



# CHILDREN'S OUTCOMES



A Publication of the Children's Hospital Outcomes Program & Information Resource Group (IRG).

## The Short Stay Unit - A Great Start!!

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The Short Stay Unit (SSU) located on 4A at The Children's Hospital (TCH) opened for business on Jan 5<sup>th</sup>, 2004. The primary goal for the SSU was to provide a dedicated inpatient unit for healthy children who need a brief hospitalization for an uncomplicated acute illness. A second goal was to integrate a community hospital care delivery model into an academic tertiary care teaching children's hospital.

Patients that met specific admission criteria could be admitted to the SSU. Admitting diagnoses could include: bronchiolitis, uncomplicated viral or bacterial pneumonia, croup, asthma (select cases), uncomplicated cellulitis, diarrhea, vomiting, dehydration, uncomplicated urinary tract infection/pyelonephritis, rule out sepsis (without evidence of meningitis by exam or LP), and accidental ingestions (without social implications or suicidal gestures).

The Medical Directors of the SSU are Lalit Bajaj and Genie Roosevelt. Both are members of the Section of Emergency Medicine. The SSU daily routine is geared toward providing efficient patient care while promoting effective communication amongst all care givers. The entire SSU medical team, including an attending physician, residents, nurses, respiratory therapists, and a case manager meet daily at morning rounds to develop management plans and facilitate discharge planning, including home oxygen teaching and home visits. Patients are discharged home as soon as they meet their discharge criteria.

In May of this year a joint SSU analysis for the first quarter of 2004 was performed by the SSU Medical Directors and members of the Information Resource Group (IRG). The intent of this analysis was to accurately describe the SSU patient population and to assess the effectiveness of the medical care provided.

During the first quarter of 2004 there were 500 patients that met the SSU admission criteria. 437 (87%) of these patients were admitted to the SSU while the remaining patients were admitted to other inpatient units due to bed shortages, Emergency Department physician preference, or a clinical status change. Of those admitted to the SSU, 97% completed their care there while 3% were transferred to another unit. The age of SSU patients ranged from 1 week to 19 years. The average age was 8 months.

The diagnosis distribution for patients treated on the SSU during the first quarter of 2004 is displayed in Table 1. One of the most important clinical indicators examined during the SSU analysis was length of stay (LOS). The average LOS on the unit for this population was 28 hours.

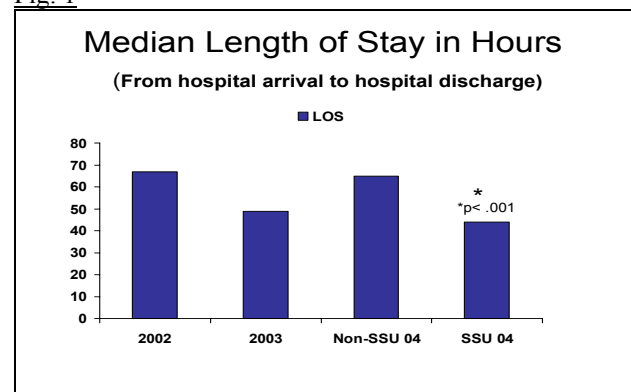
Table 1

Diagnosis	%	Avg. LOS
Bronchiolitis/Pneumonia	78%	28 hours
Asthma	7%	26 hours
Gastrointestinal Illness	6%	23 hours
R/O Sepsis (SBI)	5%	45 hours
Cellulitis	3%	34 hours
Croup	1%	22 hours
UTI	<1%	39 hours

This relatively short LOS was in part due to the medical team's preparation of the patients and families for discharge. Discharge teaching and home care preparations were initiated just after admission in most instances. Another factor that influenced the SSU average LOS was the staff's ability to discharge patients at nearly any time of the day. It was found that 54% of patients went home between 7am and noon. The remaining patients were discharged in the afternoon or evening.

Bronchiolitis and pneumonia diagnoses accounted for 78% of the SSU patient population. A disease-specific comparison between these patients and similarly diagnosed patients that were treated on other units during the same timeframe was analyzed. Additional comparisons were made between this population and similarly diagnosed patients treated during the first quarters of 2002 and 2003. It was determined that the patients treated on the SSU had a significantly shorter median length of stay ( $p < .001$ ) than the other populations (see Fig. 1).

Fig. 1



Further analysis revealed that overall resource utilization was decreased in the SSU. Significantly fewer viral antigen tests, CBCs, and chest radiographs were performed ( $p < .05$ ). At the same time the SSU patients with bronchiolitis and/or pneumonia more often received respiratory therapy instructions related to home oxygen ( $p < .01$ ).

The final part of the SSU analysis involved the assessment of staff satisfaction and feedback. Residents reported that they approved of the efficient team structure and increased interaction with the nurses. They enjoyed spending more time with the SSU patients and families and they benefited from working with a variety of attending physicians. The resident's also felt that the SSU rotation was an excellent opportunity to care for patients with common pediatric illnesses. On the other hand, the residents reported that they would have liked to see a greater variety in patient diagnoses.

The SSU nurses reported that their job satisfaction was extremely high during this period. They attributed this to the collaboration with physicians and having the autonomy to make clinical decisions. The nurses felt that their clinical judgment was highly respected by the rest of the medical team. They too enjoyed the more constant and direct interaction with their patients and families.

The SSU medical team has received high satisfaction ratings from private pediatricians from around the community. The pediatricians liked the unit's efficiency and the fact that they could deal with one resident who was usually geographically located on the unit rather than having to page someone.

In recent months a number of important changes have taken place on the SSU. The list of accepted admission diagnoses has been expanded to include: dental abscesses, viral meningitis, and post-op ophthalmology cases. In addition, nursing care is now provided to post-op patients with supracondylar fracture repairs and liver biopsies. Finally, the SSU staffing mix now includes Physician Assistant (PA) students.

The results of the SSU analysis are very positive. So why was it so successful? Dr Bajaj and Dr Roosevelt responded that careful planning prior to opening the unit solved a number of systems barriers. Clearly delineated roles, problem solving on all levels, collaborative teamwork, and integrating the Emergency Department philosophy into the ward environment were the essential pieces in bringing this all together.

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## Recent TCH/UCHSC Outcomes Publication(s)

**Goldenberg, N. A., Knapp-Clevenger, R., Manco-Johnson, M. J.. (2004). "Elevated plasma factor VIII and D-dimer levels as predictors of poor outcomes of thrombosis in children." *N Engl J Med* 351(11): 1081-8.**

**BACKGROUND:** Elevated levels of plasma factor VIII and D-dimer predict recurrent venous thromboembolism in adults. We sought to determine whether an elevation of factor VIII, D-dimer, or both at diagnosis and persistence of the laboratory abnormality after three to six months of anticoagulant therapy correlate with poor outcomes of thrombosis in children. **METHODS:** We evaluated levels of factor VIII and D-dimer and additional components of an extensive laboratory thrombophilia (i.e., hypercoagulability) panel at the time of diagnosis in 144 children with a radiologically confirmed acute thrombotic event. All patients were treated initially with heparin and then with either warfarin or low-molecular-weight heparin for at least three to six months, according to the current standard of care. Patients were examined at follow-up visits 3, 6, and 12 months after diagnosis and then annually, at which times testing was repeated in children with previously abnormal factor VIII and D-dimer test results and a uniform evaluation for the post-thrombotic syndrome was performed. **RESULTS:** Among 82 children for whom complete data were available regarding laboratory test results at diagnosis and thrombotic outcomes during follow-up, 67 percent had factor VIII levels above the cutoff value of 150 IU per deciliter, D-dimer levels above 500 ng per milliliter, or both at diagnosis, and at least one of the two laboratory values was persistently elevated in 43 percent of the 75 patients in whom testing was performed after three to six months of anticoagulant therapy. Fifty-one percent of the 82 patients had a poor outcome (i.e., a lack of thrombus resolution, recurrent thrombosis, or the post-thrombotic syndrome) during a median follow-up of 12 months (range, 3 months to 5 years). Elevated levels of factor VIII, D-dimer, or both at diagnosis were highly predictive of a poor outcome (odds ratio, 6.1;  $P=0.008$ ), as was the persistence of at least one laboratory abnormality at three to six months (odds ratio, 4.7;  $P=0.002$ ). The combination of a factor VIII level above 150 IU per deciliter and a D-dimer level above 500 ng per milliliter at diagnosis was 91 percent specific for a poor outcome, and after three to six months of standard anticoagulation, the combination was 88 percent specific. **CONCLUSIONS:** Elevated levels of plasma factor VIII, D-dimer, or both at diagnosis and a persistent elevation of at least one of these factors after standard-duration anticoagulant therapy predict a poor outcome in children with thrombosis.

### Editor's Note:

**This article generated a very complimentary editorial in the NEJM. Congratulations to Marilyn and her co-authors! With better methods of predicting poor outcomes, we can target further interventions more effectively.**