# Who needs a second dose of exogenous surfactant?

Lucia **Lanciotti** [1,*], Matteo **Pasqualini** [1], Alessio **Correani** [1], Valentina Giovanna **Dell'Orto** [2], Ilaria **Burattini** [2], Chiara **Giorgetti** [2], Sara **Colombo** [2], Maria Laura **Palazzi** [2], Virgilio **Carnielli** [1,2]

[1] Department of Odontostomatologic and Specialized Clinical Sciences, Polytechnic University of Marche, Ancona, Italy.
[2] Division of Neonatology, Department of Mother and Child, "G. Salesi" University Hospital, Ospedali Riuniti, Ancona, Italy.

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**Objective**. To identify prenatal and postnatal risk factors associated with surfactant redosing in preterm infants.
**Materials and Methods**. A retrospective single-center study including infants with respiratory distress syndrome (RDS) born from 24.0 to 31.6 weeks of gestation and admitted to the NICU from January 01, 2004 to 28 February, 2021. Hypertension in pregnancy (HIP), antenatal corticosteroids, GA (weeks), gender, year of birth, small-for-gestational-age (SGA), histological chorioamnionitis, time to first surfactant dose (hours), $SpO_2$ to $FiO_2$ ratio before surfactant administration, 100 or 200 mg/kg as surfactant initial dose and early onset sepsis were tested as risk factors for surfactant redosing.
**Results**. From a total of 1615 admissions, 662 infants were treated with exogenous surfactant: 462 (70%) could be managed with a single dose and 200 (30%) received more than one dose (25.5% two doses and 4.5% three doses). Risk of redosing was higher for infants born to mothers with HIP (OR 3.95, p = 0.000), for SGA infants (OR 3.93, p = 0.000) and when the initial surfactant dose was 100 mg/kg (OR 4.56, p = 0.000). Infants with higher GA, with delayed first surfactant administration and milder RDS, had a reduced risk of redosing (**Table 1**). Infants who received multiple surfactant doses had a significantly higher rate of bronchopulmonary dysplasia (44% *vs* 16%, p = 0.000) and mortality (16% *vs* 4%, p = 0.000), as well as longer duration of respiratory support than patients that received one dose (192 | 108-403 | *vs* 24 | 10-119 |, p = 0.000).
**Conclusions**. HIP and SGA were associated with the need for surfactant redosing. Early detection of prenatal risk factors would be desirable to improve the short and long-term respiratory outcome of very preterm babies.

**Table 1.** *Logistic regression models of prenatal and postnatal risk factors of surfactant redosing.*

| | Exp (B) | 95% CI | Sign. |
|---|---|---|---|
| SGA [a] | 3.93 [a] | 2.36 – 6.57 | 0.000 |
| HIP [b] | 3.95 [b] | 2.49 – 6.29 | 0.000 |
| Antenatal corticosteroids [a,b] | 0.95 [a] | 0.45 – 1.99 | 0.889 |
| | 0.91 [b] | 0.43 – 1.90 | 0.798 |
| GA (weeks) [a,b] | 0.85 [a] | 0.77 – 0.95 | 0.003 |
| | 0.83 [b] | 0.75 – 0.92 | 0.001 |
| Year of birth [a,b] | 0.94 [a] | 0.88 – 1.01 | 0.077 |
| | 0.94 [b] | 0.88- 1.01 | 0.082 |
| Age at first surfactant dose (hours) [a,b] | 0.92 [a] | 0.88 – 0.95 | 0.000 |
| | 0.92 [b] | 0.88 – 0.95 | 0.000 |
| SFR before first surfactant dose [a,b] | 0.995 [a] | 0.992 – 0.997 | 0.000 |
| | 0.994 [b] | 0.992 – 0.997 | 0.000 |
| Surfactant dosing of 100 mg/kg [a,b] | 4.56 [a] | 2.47 – 8.41 | 0.000 |
| | 4.61 [b] | 2.49– 8.53 | 0.000 |
| EOS [a,b] | 1.16 [a] | 0.55 – 2.45 | 0.706 |
| | 1.38 [b] | 0.65 – 2.96 | 0.406 |

[a] indicates variables included in the regression model (a) with Hosmer-Lemeshow Test of 0.898
[b] indicates variables included in the regression model (b) with Hosmer-Lemeshow Test of 0.701

EOS, Early Onset Sepsis; GA, Gestational Age; HIP, Hypertension in Pregnancy; SGA, Small for Gestational Age; SFR, $SpO_2$ to $FiO_2$ ratio.