People in Hospital on a Given Day Fell from 1,482.6 Thousand in 1999 to 1,175.3 Thousand in 2023, While Their Median Age Rose from 67.97 to 77.81 — Applying 1999 Patient Rates to the 2023 Population, Inpatients Would Rise 1.580-Fold and the Median Age Would Be 77.90: Patient Rates Reduced the Number, and the Population's Age Structure Raised the Age [M092]

Number of inpatients = population × patient rate —— What separates them is what moved the number versus what moved the age

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Abstract

Using Table 2 (trend in the estimated number of patients) and Table 4 (trend in patient rates) of the Ministry of Health, Labour and Welfare's Patient Survey (9 surveys from 1999 to 2023), this paper looked at whether the number and age of people in hospital on a given day moved with the population's age structure or with patient rates, by swapping the two. No new mathematical theorem and no new law are claimed.

First, the tables are consistent. Inpatient + outpatient = total, and age groups + unknown = total (rounding difference at most 0.4 thousand); the population derived from estimated patients ÷ patient rate agrees within 0.0008 whether summed over age groups or computed from the totals (Section 3).

Second, **people in hospital on a given day fell from 1,482.6 thousand in 1999 (1170 per 100,000, 1 in 85.5 people) to 1,175.3 thousand in 2023 (945, 1 in 105.8), while the share aged 65+ rose from 0.559 to 0.755 and the median age from 67.97 to 77.81, rising in all 9 surveys** (Section 4).

Third, this is the core of the paper. **Applying the 1999 age-specific patient rates to the 2023 population age structure, inpatients would be 1.580 times the 1999 number and the median age 77.90. Applying the 2023 rates to the 1999 population, the number falls to 0.504 times and the median age stays at 68.12.** The product of the two, 0.797, matches the actual ratio, 0.794, within 1% (Section 5).

Fourth, **of the 9.84-year rise in the median age, swapping only the population age structure gives 9.93 years and swapping only the patient rates gives 0.15 years; nearly all of it is the population's age structure.** In the age distribution (shares) too, the largest gap between "2023 population × 1999 rates" and the actual 2023 is 0.0056, much smaller than the gap between 1999 and 2023, 0.0923 (Section 5).

Fifth, M086 showed that from 1999 to 2023 the inpatient rate hardly changed the speed at which it doubles with age and only lowered its level. **If the level falls while the age shape stays, the age distribution of inpatients does not move and only their number falls** — the swap in this paper checks that shape in numbers (Section 5).

Sixth, what separates them is **what moved the number versus what moved the age**. "Inpatients have aged" is explained by the population's age structure, and "there are fewer inpatients" by patient rates. Within the same one-day count, different things move the two.

Scope note: **This paper claims no new mathematical theorem and no new law** — estimated patients and patient rates are in public tables, and this paper only swapped the population age structure and patient rates in the calculation. **This paper is a structural interpretation of the shape of numbers in public aggregate data; it is not medical advice, not a diagnosis, and not a treatment recommendation. The author is not a physician. Decisions about individual health should be discussed with a physician or a medical institution. This is a preprint that has not been peer reviewed. It does not judge whether there are many or few hospitalizations, the number of beds, or the health care system.** The estimated number of patients is an estimate of patients in hospital on the survey day (one day in October), not the number admitted in a year. The swap is built from "estimated patients = population × patient rate," and why patient rates fell cannot be separated with these tables. The median age assumes a uniform spread within each 5-year age group. 2011 excludes part of Miyagi Prefecture and Fukushima Prefecture (table note). Prefectures and medical institutions are not compared. **About the data**: the Patient Survey (Ministry of Health, Labour and Welfare) was taken from e-Stat and used under the Government of Japan Standard Terms of Use (Version 2.0); the medians and swap calculations in this paper were processed from it. What this paper adds: **splitting the number and median age of people in hospital on a given day by swapping the population age structure and patient rates, and showing that the fall in the number is the part from patient rates while nearly all of the rise in the median age is the part from the population's age structure.**

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1. Notation and question

- **People in hospital on a given day**: the estimated number of patients (inpatients), an estimate of patients in hospital on the survey day.
- **Median age**: the median computed from the estimated patients by age group, assuming a uniform spread within each group.

- **Swap**: since estimated patients = population × patient rate ÷ 100,000, multiplying the 2023 estimated patients by "1999 rate ÷ 2023 rate" for each age group gives 2023 population × 1999 rates; the reverse is the same.

Question: Did the number of people in hospital on a given day fall, and their age rise, because of the population's age structure or because of patient rates?

Observation 1.1: M086 showed that the inpatient rate kept, over 24 years, almost unchanged the shape of doubling every 11.24–12.10 years at ages 40–84, while its level at age 60 fell 0.479-fold. This paper combines the same patient rates with the population to look at the number and age on a given day.

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2. Preview and design

Written honestly: the design was decided after looking at the tables.

	Content
Tables	Patient Survey 2023, national volume, Table 2 (trend in the estimated number of patients, inpatient/outpatient × age group, 1999–2023) and Table 4 (trend in patient rates, same categories)
Noticed in the preview	M086 looked at the age shape of patient rates, so this paper centred on the side of the estimated patients (number and median age). Because estimated patients ÷ patient rate gives the population, the population and patient rates can be swapped without bringing in a separate population table
Comparison	Number of inpatients on a given day, per 100,000, share aged 65+, and median age (9 surveys), and swapping the population and patient rates between 1999 and 2023

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3. Data and checks

Calculation 3.1 The 2 retrieved files were fixed by SHA-256, and the following were checked.

- Table 2 (thousands) and Table 4 (per 100,000) have the same 9 year columns and, in the total, inpatient, and outpatient blocks, rows for 20 age groups.
- Table 2: inpatient + outpatient minus the total is at most 0.1, and age groups + unknown minus the total at most 0.4 thousand (rounding).
- The population (inpatients) derived from estimated patients ÷ patient rate × 100,000, summed over age groups (124,475 thousand in 2023) and computed from the totals (124,370 thousand), agrees within 0.0008 in all 9 surveys.

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4. People in hospital on a given day

Calculation 4.1 Inpatients (estimated number of patients)

Year	Inpatients (thousand)	Per 100,000	1 in how many people	Share aged 65+	Median age (years)
1999	1,482.6	1170	85.5	0.559	67.97
2005	1,462.8	1145	87.3	0.641	72.27
2011	1,341.0	1068	93.6	0.682	74.74
2017	1,312.6	1036	96.5	0.732	76.31
2020	1,211.3	960	104.2	0.747	76.88
2023	1,175.3	945	105.8	0.755	77.81

Observation 4.2: **People in hospital on a given day fell from 1,482.6 thousand in 1999 to 1,175.3 thousand in 2023, from 1 in 85.5 people to 1 in 105.8. The median age rose from 67.97 to 77.81, above the previous survey in all 9 surveys.** Outpatients numbered 7,275.0 thousand in 2023 (5850 per 100,000).

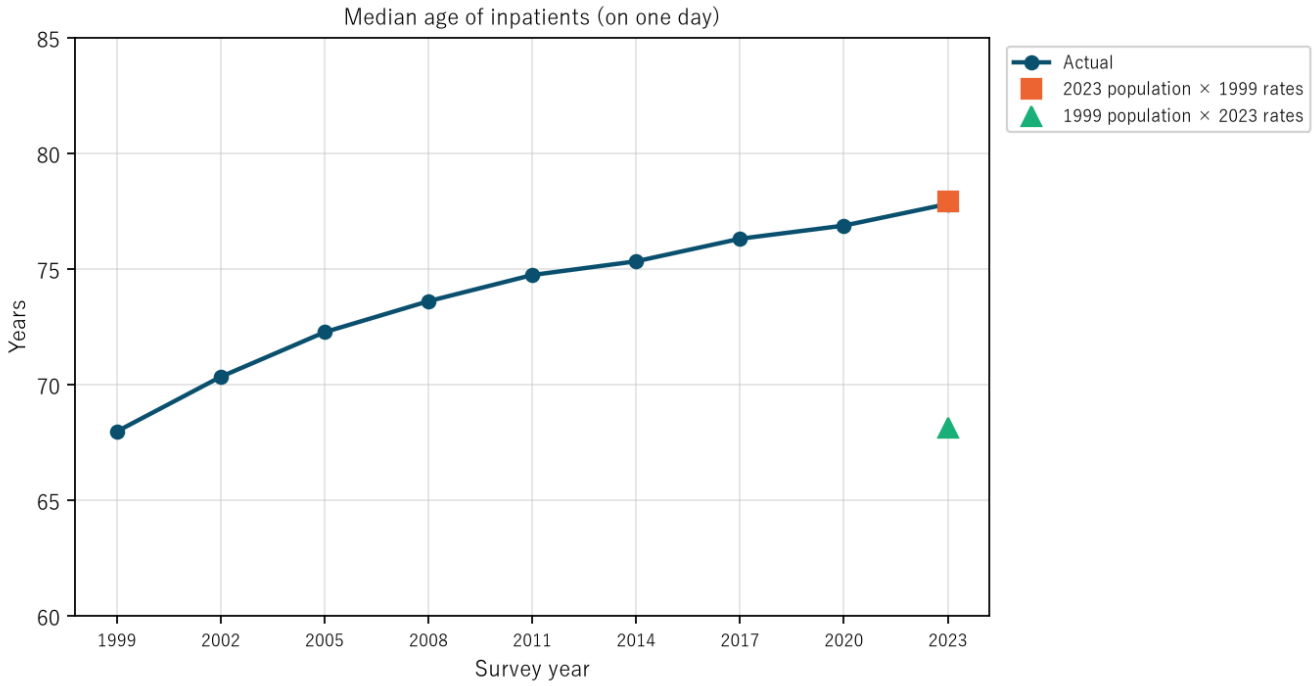


Figure 1: Median age of inpatients (on one day). Navy is actual, orange is 2023 population × 1999 rates, and green is 1999 population × 2023 rates.

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5. The core — swapping the population and patient rates

Calculation 5.1 Swapping between 1999 and 2023 (inpatients, sum over age groups)

	Inpatients (thousand)	Ratio to 1999	Median age (years)
1999 (actual)	1,478.7		67.97
2023 (actual)	1,174.8	0.794	77.81
2023 population × 1999 rates	2,336.6	1.580	77.90
1999 population × 2023 rates	745.6	0.504	68.12

Observation 5.2: **Applying the 1999 rates to the 2023 population, inpatients rise 1.580-fold. Applying the 2023 rates to the 1999 population, they fall to 0.504-fold. The product of the two, 0.797, matches the actual ratio, 0.794, within 1% (actual ÷ product 0.997).** Patient rates are what reduced the number.

Observation 5.3: **Of the 9.84-year rise in the median age, swapping only the population age structure gives 9.93 years, and swapping only the patient rates gives 0.15 years.** In the age distribution (shares) too, the largest gap between the actual 2023 and "2023 population × 1999 rates" is 0.0056, much smaller than the 0.0923 gap between the actual 1999 and 2023. Nearly all of the rise in age is the population's age structure. As M086 showed, patient rates lowered their level with almost no change in their age shape (the speed of doubling), so they did not act on the age distribution, only on the number.

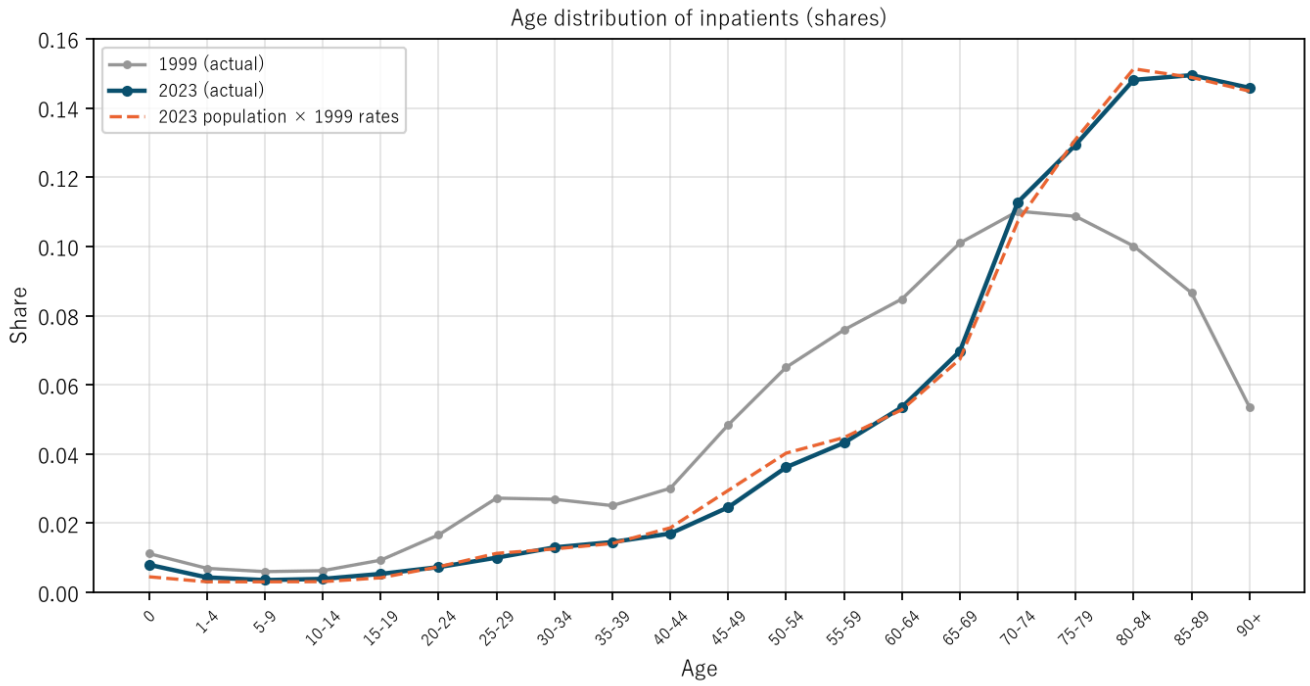


Figure 2: Age distribution of inpatients (shares). Grey is 1999, navy is 2023, and the orange dashed line is 2023 population × 1999 rates.

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6. Limitations

1. **The estimated number of patients is an estimate of patients in hospital on the survey day (one day in October), not the number admitted in a year.** People with longer stays are more likely to appear on a given day.
2. The swap is built from "estimated patients = population × patient rate," and why patient rates fell cannot be separated with these tables.

3. The median age assumes a uniform spread within each 5-year age group and excludes unknown ages.
4. 2011 excludes part of Miyagi Prefecture and Fukushima Prefecture. The 2020 survey falls in the period of the COVID-19 epidemic, but this paper does not separate its effect.
5. The paper does not judge whether there are many or few hospitalizations, the number of beds, or the health care system.

Conclusion

People in hospital on a given day fell from 1,482.6 thousand in 1999 to 1,175.3 thousand in 2023, and their median age rose from 67.97 to 77.81. Applying 1999 patient rates to the 2023 population, inpatients would rise 1.580-fold and the median age would be 77.90. Patient rates reduced the number, and the population's age structure raised the age.

What separates them is one thing — what moved the number versus what moved the age.

When you hear "there are fewer inpatients, and they have aged," **check the number and the age separately.**

Data and reproduction

Data	Patient Survey 2023, national volume, Tables 2 and 4 (Ministry of Health, Labour and Welfare, e-Stat) (retrieved 26 September 2026)
Terms of use	e-Stat follows the Government of Japan Standard Terms of Use (Version 2.0). The medians and swap calculations in this paper were processed from it and are not numbers produced by the government
Coverage	Japan, 9 surveys from 1999 to 2023 (survey day in October), estimated inpatients and patient rates, age groups
Verification	`検算/M092.py` (`--zu` also draws the figures). Every number in the text is taken from `検算/M092_output.txt`
Raw data	`data/` holds the retrieved files and `SOURCES.md` (URLs, retrieval date, SHA-256, terms of use, definitions and how the calculations were set up)
Figures	`図/M092_zu1`, `図/M092_zu2` (png, svg, English versions)

References

- Ministry of Health, Labour and Welfare. Patient Survey 2023, national volume, Tables 2 and 4 (in Japanese). e-Stat (accessed 26 September 2026). https://www.e-stat.go.jp/
- Yamagishi, Y. (2026). The Inpatient Rate Doubles Every 11.24–12.10 Years at Ages 40–84, and from 1999 to 2023 the Speed of Doubling Hardly Moved While the Level at Age 60 Fell to 0.479 — the Outpatient Level Hardly Moved (0.868), While the Years to Double Lengthened from 16.38 to 20.68 and the Slope Flattened [M086]. Zenodo (unpublished).