Mushroom Poisoning Outbreaks — China, 2020

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Summary

What is already known about this topic?
Acute liver failure, rhabdomyolysis, acute renal failure, and hemolysis caused by poisonous mushrooms are the most important mushroom poisoning threats to the Chinese population. The most notorious lethal mushrooms are the species from genera *Amanita*, *Lepiota*, and *Galerina* that cause acute liver failure, and *Russula subnigricans* that leads to rhabdomyolysis.

What is added by this report?
In 2020, the total number of investigations reached 676, involving an estimated 102 species of poisonous mushrooms, 24 of which were newly recorded in China. *Gyromitra venenata* was newly discovered in incidents in Yunnan and Guizhou provinces and were the first reported poisonings due to gyromitins in China since 2000. The rare poisoning Shiitake mushroom dermatitis was recorded in China. Hemolysis poisoning caused by *Paxillus involutus* was recorded for the second time since the beginning of the new century, resulting in one death in Inner Mongolia Autonomous Region.

What are the implications for public health practice?
Promoting knowledge about safe consumption of mushrooms is essential to reduce mushroom poisonings. It is not wise to collect and eat wild mushrooms. For southwestern provinces such as Yunnan, especially, caution must be exercised with unfamiliar mushroom species.

Preventing mushroom poisonings depends on cooperation between clinical doctors, CDC experts, and mycologists as well as the application of internet technology tools (1). Systematic epidemiological investigations, timely and accurate species identification, toxin detection, and appropriate diagnosis and treatment are key to properly controlling mushroom poisoning events.

In 2020, a total of 676 independent mushroom poisoning incidents from 24 provincial-level administrative divisions (PLADs) involving 1,719 patients and 25 deaths were investigated and the overall mortality was 1.45%. The number of cases ranged from 1 to 27,* and 14 outbreaks involved more than 10 patients. Of these cases, 93 patients from 24 incidents had eaten poisonous mushrooms purchased from market or given by friends; 51 patients from 12 incidents had been poisoned after eating dried mushrooms; 404 patients from 131 incidents with 7 deaths ate mixed mushrooms. Three rare clinical syndromes were recorded: Gamma-Aminobutyric Acid (GABA)-blocking mushroom poisoning caused by *Gyromitra venenata*, Hemolysis poisoning caused by *Paxillus involutus*, and Shiitake mushroom dermatitis caused by *Lentinula edodes*. Similar to 2019, mushroom poisonings occurred in every month but were centered from June to October (1). There were 2 peaks appearing in June and September involving 160 and 193 incidents, 428 and 412 patients, and 8 and 3 deaths, respectively (Figure 1).

In terms of geographical distribution, Southwest China (Yunnan, Guizhou, Sichuan, Chongqing, and Xizang (Tibet)) were the most severely affected region with 200 incidents, 604 patients, and 15 deaths. Central China (Hunan, Hubei, and Jiangxi) had more incidents (323 incidents), more patients (707 patients), but less deaths (4 deaths). East China (Anhui, Fujian, Jiangsu, and Zhejiang) had 82 incidents, 159 patients, and 0 deaths and were followed by the other regions: South China (Guangdong, Guangxi, and Hainan) had 33 incidents, 146 patients, and 3 deaths; North China (Beijing, Hebei, Henan, Shandong, and Shanxi) had 22 incidents, 69 patients, and 1 death; Northwest China (Ningxia and Gansu) had 13 incidents, 30 patients, and 1 death; and Northeast China (Inner Mongolia and Liaoning) had 3 incidents, 4 patients, and 1 death. In addition, 3 Burmese workers in Yunnan had gastroenteritis after eating *Chlorophyllum*
molybdites. Detailed information for each PLAD was displayed in Table 1.

Approximately 102 species of poisonous mushroom causing seven different clinical syndromes (acute liver failure, acute renal failure, rhabdomyolysis, hemolysis, gastroenteritis, psycho-neurological disorder, and Shiitake mushroom dermatitis) (2–3) were successfully identified. In 2020, 24 species were newly recorded as poisonous mushrooms and were added to the Chinese poisonous mushroom list. The most lethal 3 mushroom species were Lepiota brunneoincarnata, Russula subnigricans, and Amanita subpallidorosea killing 5, 4, and 4 people, respectively ( Supplementary Table S1, available in http://weekly.chinacdc.cn/). Chlorophyllum molybdites caused the most poisonings (appearing in 154 incidents, 304 patients), were the most widely distributed mushroom (discovered in 15 PLADs) and had the longest active period (from late March to late October) in China, 2020 (Supplementary Table S1).

Chlorophyllum molybdites. Detailed information for each PLAD was displayed in Table 1.

Similar to 2019, the same 9 species causing acute liver failure were identified in China, 2020 (1). Lepiota brunneoincarnata was found to be the most dangerous species in 2020, being responsible for 15 incidents, 29 patients, and 5 deaths as the lone cause or in combination with other species. Lepiota brunneoincarnata was discovered under coniferous trees, but in 2 incidents occurring in 2020, it was found in hardwood forest dominated by fagaceous trees in Guizhou and under Ziziphus jujube in Mengcun County, Hebei Province. The incident in Hebei Province on August 29 involved 6 patients. Amanita exitialis also appeared in Guangdong in late February, which was earlier than in 2019 but resulted in less deaths (1). There were also more incidents of patients consuming a combination of poisonous mushrooms, which can cause greater difficulties and risks for diagnosis and treatment due to species resulting in different symptoms (Supplementary Table S1).

Amanita gymnopus was a species discovered from poisoning investigations causing acute renal failure that was not found in 2019 (1). Due to delayed diagnosis and treatment, 3 people were killed by A. pseudoporphyrina in early June in Guangxi. Amanita oberwinklerana was discovered in 18 incidents from 8 PLADs. Amanita oberwinklerana, a species occurring in southern China, also caused 6 incidents including 11 patients in North China for the first time from late July to late September. More deaths were caused by Russula subnigricans, which leads to rhabdomyolysis, when compared to 2019 (1, Supplementary Table S1).

On September 12–13, 2 incidents involving 2 patients and 1 death caused by Paxillus involutus resulting hemolysis occurred in Chifeng and Tongliao, Inner Mongolia Autonomous Region. Clinically, this type of poisoning stimulates an autoimmune reaction, with a short incubation period (usually 30 min–3 h), followed by gastrointestinal tract effects (GIT) including nausea, vomiting, abdominal pain, and/or diarrhea. Intravascular haemolysis, anaemia, with potential secondary renal failure, shock, disseminated
intravascular coagulopathy, and acute respiratory failure developed on the following few days and even caused death (3).

A total of 56 species causing gastroenteritis were identified from mushroom poisoning incidents in China in 2020 (Supplementary Table S1). Among them, *Baorangia major*, *Chlorophyllum demangei*, *Entoloma caespitosum*, *Gymnopus densilamellatus*, *Lactarius atromarginatus*, *Lactifluus deceptivus*, *Lf. puberulus*, *Leucocoprinus cretaceous*, *Micropsalliota furfuracea*, *Neonothopanus nambi*, *Pholiota multicingulata*, *Pulveroboletus subrufus*, *Russula rufobasalis*, and *Tricholoma stans* were species newly discovered as poisonous mushrooms and subsequently added to the Chinese poisonous mushroom list (1–2, 4–6). This was the first report of *Baorangia major* in China. The top 3 species were *Chlorophyllum molybdites*, *Russula japonica*, and *Entoloma omiensense*, which was the same as 2019, but these 3 species caused more incidents and had wider geographical distribution (1).

About 28 species causing psycho-neurological disorders were identified from mushroom poisoning incidents in China in 2020, including *Clitocybe subditopoda*, *Gyromitra venenata*, *Inocybe aff. ericetorum*, *Malleocybe fulvipes*, *Inosperma aff. virosum*, *Inosperma cf. virosum*, *Pseudosperma cf. bulbosissimum*, and *Pseudosperma yunnanense*, which were species newly discovered as poisonous mushrooms and thus added to Chinese poisonous mushroom list (1–2, 7–9). The top five species are *Amanita subglobose*, *A. rafoserruginea*, *Gymnopilus dilepis*, *A. melleiceps*, and *A. sychnopyramis f. subannulata* (Supplementary Table S1). Among them, *Gyromitra venenata* is a new species discovered from Yunnan and Guizhou resulting 4 patients poisoned as containing gyromitrins (7).

### TABLE 1. Geographical distribution of mushroom poisoning incidents, cases, deaths, and case fatality in China, 2020.

| PLADs        | Number of incidents | Number of patients | Deaths | Case fatality (%) |
|--------------|---------------------|--------------------|--------|-------------------|
| Hunan        | 302                 | 666                | 3      | 0.45              |
| Yunnan       | 81                  | 244                | 7      | 2.87              |
| Guizhou      | 43                  | 148                | 7      | 4.73              |
| Zhejiang     | 43                  | 78                 | 0      | 0                 |
| Sichuan      | 40                  | 123                | 1      | 0.81              |
| Chongqing    | 35                  | 88                 | 0      | 0                 |
| Fujian       | 18                  | 42                 | 0      | 0                 |
| Guangxi      | 15                  | 87                 | 3      | 3.45              |
| Anhui        | 12                  | 30                 | 0      | 0                 |
| Ningxia      | 12                  | 29                 | 1      | 3.45              |
| Hubei        | 12                  | 24                 | 1      | 4.16              |
| Guangdong    | 11                  | 21                 | 0      | 0                 |
| Jiangxi      | 9                   | 17                 | 0      | 0                 |
| Jiangsu      | 9                   | 9                  | 0      | 0                 |
| Beijing      | 8                   | 23                 | 0      | 0                 |
| Hainan       | 7                   | 38                 | 0      | 0                 |
| Hebei        | 7                   | 33                 | 0      | 0                 |
| Shandong     | 3                   | 8                  | 1      | 12.50             |
| Henan        | 3                   | 3                  | 0      | 0                 |
| Inner Mongolia| 2                  | 2                  | 1      | 50.00             |
| Liaoning     | 1                   | 2                  | 0      | 0                 |
| Shanxi       | 1                   | 2                  | 0      | 0                 |
| Gansu        | 1                   | 1                  | 0      | 0                 |
| Xizang (Tibet)| 1                 | 1                  | 0      | 0                 |
| Total        | 676                 | 1,719              | 25     | 1.45              |

Abbreviation: PLADs=provincial-level administrative divisions.
**DISCUSSION**

When comparing incidents in 2019 to 2020, more mushroom poisoning incidents occurred (276 in 2019 vs. 676 in 2020) involving more patients (769 vs. 1719) and deaths (22 vs. 25) (1). As in 2019, monthly distribution analysis showed that mushroom poisonings occurred every month and were centered from June to October; however, 1 peak appeared in July in 2019 (1), while 2 peaks (June and September) appeared in 2020. Geographical distribution analysis showed that mushroom poisoning incidents were reported in 24 PLADs in 2020—among which, 16 PLADs also reported cases in 2019 with the new PLADs being Anhui, Jiangxi, Beijing, Hebei, Inner Mongolia, Liaoning, Gansu, and Xizang (Tibet) (Supplementary Table S1). The PLADs with the highest number of mushroom poisonings were Hunan, Yunnan, Guizhou, Zhejiang, and Sichuan in 2020 (Supplementary Table S1), and Hunan, Yunnan, Zhejiang, Guizhou, and Chongqing in 2019 (1). Yunnan and Guizhou had the most deaths (7) in 2020, but in 2019, Yunnan had 14 deaths (1). Approximately 102 species of poisonous mushrooms were identified in incidents in 2020, among which 35 species were also identified in 2019, and the total number reached approximately 130 species.

In Spring 2020, 4 people were poisoned by “false morels” resulting in typical metabolic-based pathology secondary to blocking of GABA synthesis in multiple organs. Clinically, the incubation period is 5–12 hours or longer, followed by gastrointestinal system effects, ataxia, hypoglycaemia, haemolysis, methaemoglobinaemia, or even hepatic damage (3). Another study showed that this species was different from *Gyromitra esculenta* and represented a new species described as *G. venenata* (7).

*Paxillus involutus* was used as medicine for treating lumbago, skelalgia, and limb numbness in China and was considered edible in some areas of Northeast China, and recent studies also showed it was a good source of antioxidant (2). However, *Paxillus involutus* was reported as causing hemolysis after repeated exposure, and its toxins and poisoning mechanism are still unclear (3). The 2 incidents in 2020 involving 6 people but only 2 persons were poisoned with 1 death and the other developing renal failure. For safety, we strongly advise not to collect and eat this species although it seems safe to many people.

*Gerhardtia sinensis* was identified in 2 incidents involving 6 patients and treated as a highly suspected poisonous species in 2019 (1). In 2020, this species caused 4 incidents involving 13 patients and was confirmed as poisonous although its toxicology was still unclear (Supplementary Table S1). Another mushroom causing 5 people GIT on August 23 from Dehong, Yunnan, was identified as *Lactifluus pseudoluteopus*. As no toxicological knowledge is available, this mushroom is highly suspected as poisonous presently although several closely related species are edible (4).

Patients from many mushroom poisoning incidents consumed mixed wild mushrooms (Supplementary Table S1), and these poisonous mushrooms often caused different clinical syndromes, which put them at high risk. For example, patients consuming together *Amanita fuliginea* and *A. neoovoidea*, *A. fuliginea* and *A. pseudoporphyria*, or *A. fuliginea* and *A. oberwinklerana* could cause acute liver failure and acute renal failure at the same time (Supplementary Table S1). *Coprinus comatus* is a widely consumed mushroom, but as it is matures, coprine accumulates and may lead GIT, especially when combined with alcohol. Therefore, we strongly advise not combining consumption of mixed wild mushrooms and alcohol.

Over 1,000 edible mushrooms and approximately 500 poisonous species were reported in China (1–2,4).
Morphologically, many poisonous species are similar to edible ones, e.g. the lethal *Russula subnigricans* causing rhabdomyolysis is similar to the edible *R. nigricans*, making it hard to differentiate and repeatedly causing poisoning incidents. Educated individuals with the ability to recognize poisonous mushrooms and people aware of the risk of eating wild mushrooms are the basis for mushroom poisoning prevention and control. Therefore, science education is of great importance for reducing mushroom poisoning. In the last few years, many educational science materials for mushroom poisonings in China were produced with cooperation from governments, CDCs, doctors, and mycologists.

Accurate and timely species identification is of pivotal importance in mushroom poisoning incidents, and progress has been made as more incidents were properly identified, which could better guide the diagnosis and treatments for patients. The number of incidents with satisfactory mushroom identification grew from only 2 during 2010–2014 (II) to over 200 in 2019 (I) and over 600 in 2020. The growing number of poisonous mushroom identifications suggests that what we know only a portion of the variety of poisonous mushrooms. Many species need to be formaly described and their edibility is not clear. More effort and closer cooperation are still needed urgently from local and national governments, CDC staff, doctors, and mycologists to properly control mushroom poisoning events.

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SUPPLEMENTARY TABLE S1. Mushroom species involved in poisoning incidents and their spatial and temporal distribution in China, 2020.

| Mushroom species | Number of incidents | Number of patients | Deaths | Case fatality (%) | Spatial and temporal distribution |
|------------------|---------------------|--------------------|--------|-------------------|----------------------------------|
| Acute liver failure |                     |                    |        |                   |                                  |
| Amanita exitialis  | 11                  | 36                 | 2      | 5.56              | Feb 24 to Mar 30, Guangdong; June 22 to July 22, Yunnan; June 1 to July 18, Hunan and Guizhou |
| Amanita fuliginea  | 9                   | 23                 | 0      | 0                 |                                  |
| Amanita fuliginea and A. neoovoidea<sub>ARF</sub> | 1 | 2 | 0 | 0 | June 28, Zhejiang |
| Amanita fuliginea and A. pseudoporphyria<sub>ARF</sub> | 2 | 3 | 0 | 0 | June 2 to 9, Hunan |
| Amanita fuliginea and A. subjunquillea<sub>ALF</sub> | 1 | 4 | 3 | 75.00 | July 18, Guizhou |
| Amanita fuliginea and A. oberwinklerana<sub>ARF</sub> | 1 | 2 | 0 | 0 | June 23, Hunan |
| Amanita fuliginea and A. frullaria<sup>GP</sup> | 3 | 9 | 0 | 0 | June 5 to 15, Hunan |
| Amanita cf. fuliginea | 2 | 9 | 0 | 0 | June 18 to June 19, Guizhou and Chongqing |
| Amanita palloidorosea | 4 | 7 | 0 | 0 | June 16 to July 8, Guizhou |
| Amanita palloidorosea and A. sinocitrina<sup>P</sup> | 1 | 1 | 0 | 0 | June 30, Guizhou |
| Amanita palloidorosea and A. frullaria<sup>GP</sup> | 1 | 2 | 0 | 0 | June 30, Chongqing |
| Amanita rimoso | 4 | 10 | 0 | 0 | June 6 to 27, Hunan, Hubei, and Chongqing |
| Amanita rimoso and Lepiota brunneoincarnata<sub>ALF</sub> | 1 | 4 | 0 | 0 | June 12, Hunan |
| Amanita subjunquillea | 6 | 28 | 0 | 0 | June 18 to 28, Guizhou; Aug 20 to Sept 2, Hebei and Beijing; Sept 16 to Oct 15, Yunnan and Guizhou |
| Amanita subpallidorosea | 4 | 8 | 4 | 50.00 | Oct 20, Guizhou |
| Amanita subpallidorosea, A. citrina<sup>P</sup> and Lactifluus puberulus<sup>ALF</sup> | 1 | 3 | 0 | 0 | Oct 8 to 16, Yunnan, Sichuan, and Guizhou |
| Amanita sp., Psathyrella candolleana<sup>GP</sup>, Russula sp.<sup>U</sup> and Agaricus sp.<sup>U</sup> | 1 | 2 | 1 | 50.00 | July 13, Sichuan |
| Galerina sulciceps | 6 | 12 | 2 | 16.67 | May 13 to July 3, Hebei, Hunan, and Jiangsu; Aug 19 to 30, Ningxia, Gansu, Shandong, Hebei and Liaoning |
| Lepiota brunneoincarnata | 14 | 28 | 5 | 17.86 | Sept 14, Guizhou |
| Lepiota brunneoincarnata and Gymnopus dryophillus<sup>U</sup> | 1 | 1 | 0 | 0 |                                  |
| Rhabdomyolysis |                     |                    |        |                   |                                  |
| Russula subnigricans | 10 | 26 | 4 | 15.38 | June 26 to Oct 4, Yunnan, Zhejiang, and Hunan |
| Russula subnigricans and R. japonica<sup>G</sup> | 1 | 4 | 0 | 0 | July 5, Yunnan |
| Russula subnigricans and Entoloma prismaticum<sup>U</sup> | 1 | 2 | 0 | 0 | Aug 8, Sichuan |
| Acute renal failure |                     |                    |        |                   |                                  |
| Amanita gymnopus | 3 | 4 | 0 | 0 | June 14 to July 7, Hunan and Yunnan; Oct 10, Zhejiang |
| Amanita neoovoidea | 4 | 4 | 0 | 0 | Sept 24 to Oct 19, Hunan and Sichuan |
| Amanita oberwinklerana | 14 | 36 | 0 | 0 | June 6 to July 5, Guizhou, Chongqing, Hunan, and Jiangsu; July 26 to Sept 25, Henan, Shanxi, Beijing, Hebei and Hunan |
| Amanita oberwinklerana and A. cf. ibotengutake<sup>G</sup> | 1 | 1 | 0 | 0 | Sept 5, Beijing |
| Amanita oberwinklerana and A. pseudoporphyria<sup>ARF</sup> | 2 | 3 | 0 | 0 | June 3 to Sept 30, Hunan |
| Amanita pseudoporphyria | 14 | 49 | 3 | 6.12 | June 6 to Oct 14, Hunan, Guangxi, and Yunnan |
| Amanita aff. pseudoporphyria | 3 | 10 | 0 | 0 | June 6 to Oct 5, Hunan |
| Mushroom species                        | Number of incidents | Number of patients | Deaths | Case fatality (%) | Spatial and temporal distribution |
|----------------------------------------|--------------------|-------------------|--------|-------------------|-----------------------------------|
| *Amanita pseudoporphyria* and *Suillus placidus* (dried mushrooms) | 1                  | 3                 | 0      | 0                 | Dec 16, Hunan                     |
| **Hemolysis**                          |                    |                   |        |                   |                                   |
| *Paxillus involutus*                   | 2                  | 2                 | 1      | 50.00             | Sept 12 to 13, Inner Mongolia    |
| **Gastroenteritis**                    |                    |                   |        |                   |                                   |
| *Baorangia major*                     | 1                  | 4                 | 0      | 0                 | May 25, Fujian                    |
| *Baorangia major* and *B. pseudocalopus* | 1                  | 7                 | 0      | 0                 | July 19, Yunnan                  |
| *Baorangia sp.*                        | 1                  | 5                 | 0      | 0                 | July 23, Yunnan                  |
| *Boletellus cf. emodensis*            | 1                  | 1                 | 0      | 0                 | Aug 12, Yunnan                   |
| *Chlorophyllum demangei* and *Scleroderma aurantiacum* | 1                  | 2                 | 0      | 0                 | July 31, Sichuan                 |
| *Chlorophyllum globosum*              | 3                  | 14                | 0      | 0                 | June 3 to Aug 20, Sichuan        |
| *Chlorophyllum hortense* and *Clitocybe sp.* | 1                  | 1                 | 0      | 0                 | Oct 26, Sichuan                  |
| *Chlorophyllum molybdites*            | 152                | 302               | 0      | 0                 |                                   |
| *Chlorophyllum molybdites* and *Ch. hortense* | 1                  | 1                 | 0      | 0                 | Sept 13, Hunan                   |
| *Chlorophyllum molybdites* and *Entoloma omiense* | 1                  | 1                 | 0      | 0                 | Sept 28, Hunan                   |
| *Chlorophyllum spp.*                  | 3                  | 9                 | 0      | 0                 | July 31 to Dec 14, Sichuan, Hunan, and Guangdong |
| *Cortinarius sinensis* and *C. fulminoides* (bought from market) | 1                  | 4                 | 0      | 0                 | Sept 8, Ningxia                   |
| *Entoloma caespitosum*                | 1                  | 1                 | 0      | 0                 | Sept 20, Hunan                   |
| *Entoloma omiense*                    | 28                 | 49                | 0      | 0                 | June 28 to Oct 9, Hunan, Zhejiang, Hainan, and Fujian |
| *Entoloma omiense, Entoloma sp* and *Psathyrella candolleana* | 1                  | 1                 | 0      | 0                 | July 8, Hunan                    |
| *Entoloma omiense and Micropsalliota sp* | 1                  | 3                 | 0      | 0                 | Sept 10, Fujian                  |
| *Entoloma omiense and *Suillus placidus* | 1                  | 4                 | 0      | 0                 | Sept 17, Guizhou                 |
| *Entoloma cf. rhodopolium*            | 1                  | 5                 | 0      | 0                 | Aug 4, Yunnan                    |
| *Entoloma cf. sinuatum*               | 2                  | 4                 | 0      | 0                 | Sept 14 to 21, Guizhou           |
| *Entoloma spp.*                       | 17                 | 51                | 0      | 0                 | June 5 to Oct 18, Guangxi, Guizhou, Hunan, and Yunnan |
| *Gerhardtia sinensis*                 | 4                  | 13                | 0      | 0                 | Oct 7 to 11, Hunan               |
| *Gymnopus densilamellatus*            | 3                  | 19                | 0      | 0                 | Feb 12 to May 31, Hunan and Guizhou |
| *Hygrophorus cf. white* and *Lycoperdon caudatum* and *Megascleroderma marginata* | 1                  | 5                 | 0      | 0                 | Oct 9, Sichuan                   |
| *Hypholoma fasciculare*               | 3                  | 9                 | 0      | 0                 | July 9 to Dec 4, Sichuan and Yunnan |
| *Lactarius subhirtipes*               | 3                  | 9                 | 0      | 0                 | May 31 to July 26, Hunan, Guizhou, and Anhui |
| *Lactifluus deceptivus*, *L. pilosus* and *L. aff. piperatus* (dried mushrooms) | 1                  | 2                 | 0      | 0                 | Feb 9, Hunan                      |
| *Lactifluus pseudoluteopus*            | 1                  | 5                 | 0      | 0                 | Aug 23, Yunnan                   |
| *Leucocoprinus cretaceus* and *Lc. cepistipes* | 1                  | 2                 | 0      | 0                 | Sept 13, Hunan                   |
| *Marasmius maximus* and *Mycena sp.* | 1                  | 1                 | 0      | 0                 | July 18, Hubei                   |
| *Melanoleuca griseobrunnea*           | 1                  | 2                 | 0      | 0                 | May 12, Zhejiang                 |
| *Micropsalliota furfuracea*           | 1                  | 2                 | 0      | 0                 | Sept 14, Hunan                   |
### Mushroom species

| Mushroom species | Number of incidents | Number of patients | Deaths | Case fatality (%) | Spatial and temporal distribution |
|------------------|---------------------|--------------------|--------|-------------------|----------------------------------|
| Micropsalliota sp., Hortiboletus rubellus and Russula pectinatoides | 1 | 2 | 0 | 0 | Sept 24, Hunan |
| Neoboletus venenatus (patients of two incidents ate dried mushrooms, bought from market) | 4 | 9 | 0 | 0 | Aug 13 to Sept 24, Xizang, Guangdong, Hunan, and Sichuan |
| Neoboletus venenatus and Scleroderma bovista (dried mushrooms, bought from market) | 1 | 2 | 0 | 0 | June 18, Hunan |
| Neothopan anus aff. nambi | 2 | 4 | 0 | 0 | May 13 to July 13, Yunnan |
| Omphalotus guepiniformis | 2 | 10 | 0 | 0 | May 28, Guangxi; Oct 4, Hunan |
| Omphalotus olearius | 2 | 16 | 0 | 0 | Sept 9 to Nov 16, Yunnan |
| Pholiota multicingulata | 2 | 9 | 0 | 0 | Sept 22 to Oct 5, Hunan |
| Pulveroboletus subrufus, Russula punctipes, Chiura virens and Suillus pinetorum | 1 | 2 | 0 | 0 | Dec 6, Guizhou |
| Rubrobolus sinicus and Neoboletus cf. multipunctatus | 1 | 4 | 0 | 0 | July 28, Guizhou |
| Rubrobolus sinicus and Retiboletus fuscus | 1 | 3 | 0 | 0 | June 18, Yunnan |
| Rubrobolus sp. | 1 | 2 | 0 | 0 | July 25, Hunan |
| Russula viridicinnamomeae, Agaricus sp. and Termitomyces microcarpus and Lactarius vividus | 1 | 5 | 0 | 0 | Aug 2, Sichuan |
| **Russula rufobasalis** | 1 | 1 | 0 | 0 | June 10, Hunan |
| **Russula rufobasalis, Lactarius atromarginatus**, Amanita fritillaria and Russula citrina | 1 | 2 | 0 | 0 | June 11, Hunan |
| **Russula rufobasalis**, Amanita fritillaria, Russula compacta, R. nigricans, R. subatropurpurea, R. cf. fragrantissima, and Cortinarius purpurascens | 1 | 2 | 0 | 0 | June 11, Hunan |
| Russula grata, R. cf. subfoetens, Lactifluus aff. glaucescens, R. fragrantissima, R. pseudoamoenoicicolor, R. samari, R. cyanoxanth, R. variata, R. vesca, R. virescens and Entoloma cf. undatum (dried mushrooms, bought from market) | 1 | 3 | 0 | 0 | Feb 5, Hunan |
| **Russula japonica** | 58 | 151 | 0 | 0 | May 31 to Oct 15, Hunan, Zhejiang, Chongqing, Anhui, Yunnan, Guizhou, Fujian, and Hubei |
| **Russula japonica**, Entoloma omiensc and Agaricus sp. | 1 | 3 | 0 | 0 | Oct 5, Hunan |
| Russula japonica, R. cerolens, Leotia lubrica and Phylloporus dimorphus | 1 | 2 | 0 | 0 | July 11, Guizhou |
| Russula japonica and R. foetens | 1 | 1 | 0 | 0 | June 15, Hunan |
| Russula japonica and R. sanguinea | 1 | 3 | 0 | 0 | June 10, Hunan |
| Russula japonica and R. punctipes | 1 | 3 | 0 | 0 | Oct 3, Hunan |
| Scleroderma areolatum | 1 | 12 | 0 | 0 | Aug 12, Beijing |
| Scleroderma cepa | 4 | 11 | 0 | 0 | July 7 to Sept 27, Yunnan, Sichuan, Hunan, and Chongqing |
| Scleroderma citrinum | 1 | 1 | 0 | 0 | Oct 13, Hunan |
| Suillus granulatus (dried mushrooms, bought from market) | 1 | 2 | 0 | 0 | Mar 23, Ningxia |
| Suillus granulatus, Amanita sinocitrina, A. griseofolia, Russula spp., Lycoperdon sp. and Gymnoporus sp. | 1 | 1 | 0 | 0 | Sept 24, Hunan |
| Suillus pinetorum | 1 | 8 | 0 | 0 | July 21, Yunnan |
| Thicholoma highlandense | 1 | 2 | 0 | 0 | Nov 13, Yunnan |
| Tricholoma sinopardinum, T. sinoportentosum and Lactarius detrerrimus and Agaricus sp. | 1 | 3 | 0 | 0 | July 21, Sichuan |
### Mushroom species

| Mushroom species | Number of incidents | Number of patients | Deaths | Case fatality (%) | Spatial and temporal distribution |
|-----------------|---------------------|--------------------|--------|-------------------|-----------------------------------|
| *Tricholoma stans* | 1                   | 6                  | 0      | 0                 | Nov 14, Yunnan                     |
| *Tylopilus neofelleus* | 1           | 1                  | 0      | 0                 | Aug 9 to Sept 27, Yunnan and Chongqing |

### Psycho-neurological disorder

| Mushroom species | Number of incidents | Number of patients | Deaths | Case fatality (%) | Spatial and temporal distribution |
|------------------|---------------------|--------------------|--------|-------------------|-----------------------------------|
| *Amanita griseopantherina* and *Russula foetens* | 1                   | 12                 | 0      | 0                 | July 21, Sichuan                  |
| *Amanita melleiceps* | 5                   | 20                 | 0      | 0                 | May 30 to Sept 15, Hunan and Guangxi |
| *Amanita orientigemmata* | 1           | 1                  | 0      | 0                 | Sept 23, Hunan                    |
| *Amanita orsonii, A. pseudovaginata* and *Entoloma cf. subcorvinum* | 1           | 2                  | 0      | 0                 | June 28, Guizhou                  |
| *Amanita rufoferruginea* | 6                   | 18                 | 0      | 0                 | June 6 to Aug 6, Hunan, Chongqing, and Sichuan |
| *Amanita subglobosa* | 17                  | 49                 | 0      | 0                 | Apr 26 to June 10, Hainan, Guangxi, and Hunan |
| *Butyriboletus roseoflavus* (bought from market, maybe from Yunnan) | 1           | 9                  | 0      | 0                 | Nov 5, Hainan                      |
| *Clitocybe dealbata* | 1                   | 2                  | 0      | 0                 | July 15, Yunnan                   |
| *Clitocybe subditopoda* | 1           | 3                  | 0      | 0                 | Oct 5, Guizhou                    |
| *Gymnopilus dilepis* | 6                   | 13                 | 0      | 0                 | June 21 to Sept 23, Sichuan, Yunnan, and Guizhou |
| *Gymnopilus spp.* | 5                   | 8                  | 0      | 0                 | May 9 to Oct 3, Jiangxi, Hubei, Hunan, and Yunnan |
| *Gyromitra venenata* | 2                   | 4                  | 0      | 0                 | Mar 13 to 21, Guizhou, Yunnan     |
| *Inocybe aff. ericetorum* and *Russula insignis* | 1           | 1                  | 0      | 0                 | May 26, Hunan                     |
| *Inocybe serotina* | 1                   | 2                  | 0      | 0                 | Sept 19, Ningxia                  |
| *Inocybe serotina* and *Malocybe fulvipes* | 1           | 1                  | 0      | 0                 | Sept 2, Ningxia                   |
| *Inocybe serotina* and *Pseudosperma umbrinellum* = *Inocybe umbrinella* | 1           | 4                  | 0      | 0                 | Aug 28, Ningxia                   |
| *Inocybe splendentoides* | 1           | 1                  | 0      | 0                 | Oct 7, Beijing                    |
| *Inosperma aff. virosus* | 2                   | 16                 | 0      | 0                 | Sept 9 to 16, Yunnan              |
| *Inosperma cf. virosus* | 1                   | 5                  | 0      | 0                 | May 9, Hainan                     |
| *Lanmaoa asiatica* | 1                   | 4                  | 0      | 0                 | July 19, Yunnan                   |
| *Lanmaoa asiatica, Rubroboletus latisporus* | 1           | 3                  | 0      | 0                 | Aug 27, Guangdong                 |
| *Lanmaoa asiatica, Rubroboletus latisporus* | 1           | 3                  | 0      | 0                 | Aug 27, Guangdong                 |
| *Lanmaoa asiatica, Rubroboletus latisporus* | 1           | 3                  | 0      | 0                 | Oct 13, Zhejiang                  |
| *Panaeolus fimbicola* | 1                   | 2                  | 0      | 0                 | June 30, Shandong                 |
| *Pseudosperma cf. bulbosissimum* | 1           | 4                  | 0      | 0                 | Oct 5, Ningxia                    |
| *Pseudosperma umbrinellum, Malocybe siciliana* = *Inocybe siciliana, Hebeloma dunense* and *Psathyrella candolleana* | 1           | 4                  | 0      | 0                 | Sept 4, Hebei                     |
| *Pseudosperma yunnanense* | 1                   | 1                  | 0      | 0                 | July 10, Yunnan                   |
| *Psilocybe cubensis* | 1                   | 2                  | 0      | 0                 | Nov 27, Hunan                     |
| *Shiitake mushroom dermatitis* | 1           | 1                  | 0      | 0                 | Jan 5, Jiangxi                    |

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**Note:** The data is sourced from the *China CDC Weekly* and the Chinese Center for Disease Control and Prevention. The cases reported cover various regions in China, including Yunnan, Hunan, Guangxi, Sichuan, Chongqing, and others.
| Mushroom species                        | Number of incidents | Number of patients | Deaths | Case fatality (%) | Spatial and temporal distribution |
|----------------------------------------|---------------------|--------------------|--------|-------------------|-----------------------------------|
| Unclassified                           |                     |                    |        |                   |                                   |
| Agaricus blazei                        | 1                   | 2                  | 0      | 0                 | Aug 25, Yunnan                    |
| Amanita cf. constricta and Entoloma cf. piceinum | 1                   | 5                  | 0      | 0                 | Aug 7, Sichuan                    |
| Amanita griseofolia                    | 1                   | 4                  | 0      | 0                 | June 27, Guizhou                  |
| Borytiboletus yicipus (from Yunnan)    | 1                   | 4                  | 0      | 0                 | July 26, Hunan                    |
| Coprinopsis nivea                      | 1                   | 3                  | 0      | 0                 | June 29, Hunan                    |
| Coprinus comatus                       | 2                   | 3                  | 0      | 0                 | Early August to Oct 25, Beijing and Ningxia |
| Cortinarius sinensis (bought from market) | 1                   | 2                  | 0      | 0                 | Sept 24, Ningxia                  |
| Lactarius cinnamomeus                  | 1                   | 2                  | 0      | 0                 | Mar 14, Hunan                     |
| Lactifluus tenuicystidiatus            | 1                   | 2                  | 0      | 0                 | Aug 25, Yunnan                    |
| Panus giganteus                        | 1                   | 4                  | 0      | 0                 | Sept 20, Hunan                    |
| Panus tigrinus                         | 1                   | 1                  | 0      | 0                 | May 16, Yunnan                    |
| Pleurotus ostreatus                    | 1                   | 1                  | 0      | 0                 | Oct 31, Ningxia                   |
| Retiboletus fuscus (dried mushrooms, from Yunnan) | 1                   | 2                  | 0      | 0                 | Mar 6, Fujian                     |
| Russula cf. viridicinnamomea           | 1                   | 4                  | 0      | 0                 | July 29, Fujian                   |
| Scleroderma yunnanense                 | 3                   | 7                  | 0      | 0                 | June 25 to Sept 15, Hunan, Yunnan, and Fujian |
| Stropharia rugosoannulata              | 1                   | 1                  | 0      | 0                 | Jan 31, Guizhou                   |
| Xerocomus parvulus                     | 1                   | 4                  | 0      | 0                 | Sept 28, Hunan                    |

Abbreviations: ALF=Acute liver failure, ARF=Acute renal failure, G=Gastroenteritis, P=Psycho to neurological disorder, U=Unclassified, E=edible.

Note: Species newly recorded as poisonous mushrooms in China are in bold.