



Health Care Mitigation Grants Program Final Report Facility Improvement Project

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| Grant Recipient: | Miller Children’s Hospital Long Beach Facility Grant |
| Contract Number: | HD – 7869 |
| Award Amount: | \$287,249 |
| Date Submitted: | September 14, 2016 |

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| Totals POLB Expenditures: | \$284,807.54 |
| Total Number Beneficiaries Served: | 23,475 |
| Please describe how you determined the number of beneficiaries served. | |
| <p>Number of infants, children and youth admitted to Miller Children’s Hospital with acute and life threatening illnesses including those with or at risk of respiratory and cardiopulmonary illnesses and those residing in POLB Zones 1a, 2a, and 3a, over the 5 year grant period.</p> <p>A total of 69,046 infants, children and youth were admitted to MCHLB over the 5 year project period. Of these, more than 45% were diagnosed with or at risk of respiratory and/or cardiopulmonary illness. Eighty-eight percent (88%) of patients were ≤12 years of age. A total of 23,475 children reside within Port Zones 1a (25%), 2a (4%), and 3a (5%).</p> | |

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| Provide a narrative description of the project. | |
| Project Title: | Clean Air Program |
| Project Type: | Health Care and Senior Facilities: Facility Improvement Project Install Facility Air Filtration |
| Target Population: | Infants, Children, Youth and Adolescents admitted to Miller Children’s Hospital Long Beach for acute respiratory/cardiopulmonary medical illnesses. |
| Project Period: | 5-Years (October 2011 through September 2016) |
| Scope of the Project: | Install High Performance Filtration Monitor the Integrity of the High Performance Air Filters Monitor particulates in outside (base) and inside air (reference) monthly. |
| | <ol style="list-style-type: none"> 1. Background 2. Product selection 3. System for procurement 4. System and schedule for installation and replacement 5. System and staff education for inspections and monitoring 6. System for record keeping and documentation 7. Process for monitoring and reporting outcome 8. Plan for grant closure and ongoing filtration |
| <u>OVERVIEW:</u> | |
| <p>Beginning in September 2011, MCHLB initiated a 5-Year Facility Improvement Project to improve removal of fine and ultrafine particulates from hospital in-door air and reduce the impact of in-door air pollution on the health of seriously ill infants and children including children with or at risk of respiratory and cardiopulmonary illnesses by replacing lower performing MERV 3 pre-filters and MERV 14 final filters with newly released, higher</p> | |

performing MERV 8 Pre-Filters and MERV 16 Final filters. The project involves acquisition and installation of the new high performance filters, monitoring and inspecting of filter performance and integrity, measurements of outdoor and indoor particulates in the air, and reporting of project outcomes.

DESCRIPTION

MCHLB, a 367-bed private, not-for-profit hospital, established in 1970, is located in Port Zone 2a, between Long Beach Blvd and Atlantic Avenue. Acute pediatric inpatient care is provided within two adjacent 4-story buildings with contiguous corridors linking the buildings together at floor level. Combined, the buildings encompass more than 400,000 square feet of space including patient bedrooms (PICU, NICU, Pediatrics), imaging services, ultrasound, cardiac and respiratory care, surgical suites, and other specialized diagnostic and interventional facilities where patients receive acute care and procedures. Children with and at risk of respiratory and cardiopulmonary related illnesses receive care throughout the facility.

The HVAC air distribution systems serving MCHLB are complex and must operate across the entire 400,000 sq ft facility space at optimal performance levels without fail 24 hour a day/365 days a year (8,760-hrs/year). Air flow, volume, humidity and filtration must be carefully balanced and monitored to ensure the safe and sanitary delivery of direct indoor air including electrically sensitive and specialty air flow areas in accordance with the rules and regulations of the State of California Mechanical Codes, OSHPD, SCQAQMD, ASHRAE and ANSI. Responsibility for managing the filter installation project, including acquisition, installation and maintenance has been assigned to the engineering department managers.

Generally, the air handlers utilize a combination of outside air and re-circulated indoor air. Two filter banks are utilized to optimize air quality from this mixture of air: a) a pre-filter bank located upstream of the air-conditioning equipment, and b) a final filter bank located downstream of the air conditioning equipment controlling the final distribution of indoor air to the area it serves. The pre-filter captures the larger airborne tars, soot and particulates. The air is conditioned as it passes over chilled and/or hot water coils to a requested temperature. The air then leaves the conditioning coil and fan assembly and passes through a final filter where fine and ultrafine particulates are captured before the final air is distributed to the hospital units.

A process and schedule for the routine purchase and installation of the MERV8 and MERV16 selected pre-filters and final filters, monitoring of filter integrity, measurements of air handler efficiencies, and measurement of particulates in outdoor/indoor air was established and integrated into the engineering department workflow. Filters were purchased annually. MERV 8 Pre-Filters were installed quarterly. MERV 16 Final Filters were installed annually. Education and review of the appropriate procedures for installation of the new filters, assessment of filter integrity, monitoring gauges and metering devices within the air handling system, and documenting essential information was provided to engineering personnel. All filters along with the air distribution system were inspected prior to installation and as part of the hospital daily monitoring and equipment maintenance procedures including the new high performance filters and operating equipment. Representatives of the air filter industry report the new advanced high performance filters utilized in this system create 300% greater filtration while maintaining air balance, volume, preventing low pressure drop, and maintaining filter integrity in the wet marine environment of Long Beach and the heavy industry 24-hour per day workload of a large hospital.

(Project Narrative: Continued Next Page)

PROJECT GOALS:

1. Improve removal of fine and ultrafine particulates from the in-door air; and
2. Reduce the impact of in-door air pollution on the health of seriously ill infants and children including children with or at risk of respiratory and cardiopulmonary illnesses by upgrading filtration in the existing air distribution system (HVAC) from the lower performing MERV 3 pre-filters and MERV 14 final filters to newly released, higher performing MERV 8 Pre-Filters and MERV 16 Final filters

METHODOLOGY:

- 1) Engineering manager coordinated and documented the annual purchase and acquisition of MERV 8 pre-filters and MERV 16 final filters
 - a. Selection of an approved vender
 - b. Determined the order quantity
 - c. Opened purchase orders
 - d. Placed orders
 - e. Received and verified shipments
 - f. Processed vendor invoices for payment
- 2) Engineering manager established a schedule, implemented, monitored and documented installation of MERV 8 and MERV 16 filters by trained and qualified engineering personnel.
 - a. Installation of MERV 8 pre-filters: quarterly
 - b. Installation of MERV 16 final filters: annually
 - c. Begin with critical care areas followed by acute pediatric patient care areas.
- 3) Trained and qualified engineering personnel monitored the integrity of HVAC filters and were instructed in the process to replace filters in the event a filter did not meet standards based on assessment in between scheduled installation intervals.
 - a. Conducted monthly inspection of the entire air handling system to ensure stability of all components including inspection for possible filter degrading, torn media and general operating integrity.
 - b. Prepared for removal of filters in the event a filter did not meet standards and installment of a new replacement filter would be required.
 - c. Documented inspections, findings and actions taken.
- 4) Conducted random air samples each month using the particulate counter to assess filter performance at 0.3 micron, and provided data with quarterly reports.
- 5) An Administrative decision by hospital leadership to continue use of MERV 8 and MERV 16 filters was completed.

PERFORMANCE MEASURES:

1. Installation of 291 MERV 8 Pre-Filters is completed quarterly each year through the entire 5 year project period (Oct 2011 through Sept 2016)
2. Installation of 327 MERV 16 Final Filters is completed annually through the entire 5 year project period.
3. Assessment of the integrity of all components of the filtration system is within expected levels of performance.
 - a. Incidence of degradation of the filter media
 - b. Maintenance of air volume
 - c. Low pressure drop
 - d. Final filter life expectancy of 6-12 months

Provide a narrative discussion of the actual project results (outputs and outcomes) based on the metrics defined in your workplan. Please describe the methodology used for any quantitative results. Outcomes and outputs may include, but are not limited to:

- Number of filters installed;
- Number of people served;
- Number of educational sessions held;
- Decrease in missed school/work days;
- Decrease in hospitalizations;
- Improvements in quality of life;
- Other

Use additional sheets if necessary.

Project Outputs and Outcomes

1. Install 291 MERV 8 Pre-Filters per quarter annually for each of the 5 project years.
Expected Outcome: A total of 5,820 MERV 8 filters will be installed over 5 years
(291 MERV8 prefilters x 4 qtrs x 5 yrs = 5,820 MERV8 prefilters)
Actual Outcome: 5,280 MERV 8 pre-filters were installed in accordance with the
scheduled quarterly intervals over the 5 year term of the project.
Performance Measure Met Not Met:

2. Install 327 MERV 16 high performance Final Filters annually for each of the 5 project years.
Expected Outcome: A total of 1,625 MERV 16 Final Filters will be installed over the 5 year
project period. (327 final filters/year x 5 years = 1,625 MERV 16 final
filters)
Actual Outcome: 1,625 MERV 16 Final Filters were installed in accordance with the
scheduled interval of annually over the 5 year term of the project
Performance Measure Met Not Met

3. All components of the filtration system will operate within expected levels of performance
 - a. Expected Outcome: The incidence of degradation of filter media requiring replacement
prior to the scheduled installation interval will be less than five percent (<5%)
Actual Outcome: No incidence of degradation of filter media occurred (0%)
Performance Measure: Met Not Met

 - b. Expected Outcome: Maintain Air Volume at 98% or greater
Actual Outcome: Maintained Air Volume at 100%
Performance Measure Met Not Met

 - c. Expected Outcome: Successful low pressure drop for 98% or greater
Actual Outcome: Successful low pressure drop for 100%
Performance Measure: Met Not Met

 - d. Final filter life expectancy of 6-12 months
Expected Outcome: Life expectancy of 6-12 months in at least 95% final filters
Actual Outcome: Life expectancy of all final filters within 6-12 months (100%)
Performance Measure: Met Not Met

4. MCHLB will continue to utilize the advanced high performance filters for the benefit of optimal
removal and reduced exposure of fine and ultrafine particulates in the air delivered to seriously
ill hospitalized infants, children, youth, and adolescents.

BUDGET:

A total of \$287,249 was awarded for the 5-Year Health Care Facility Improvement Grant for the purchase of MERV8 and MERV16 pre-filters and final filters, and the purchase of a Solair Gen-E Particle Counter to measure particulates in outdoor air and filtered indoor air.

The total actual grant expenditures over the 5-Year Project Period are \$287,386.33.

At the conclusion of the 5-Year Project period a total of \$1,862.67 of grant funding awarded remains unspent and will not be required for the remainder of the project.

PROJECT FUNDING DETAIL:

| Grant Year | Grant Award | Actual Expense | Variance | Items |
|-------------------------------|---------------------|---------------------|------------|--|
| 1 | \$64,683.40 | \$64,683.40 | \$0 | Filters MERV8 MERV16 Particle Counter |
| 2 | \$55,641.40 | \$54,936.09 | \$705.31 | Filters MERV8 MERV16 |
| 3 | \$55,641.40 | \$55,062.61 | \$578.79 | Filters MERV8 MERV16 |
| 4 | \$55,641.40 | \$55,062.61 | \$578.79 | Filters MERV8 MERV16 |
| 5 | \$55,641.40 | \$55,062.61 | \$578.79 | Filters MERV8 MERV16 |
| | | | | |
| TOTALS | \$287,249.00 | \$284,807.30 | | |
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| REMAINING UNSPENT FUNDS | | | \$2,441.68 | |
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