Anesth.	ABA	33

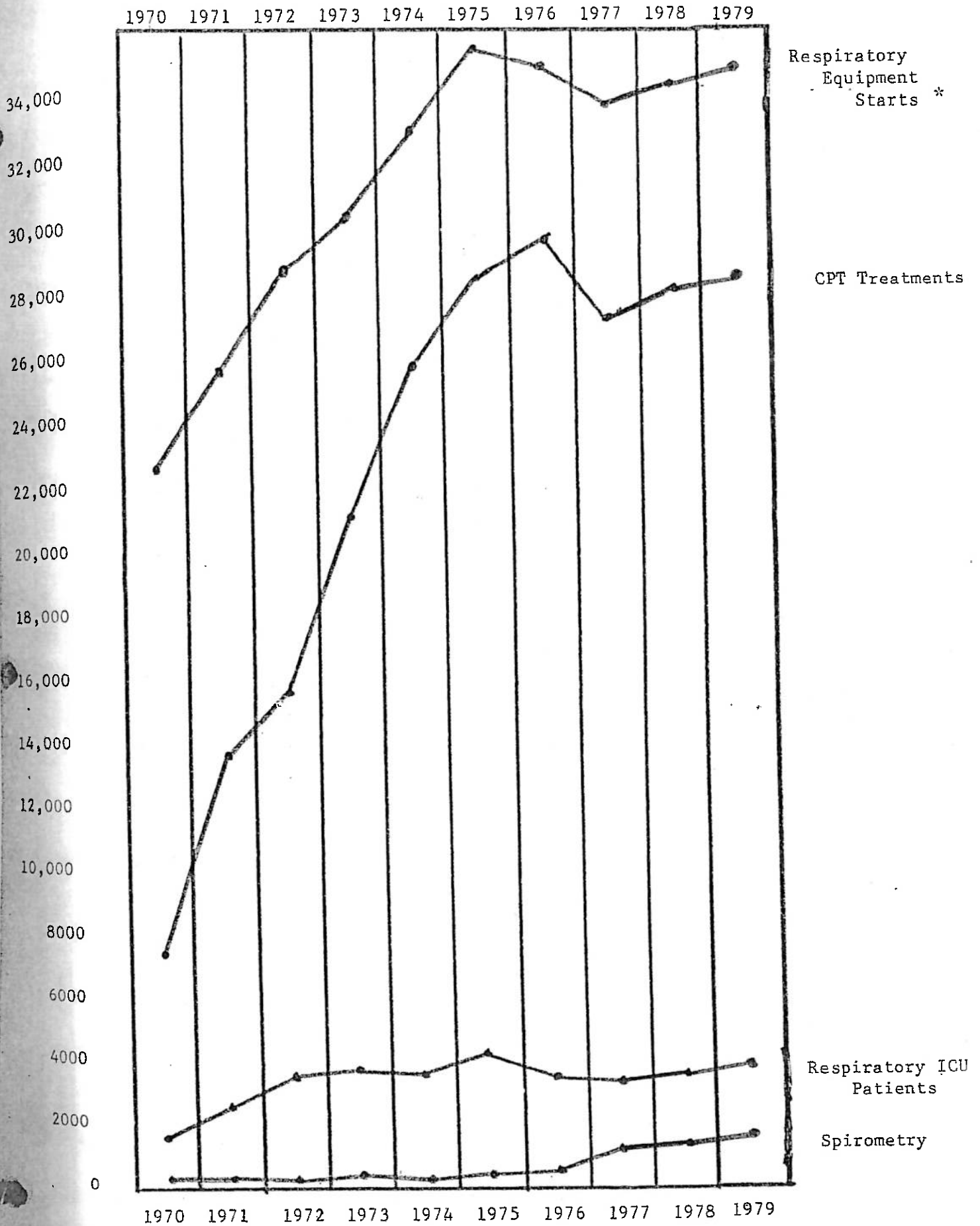
II. Interns, Residents, and Other Temporary Professional Personnel
Assigned to the Section or Department:

<u>Number</u>	<u>1st Qtr.</u>	<u>2nd Qtr.</u>	<u>3rd Qtr.</u>	<u>4th Qtr.</u>
Residents & Interns	7.6	4.0	6.5	5.8
Associate Consultants	0	0	0	0
Other (Visiting Physicians)	0	0	.6	0

III. Paramedical Personnel in the Section or Department:

Number on January 1, 1974: 46 full-time, 1 part-time

Number on December 31, 1974: 59 full-time, 2 part-time



* Does not include Triflo and Anesthesia Bag starts since these were not included in past years.

RESPIRATORY THERAPY DATA, 1969 - 1979

ST. MARY'S HOSPITAL

Year	Total Equip. Starts	IPPB			Bird	Emerson	MA-1	Ohio 560	CPAP	Baby Bird
		Bennett	Handi-Vent	Bird						
1969	9,746	1,753	238	679	25	32	--	--	--	
1970	12,596	1,877	337	708	19	110	--	--	--	
1971	15,536	1,802	1,184	795	18	97	37	--	--	
1972	16,866	1,889	1,338	833	32	138	76	38	--	
1973	17,790	1,747	1,295	796	108	186	107	80	--	
1974	19,280	2,155	1,020	1,021	51	127	146	190	94	
1975	19,132	2,304	482	1,075	52	152	231	283	74	
1976	19,304	1,952	--	1,403	48	120	260	207	120	
1977	16,921	1,453	--	1,340	113 *	143	242	175	93	
1978	16,348	1,529	--	756	<u>Solimens</u> 853	92	141	162	116	
1979	27,519 ***	1,133	--	25	1,754	36	--	239	110	

* includes all miscellaneous volume ventilators

*** equipment starts include Triflo and Anesthesia Bag starts not included in past years

COMPARISON: PATIENT DAY DURATION ON EQUIPMENT - ST. MARY'S & METHODIST

St. Mary's -----

Methodist	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>
Bird	1.9 2.1	2.1 3.0	1.7 2.1	1.4 1.1	1.38 1.16	5.2 1.0
Bennett	6.3 7.0	5.8 6.2	6.2 5.9	6.2 5.0	5.62 5.3	5.3 5.2
MA-1	3.9 5.0	5 6.8	6 3.9	5.3 1.8	4.12 2.54	2.9 2.9
Ohio 560	3.2 --	4.1 --	2.8 --	3.3 --	3.02 --	-- --
Siemans					3.03 4.1	2.1 5.0
C.P.A.P.	4.3 .4	4.4 1.5	4.9 3.7	5.2 1.5	5.93 1.0	6.5 1.0
Baby Bird	2.6 --	4.9 --	3.8 --	3.9 --	3.28 --	5.8 --
Mist Face Tent	3.5 3.0	3.1 2.6	2.7 1.8	2.8 --	3.82 --	4.3 --
Veri-flo	-- --	-- 6.4	-- 5.1	-- 4.3	-- 4.74	-- 4.0
Heated Mist	6.2 6.4	4.7 7.4	4.9 5.1	5.1 5.5	2.98 --	-- --
Ultrasonic	5.6 4.9	5.5 4.3	6.2 4.3	6.3 5.4	5.8 4.3	5.4 4.5
Nasal Cannula	5.4 6.2	5 5.7	5.2 5.3	5.3 5.2	4.78 4.99	5.3 4.8
O ₂ Tent & Hood	3.4 --	3.8 .17	3.5 --	3.3 --	3.89 --	4.0 --
Portable O ₂			-- 4.1	-- 3.0	6.25 4.33	-- 4.9

HEMODYNAMIC MONITORING, ST. MARY'SCOMPARISON: 1978 - 1979

	<u>1978</u>	<u>1979</u>	<u>Per Cent of Change</u>
Total Cardiac Outputs	833	1,388	+ 66.7%
Total Arterial Lines	217	373	+ 71.9%
Total Swan-Ganz Catheters	159	157	- 1.3%
Total Swan-Ganz Catheters in 3A Unit	150	155	+ 3.3%
Total Swan-Ganz Catheters in 3DS Unit	9	2	- 77.8%

Revenue and Cost by Procedure
Using Current Utilization Levels
For The Six Months Ended June 30, 1979

Procedure Number	Description	Current Fee	Cost Per Procedure	Bookings Volume	Net Revenue	Net Expense	Surplus (Deficit)	Gross Margin Percentage
5483-5525	Full Physiological Monitoring-Swan Ganz	221.50	308.95	80	14,782	17,874	(3,092)	(21)
5487	Full Physiological Monitoring Only	61.50	37.31	339	20,246	11,350	8,896	44
550	Arterial Line Placement	-	62.50	173	-	10,813	(10,813)	-
551	Arterial Line Maintenance	-	6.26	346	-	2,165	(2,165)	-
551	ECG Monitoring	18.50	3.55	2,344	41,661	5,651	36,010	86
1876	Endotracheal Intubation	46.00	33.19	73	3,151	2,221	930	30
5521	Trach-tube Change	46.00	39.78	175	7,561	6,478	1,083	14
5694	Tracheostomy Tube	16.50	23.35	77	1,191	1,722	(531)	(45)
5520	Bronchoscopy	84.00	133.25	68	5,368	8,717	(3,349)	(62)
5522	Sputum Induction	12.50	39.57	133	1,561	5,163	(3,602)	(231)
5522	IV Catheter Placement	12.50	15.17	595	6,984	8,579	(1,595)	(23)
5662	Respiratory Monitoring	21.50	41.32	41	827	1,641	(814)	(98)
5688	IPPB Treatment	11.50	11.42	3,318	35,823	35,591	232	1
5695	Nasotracheal Aspiration	16.50	14.05	449	6,958	5,862	1,096	16
5696	Muscle Strength Evaluation	11.00	10.24	174	1,798	1,667	131	7
5697	Aerosol Treatment	11.00	11.35	1,272	13,108	13,599	(491)	(4)
5962	Cardiac Output Thermal Dilution	11.50	13.38	434	4,681	5,507	(826)	(18)
5499	Respiratory Services - Unspecified	98.40	10.93	487	5,313	4,981	332	6
5504	Emergency Resuscitation Team	23.00	73.73	105	9,775	7,222	2,553	26
6082	Chest Physiotherapy - 30 min.	11.50	20.29	8,828	182,524	167,466	15,058	8
6084	Chest Physiotherapy - 15 min.	4.42	10.67	1,613	17,406	16,097	1,309	8
9560	Maximal Flow Volume Curve	5.99	52.67	15	62	786	(724)	(1168)
9561	Maximal Flow Volume Loop Before & After	15.82	61.50	4	23	245	(222)	(965)
9562	Spirometry Before & After Bronchoscopy	16.85	63.39	33	294	872	(578)	(197)
9564	Spirometry and Lung Volume	38.96	65.86	56	519	2,059	(1,540)	(297)
9565	Spirometry Bfr/Aft Bronch and Lung Vol.	43.56	66.41	115	2,036	3,558	(1,522)	(75)
9567	Maximal Inspiratory Flow Volume Curve	67.50	43.08	13	4,683	7,337	(2,654)	(57)
5683	Volume Respirometer	12.50	81.80	2,835	179,650	220,383	(40,733)	(23)
5690	CO ₂ Inhalator	Variable	24.00	26	305	604	(299)	(98)
5496	Equipment Charges	9.25	14.61	262	3,241	2,849	392	12
5661	Respiratory Exercisers	15.00	13.09	3,278	28,484	41,077	(12,593)	(44)
5674	Compressed Air H Cylinder	8.25	16.60	10	140	157	(17)	(12)
5675	O ₂ E Cylinder	6.50	5.85	684	5,301	3,720	1,581	30
5676	Coff-later	11.50	7.65	40	244	218	26	11
5678	Cold Mist	14.00	9.35	11,613	125,391	80,780	44,611	36
5679	O ₂ Cannula or Mask	14.00	4.58	1,357	17,834	11,544	6,290	35
5680	IPPB Unit	18.50	5.91	5,821	62,854	22,651	40,203	64
5681	Portable Bird Respirometer	31.00	16.12	3,478	45,719	17,630	28,089	61
5682	Resuscitation Bag	6.50	10.83	185	3,209	2,777	432	13
5685	O ₂ Tent or Hood	10.50	4.88	704	20,506	6,313	14,193	69
5689	Air Compressor	10.50	18.02	3,106	18,951	13,928	5,023	27
5698	Heater Immersion	3.00	2.82	317	3,124	5,512	(2,388)	(76)
5699	Blender Mist	13.50	8.74	255	9,297	3,126	6,171	66
	Consultations and Visits	Various	Various	70	887	35	332	5
				3,600	119,950	194,120	(74,170)	(62)
	Total				1,034,184	984,397	49,787	5
	Non-clinical services and expense adjustments				193	5,910	(5,717)	
	Net revenue and expense per financial statement				1,034,377	990,307	44,070	4