
Dialysis Outcomes and Practice Patterns Study

# Associations of Dialysate Bicarbonate with Mortality: Results from the Dialysis Outcomes and Practice Patterns Study

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# Acknowledgements


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# Background

- Pre-dialysis metabolic alkalosis has been associated with elevated mortality risk in patients on maintenance hemodialysis (HD) [e.g. Bommer AJKD 2004]

- We hypothesized that use of high dialysate bicarbonate (DB), which could result in severe post-dialysis metabolic alkalosis, may adversely affect clinical outcomes

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# Methods

- **Study population:**
  - **16,899 patients on thrice-weekly in-center HD from 12 countries in DOPPS phase 2 (2002-2004) and phase 3 (2005-2008)**
  - **Exclusions: Patients in centers using non-bicarbonate dialysate (<1%)**
- **Outcome: all-cause mortality**
- **Covariates:**
  - **Age, sex, BMI, vintage, 13 comorbidities, albumin, hemoglobin, serum bicarbonate, SBP, residual kidney function, catheter use, and spKt/V**
- **Model:**
  - **Cox models stratified by country and study phase, and accounting for facility level clustering**

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# Bicarbonate vs. Total Base Concentration

- 'Bicarbonate' dialysate often also contains acetate at 2-4 (up to 8) mEq/L
- Study coordinators were asked to provide the prescribed dialysate base/buffer concentration as sum of acetate and bicarbonate if combined
- In this presentation, concentration of 'dialysis bicarbonate' refers to total base concentration
- Some misclassification of total base concentration was possible (if acetate content was not appreciated)

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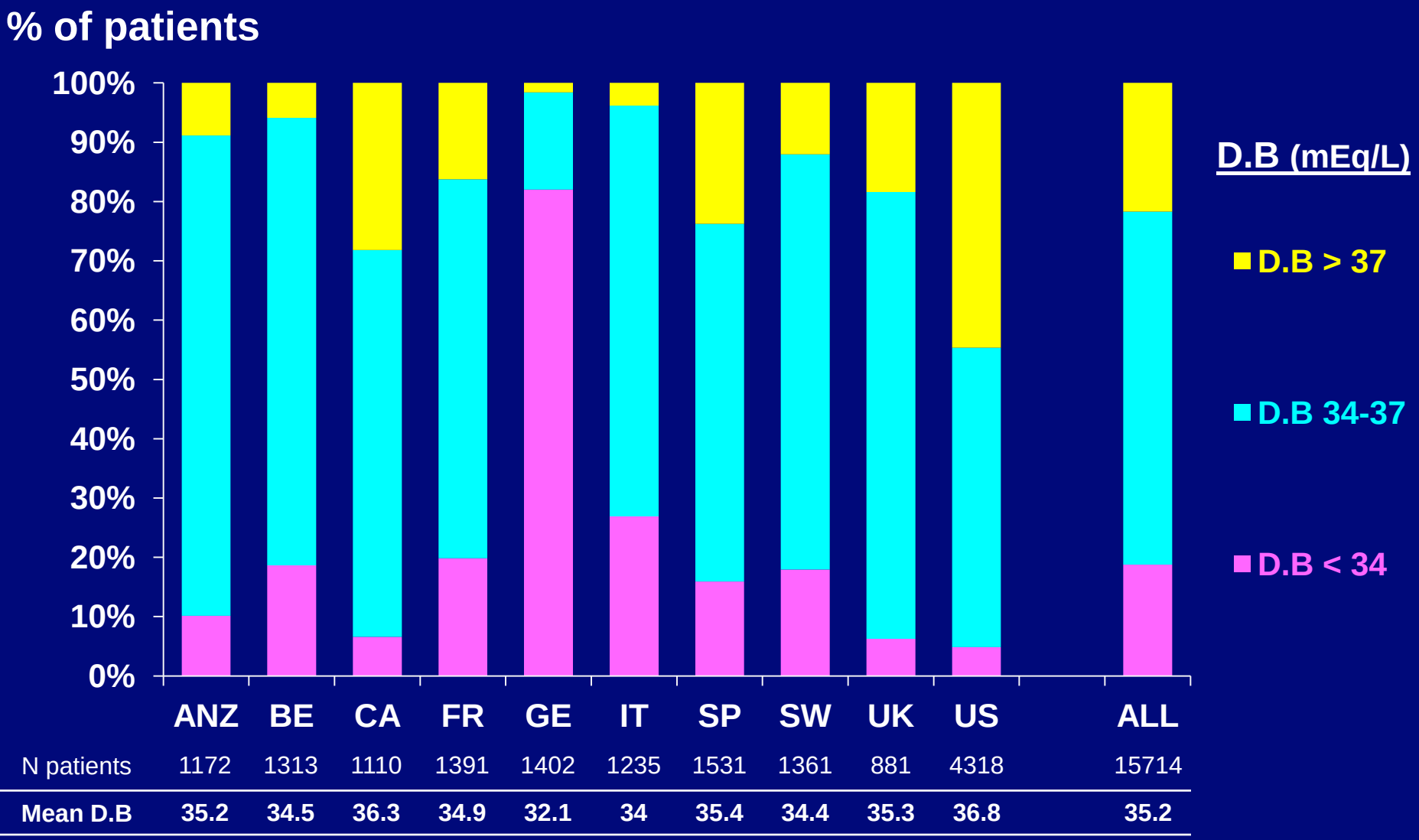
# Dialysate Bicarbonate by Country

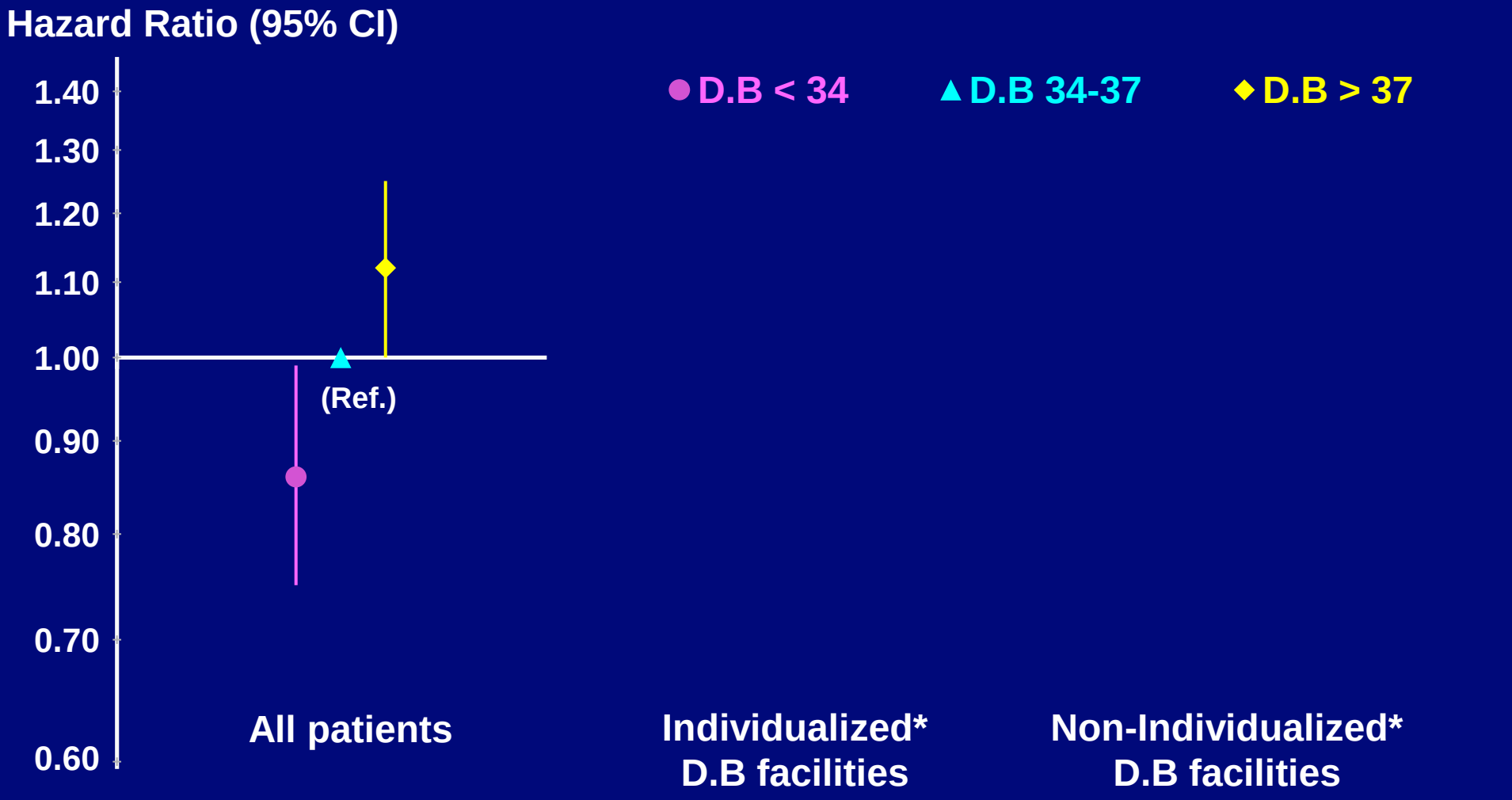



| | ANZ | BE | CA | FR | GE | IT | SP | SW | UK | US | ALL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N patients | 1172 | 1313 | 1110 | 1391 | 1402 | 1235 | 1531 | 1361 | 881 | 4318 | 15714 |
| **Mean D.B** | **35.2** | **34.5** | **36.3** | **34.9** | **32.1** | **34** | **35.4** | **34.4** | **35.3** | **36.8** | **35.2** |

* % of facilities where ≥ 90% of patients use a single D.B concentration

Source: DOPPS 2-3 data; Japan not shown due to possible misclassification issues

# Mortality is Positively Associated with Dialysate Bicarbonate Concentration




*Non-individualized defined as ≥90% of patients in a facility prescribed the same D.B; All other facilities defined as Individualized; Source: DOPPS 2-3 data; Cox model stratified by phase and region, adjusted for age, sex, vintage, BMI, 13 comorbidities, albumin, hemoglobin, SBP, vascular access, residual kidney function, Kt/V, serum bicarbonate, and facility clustering.

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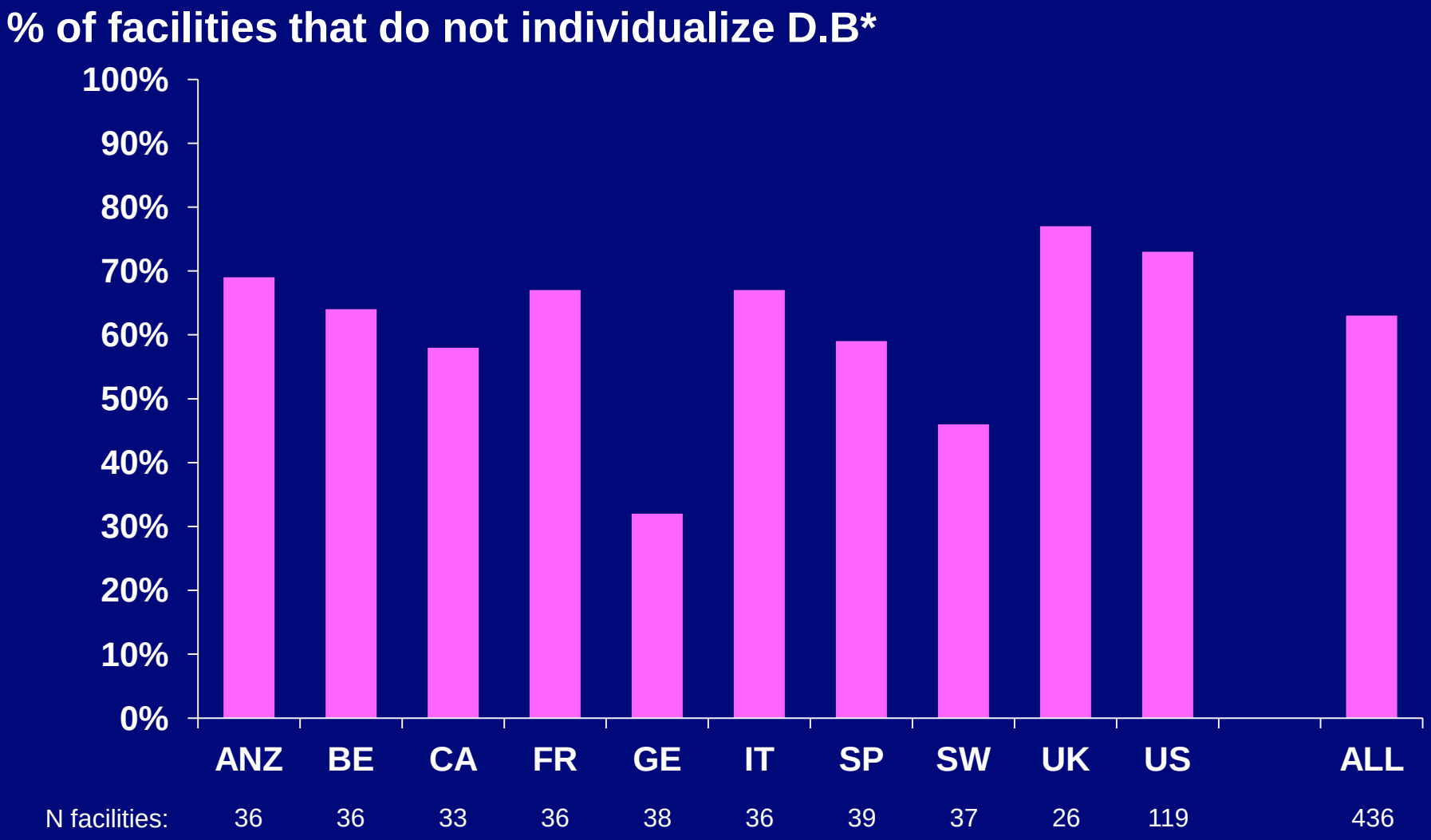
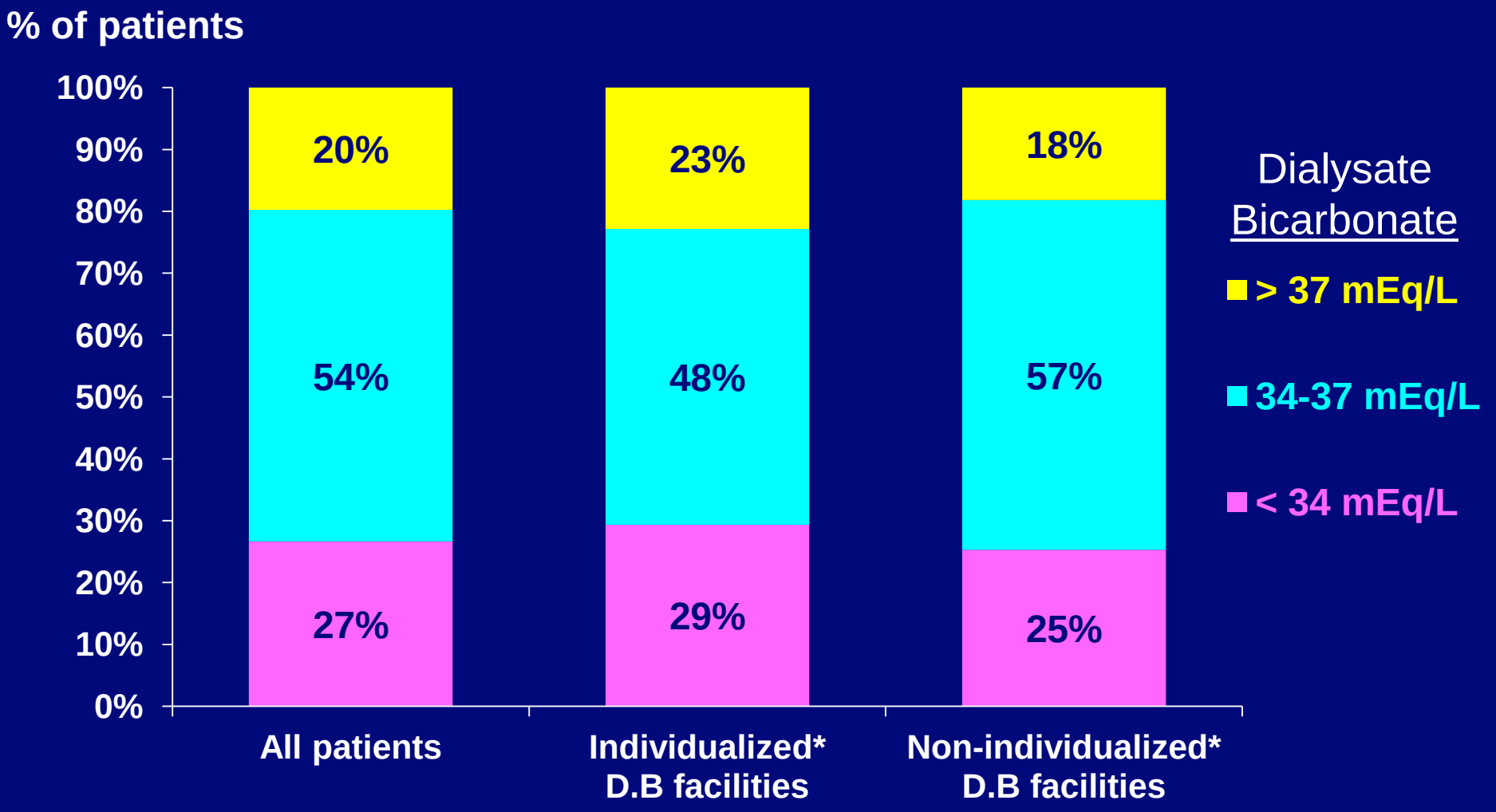
Adapted from Tentori et al. ASN 2011 abstract

# Many Facilities Use A Single Dialysate Bicarbonate Concentration




* % of facilities where ≥ 90% of patients use a single D.B concentration
Source: DOPPS 2-3 data; Japan not shown due to possible misclassification issues

# Dialysate Bicarbonate Concentration Varies, Even Between 'Non-Individualized' Facilities

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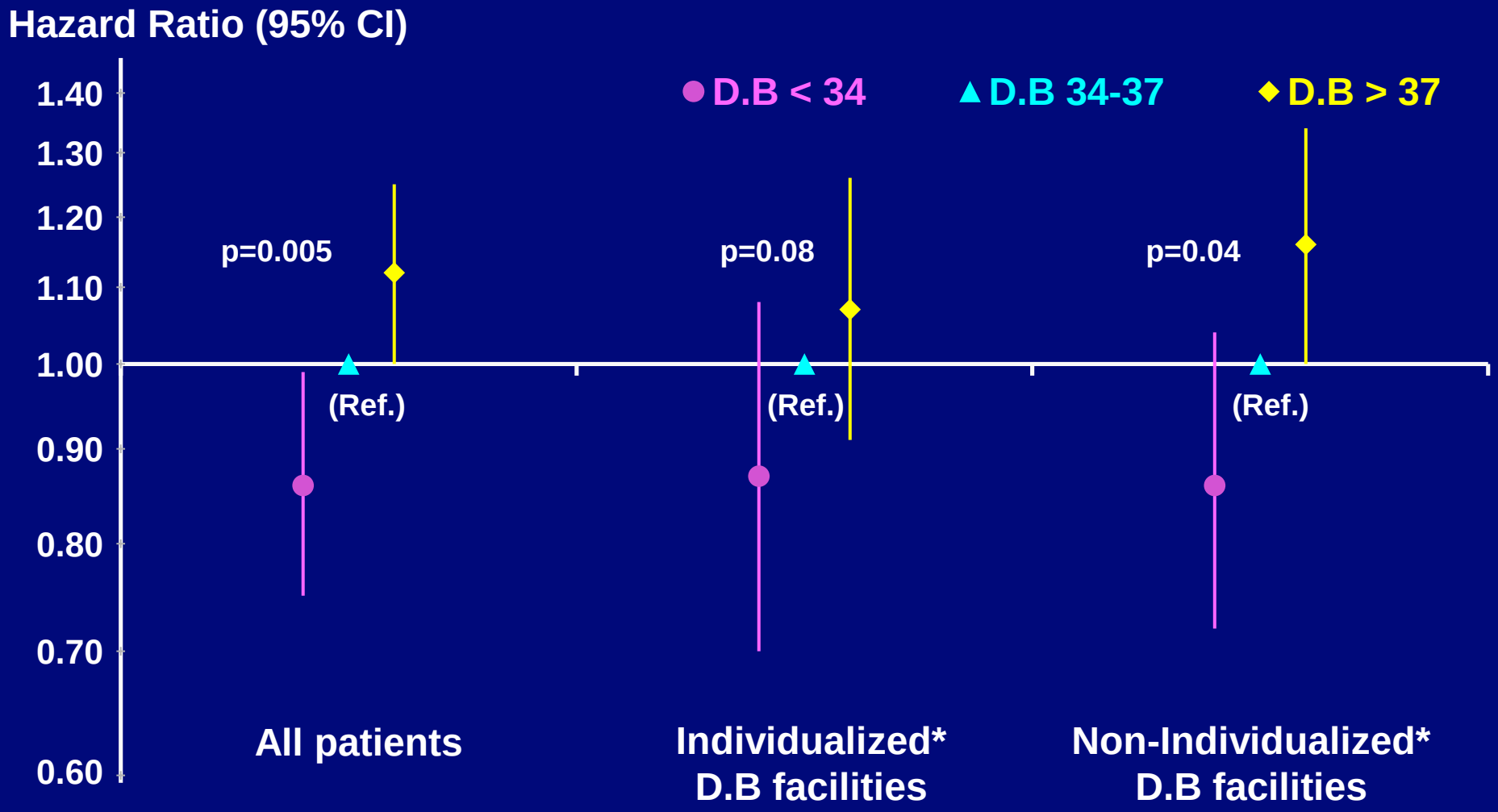


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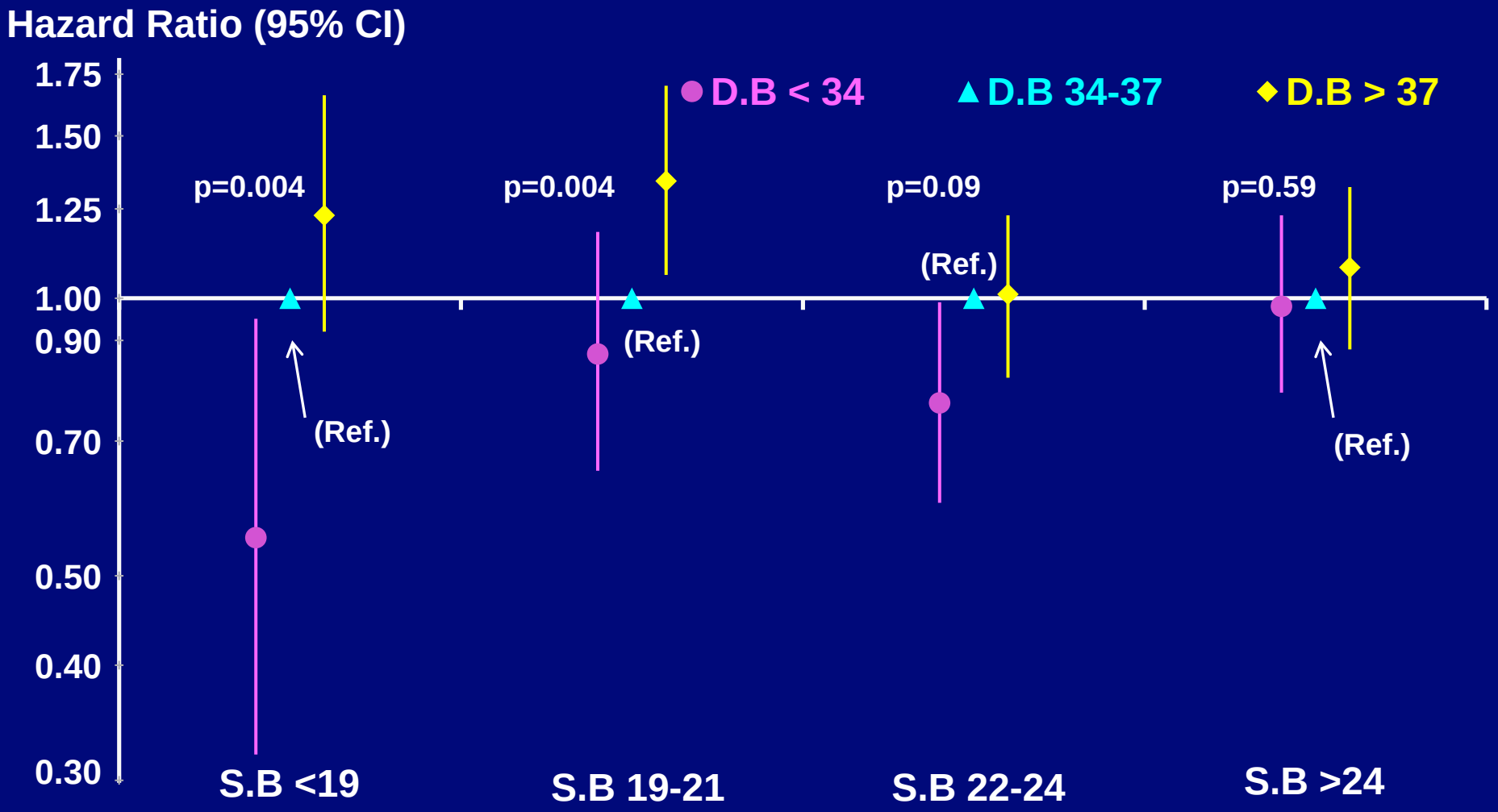
**Adapted from Tentori et al. ASN 2011 abstract**

# Dialysate Bicarbonate and Mortality, by Serum Bicarbonate




Source: DOPPS 2-3 data; Cox model stratified by phase and region, adjusted for age, sex, vintage, BMI, 13 comorbidities, albumin, hemoglobin, SBP, vascular access, residual kidney function, Kt/V, serum bicarbonate, and facility clustering; P-values represent the effect of D.B as a continuous variable

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# Additional Analyses

- The association of higher DB with higher mortality did not vary appreciably by level of serum or dialysate potassium, or serum or dialysate calcium
- Findings did not differ appreciably when excluding Japan
- Similar findings were observed using an upper cutpoint of >35 mEq/L (rather than >37 mEq/L)

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# Summary / Conclusion

- High dialysate bicarbonate ( >37 mEq/L):
  - Is quite common, especially in US
  - Is associated with higher mortality
- This association is most apparent among patients with low predialysis serum bicarbonate
- Dialysate composition can easily be modified, and avoidance of high DB may have a beneficial impact on survival
- This novel finding, and mechanisms such as the possible role of post dialysis alkalosis, deserve further study

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