

Mumps Outbreak in King County and Beyond

In a typical year, mumps wouldn't make the list of health conditions your average American worries about. Since its introduction in 1967, the MMR vaccine has been responsible for a greater than 99% decrease in the incidence of mumps in the U.S., shifting what was once a common childhood illness to the realm of rare disease. But 2016 and 2017 have not been typical years.

In sync with several other states across the nation, Washington is in the midst of a significant mumps outbreak. At time of publication, the State Department of Health reported a total of 586 confirmed and probable cases since mid-November 2016, with King County accounting for approximately 38% of cases statewide. [King County's cases](#) included persons ranging in age from one to 64 years, but have been concentrated among children, with approximately 60% of cases among children 17-years-old and younger. Most transmission is suspected to have taken place in home and school settings, with few workplace and other community exposures identified. The majority (62.7%) of cases occurred in Auburn, with Federal Way, Kent, and Seattle seeing 8.4%, 8.9% and 8.0% of cases, respectively. Nearly two-thirds of cases have been able to demonstrate documentation of mumps vaccination, and many additional cases report receipt of usual childhood immunizations. This leaves some scratching their heads and wondering why the MMR vaccine is not entirely keeping mumps at bay.

***How effective is the MMR
(Measles Mumps and Rubella) vaccine?***

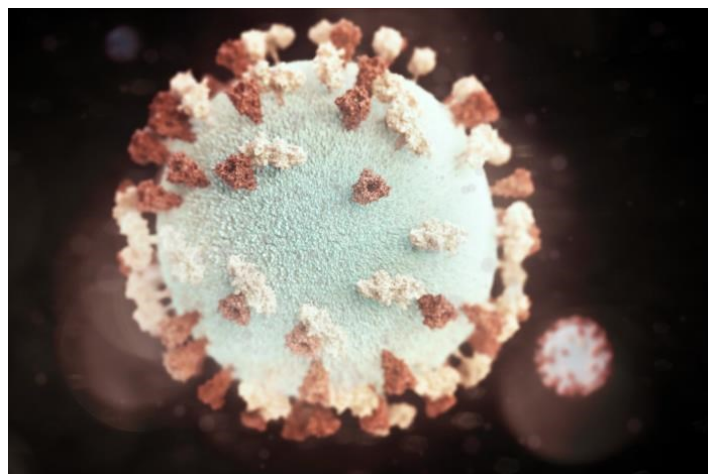


Figure 1. Mumps Virus. Photo courtesy CDC/Allison M. Maiuri MPH, CHES

Prior to the introduction of the MMR vaccine, approximately 186,000 cases were reported annually in the United States -- undoubtedly an underestimate of the true incidence of disease since many cases were likely unreported. At that time, mumps was the primary cause of viral encephalitis and a leading cause of viral meningitis. But in the combined five decades since the vaccine's licensure, we have seen only a small fraction of the number of cases that occurred in just one year before widespread vaccination. For example, in 2012, a mere 229 cases were reported nationwide.

In the current outbreak, the majority of King County cases have been among vaccinated individuals. Why are vaccinated people getting sick? Waning immunity is the most likely explanation. It is also possible that circulating mumps viruses are different than the vaccine strain. And in rare cases, vaccine storage and handling failures may

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contribute to vaccine inefficacy. However, the MMR vaccine does protect the vast majority of those exposed to mumps. The mumps component of the MMR vaccine is about 88% effective (range: 66-95%) when a person receives two doses, and 78% effective with just one dose. We are seeing higher case counts among those who are vaccinated simply because many more people are immunized than not. Just as importantly, vaccinated persons who become infected tend to experience less severe illness. Although they may present with classic mumps symptoms, serious complications are very rare. **Vaccination is unequivocally the best mumps prevention strategy.**

Why is a mumps outbreak occurring now?

It is difficult to pinpoint exactly what triggers an outbreak, but we do know that mumps spreads rapidly in crowded conditions, much like the common cold. A case of mumps can get a grip in a college dorm, grade school, densely packed housing or other place where there's a frequent exchange of mucus and saliva. For example, a 2006 outbreak affecting over 6,500 people occurred primarily on college campuses throughout the Midwest.

Since it is possible that the immunity to mumps conferred through vaccination wanes over time, many people are asking whether a third dose of vaccine should be recommended. For now, data are insufficient to recommend for or against the routine use of a third dose of MMR vaccine for outbreak control. CDC has provided [guidance for considerations for use of a third dose](#) in specifically identified target populations, and the ACIP (the Advisory Committee on Immunization Practices) will be considering the question at an upcoming meeting.

It is also possible that mumps outbreaks occur cyclically, similar to pertussis. If this is true, ensuring that as much of the population as possible is immunized against mumps is the best preparedness measure we can take to diminish the severity and prevalence of disease in the current outbreak and in future outbreaks.

What are the clinical features of mumps?

Mumps is caused by a paramyxovirus, a member of the Rubulavirus family. Illness may begin with nonspecific prodromal symptoms, such as low-grade fever, muscle pain, and headache, but progresses to painful swelling of one or both parotid salivary glands in the cheek and jaw,

called parotitis. Swelling first appears in the lower part of the ear. As fluid accumulates, swelling may move downward and forward, pushing the angle of the ear out and up and eventually obscuring the angle of the jawbone below the ear. 20-40% of mumps cases may have respiratory symptoms only with no parotitis.

The incubation period for mumps ranges from 12 to 25 days, with most transmission taking place in the 16- to 18-day window before the onset of parotitis. An infected person may be contagious for three days prior through five days after the onset of parotitis. Nonspecific symptoms may begin several days before parotitis presents. Parotitis lasts at least two days but may continue for 10 days or more.

Mumps complications are rare but can be serious, and tend to affect adults more frequently than children. In recent outbreaks, orchitis, swelling of the testicles, occurred in approximately 3% to 10% of adolescent and adult males, carrying a very small risk of sterility. Mastitis, swelling of the breast tissue, and oophoritis, swelling of the ovaries, was seen in less than 1% of affected females. Other potential complications, affecting less than 1% of cases, include pancreatitis, deafness, meningitis, and en-

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cephalitis. Death is extremely rare.

What lab testing methods are recommended?

Mumps is a [notifiable condition](#). Therefore, healthcare providers and facilities, laboratories, childcare facilities, schools and other select institutions are required to report suspected or confirmed cases of mumps to their local health jurisdiction. **Communicable Disease Epidemiology staff are available to consult on mumps testing 24/7 – just call 206-296-4774.**

From zero to five days after onset of parotitis, a buccal swab is the preferred specimen for mumps detection. If the patient is seen four or more days after onset of parotitis, urine should also be collected (if day four or five, collect both buccal and urine; after day five, collect urine only). Buccal swabs and urine specimens can be used for virus isolation and detection of mumps RNA by polymerase chain reaction (PCR) at the Washington Public Health Laboratories. Refer to these [specimen collection guide-lines](#) for specific information on how to store and transport specimens. **In particular, note that if testing is unlikely to occur within 72 hours of specimen collection (e.g. collection occurs late on a Friday afternoon), specimens should be frozen at -70°C and shipped on dry ice.**

Anti-mumps immunoglobulin M (IgM) antibody may not be detectable in fully immunized persons and cannot be used to rule out mumps infection. If serology is ordered, testing should be performed through a commercial laboratory.

Besides vaccination, how can we prevent additional mumps cases?

Healthcare providers should advise all suspected mumps cases to practice social distancing for five days after the onset of parotitis by refraining from attending school or work, staying out of public places, and avoiding close contact with other members of their households. Public Health will follow up with schools, worksites and other possible transmission venues to provide information about mumps transmission and possibly recommend exclusion of persons known to be unimmunized against mumps.

Healthcare workers and reception staff at healthcare facilities face an increased risk of mumps exposure during

the current outbreak. Healthcare facilities should follow the recommendations outlined in this [Health Advisory: Mumps Vaccination and Infection Control Measures For Healthcare Providers During the Ongoing Mumps Outbreak](#).

Visit [Public Health Seattle King County's Communicable Diseases and Immunizations webpage](#) for updated information, including daily case counts. For more information, read the [Public Health Insider](#) article "[Mumps Outbreaks: Why Do We Care and Is the Vaccine Working?](#)"

¹ Mumps Vaccination [Internet]. CDC 2016 [cited 3 Feb 2017]. Available from: <https://www.cdc.gov/mumps/vaccination.html>

² Mumps Cases and Outbreaks [Internet]. CDC 2017 [cited 3 Feb 2017]. Available from: <https://www.cdc.gov/mumps/outbreaks.html>

³ Mumps Outbreak [Internet]. Washington State Department of Health 2017 [cited 13 March 2017]. Available from: <http://www.doh.wa.gov/YouandYourFamily/IllnessandDisease/Mumps/MumpsOutbreak>

⁴ Weekly Mumps Outbreak in King County [Internet]. Public Health – Seattle & King County 2017 [cited 13 March 2017]. Available from: <http://www.kingcounty.gov/depts/health/communicable-diseases/disease-control/mumps/outbreak.aspx>

⁵ Centers for Disease Control and Prevention. The Pink Book: Epidemiology and Prevention of Vaccine-Preventable Diseases; c15. 2015. Available online at <https://www.cdc.gov/vaccines/pubs/pinkbook/mumps.html>

⁶ *ibid* 1.

⁷ *ibid* 1.

2017 Immunization Schedules Available Now!

The CDC and its Advisory Committee on Immunization Practices (ACIP) recently released the 2017 [updated immunization schedules for children/adolescents](#) and for [adults](#). A complete summary of changes can be found in the [MMWR for the child/adolescent schedule](#) and the [MMWR for the adult schedule](#).

Recommended schedules are revised annually by ACIP to reflect current recommendations for vaccines licensed by the US Food and Drug Administration.

Immunization Coverage Among Refugee Arrivals in Washington State

Approximately 65 million people across the world are on the move, forcibly displaced from their homes because of conflict and persecution. This includes nearly 21.3 million refugees, over half of whom are under the age of 18.¹ Washington has historically ranked as one of the top ten resettlement states in the U.S., resettling 3,863 refugees from 25 countries in 2016 alone.² Refugees face a unique set of challenges to accessing healthcare, but how is immunization status affected? To learn more, we talked with epidemiologist, Azadeh Tasslimi, and State Refugee Health Coordinator and Program Manager Jasmine Matheson, of the WA Department of Health – Refugee Health Program.

Who are refugees and how do they get to Washington State?

A refugee is a person who is unable to return to his or her home country because of persecution, or a well-founded fear of persecution due to race, religion, nationality, membership in a particular social group, or political opinion.

The United States government allows a certain number of refugees to be resettled in the U.S. each year. Individuals granted refugee status overseas by the [U.S. Department of Homeland Security](#) are brought to the U.S. for resettlement by the [U.S. Department of State](#). [Voluntary agencies](#) and the [Office of Refugee Resettlement](#) assist refugees with resettlement and integration into the U.S.

Washington State is home to a diverse refugee community. In the past 5 years, the top four countries of origin have been Ukraine, Iraq, Afghanistan, and Somalia.

Which vaccines are required for refugees entering the U.S.?

All refugees receive a health exam before entering the U.S., however, refugees do not have to meet Advisory Committee on Immunization Practices (ACIP) requirements at the time of arrival in the U.S. There is a strong system in WA to ensure refugees receive access to immunizations shortly after arrival.

Refugees receive a domestic medical exam within their first 30 to 90 days in the U.S. The exam includes an assessment of overseas vaccination history and, if needed, initiation of the series or catch-up schedule at that time.

In WA, there are six refugee health screening clinics that provide this exam, including [Public Health and Seattle King County's Downtown Clinic](#).



Photo courtesy of PHSKC.

How does Washington compare to other states?

The [WA Department of Health - Refugee Health Program](#) monitors refugee health screening outcomes, including immunizations, to inform screening guidelines and program evaluation activities. We assessed vaccination up-to-date (UTD) status among 11,240 (99%) pediatric and adult refugees who received a domestic medical exam from 7/1/2012-6/30/2016 and who had matching records in the WA Immunization and Information System (IIS). UTD status is defined as receipt of the valid and minimum number of ACIP-recommended doses per age and incorporates the catch-up schedule.

Recent outbreaks of vaccine-preventable diseases in WA, such as pertussis, measles, and the current [mumps](#)

¹Figures at a Glance [Internet]. UN Refugee Agency. 2015 [cited 28 Feb 2017]. Available from: <http://www.unhcr.org/en-us/figures-at-a-glance.html>

² Office of Refugee and Immigrant Assistance [Internet]. Washington State Department of Social and Health Services, 2017 [cited 28 Feb 2017]. Available from: <https://www.dshs.wa.gov/esa/office-refugee-and-immigrant-assistance>

Refugees, cont'd.

[outbreak](#) demonstrate the importance of adequate and timely immunizations.

The majority of refugees have received vaccine doses shortly after arrival in WA. For example, by 90 days post-arrival, 91% of refugees in WA had one or more doses of measles, mumps, and rubella (MMR) vaccine or serologic evidence of immunity to mumps. By 18 months post-arrival, vaccine UTD rates among refugees were comparable to or higher than those estimated for the general WA and U.S. populations for all vaccines.

What are the local impacts of overseas vaccination programs?

We found that refugees in WA who were enrolled in the [CDC Vaccine Program for U.S.-bound Refugees](#) (VPUR) (whereby 1-3 doses of each vaccine series is given 3-6 months prior to departure) had significantly higher vaccine UTD rates at the time of arrival in WA compared to those not enrolled. For vaccines requiring multiple doses (e.g., DTaP and hepatitis B vaccines) and thereby multiple clinic visits, enrollment in VPUR improved timeliness of series completion after arrival in WA.

What should healthcare providers be aware of in order to best support refugees in achieving full vaccination coverage?

Refugees come from diverse regions of the world and may be affected by health conditions and have health risks common to all refugee populations, as well as some that may be unique to specific groups. By having an understanding of a patient's background, providers can better adapt existing best practices and strategies for achieving full vaccination coverage for their refugee patients.

Timely and adequate vaccination is not just important to protect health, but is also important to meet certain requirements as a refugee enrolls in school and applies for adjustment of status to permanent resident (i.e., green card).

WA refugee health screening clinicians assess each refugee's vaccination history and enter all documented overseas doses as well as doses administered at the domestic medical exam into the IIS. Therefore, providers should first review a refugee patient's IIS record to determine which doses may be needed.

Most refugees receive vaccinations as part of the catch-up schedule, which often requires the same number of doses as the routine schedule. It is important to utilize

every opportunity to offer all vaccinations, not just well-child visits, and to be aware of individual risk factors that may indicate a need for additional vaccinations per ACIP recommendations.

To better support refugee patients and improve coordination of their care, primary care providers with expertise in serving refugee communities in WA have built multidisciplinary teams that include social workers, case managers, interpreters and community health workers.

Providers can also support refugee patients by understanding the cultural, traditional practices and religious observances that may impact utilization of health care. [EthnoMed](#) is a local resource that contains information about cultural beliefs, medical issues and related topics pertinent to the health care of refugees.

ACIP Recommends Single Dose Hep B Revaccination

Infants requiring revaccination against hepatitis B can now receive just one additional hepatitis B dose rather than the three previously recommended, voted the Advisory Committee on Immunization Practices (ACIP) at its February 22 meeting.

This new recommendation is part of a comprehensive strategy responsible for reducing hepatitis B perinatal transmission rates by 90% since the early 1990s.¹ Infants born to hepatitis B surface antigen-positive mothers receive postexposure prophylaxis consisting of hepatitis B vaccine and hepatitis B immune globulin administered within 12 hours of birth, a 3- or 4-dose hepatitis B vaccine series, and postvaccination serologic testing (PVST) one to two months following completion of the vaccine series to evaluate the infant's immune response. When an infant's surface antibody levels are less than 10 IU/L after all of these steps have been taken, revaccination is recommended. This new shift to a one-dose revaccination recommendation will mean fewer medical appointments for families, shorter duration of case management for providers, and fewer costs for the healthcare system.

Infants with antibody levels below 10 IU/L after single-dose revaccination should receive two additional doses of vaccine, followed by PVST one to two months after the last dose.

¹ Schillie S, Murphy T, Fenlon N, Ko S, Ward J. Update: Shortened Interval for Postvaccination Serologic Testing of Infants Born to Hepatitis B-Infected Mothers. *MMWR Morb Mortal Wkly Rep* 2015; **64(39)**:1118-20. DOI: https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6439a6.htm?s_cid=mm6439a6_e

Flu Vaccine Effectiveness: Why So Variable?

This season's flu vaccine nearly halves a person's risk of needing outpatient influenza-related medical care. That's according to [interim estimates](#) by the Centers for Disease Control and Prevention (CDC) based on data collected between November 28, 2016 and February 4, 2017. Five sites across the U.S. enrolled a total of 3,144 adults and children to measure this season's vaccine effectiveness -- the proportionate reduction in influenza cases among vaccinated persons.

As in previous years, data show that influenza A viruses (H3N2) have dominated this season, accounting for 88% of illness among those studied. Adjusted vaccine effectiveness is estimated to be 43% against influenza A viruses and 73% against influenza B viruses. Overall, the 2016-17 influenza vaccine has offered 48% greater protection against flu.

Vaccine effectiveness studies like this have been conducted each flu season since 2004-05, producing results that sometimes dramatically diverge from one year to the next. In the 2013-14 season, for example, vaccination was 52% effective against the flu, but just a year later, a flu shot only offered 19% greater protection.¹ While there is never a question of whether flu season will strike, determining the length, timing, and severity of the flu season, and then selecting vaccine components to match the dominant circulating strains, is part rigorous science, but also part guesswork.

What makes the flu virus so unpredictable? Two mechanisms can take the bulk of the credit for influenza's nearly constant state of flux: "antigenic drift" and "antigenic shift." Antigenic drifts are small changes in the virus's genes that happen continuously as the virus replicates. Taken in isolation, any singular change would not have a discernible impact on flu vaccine effectiveness. However, when changes accumulate over time, they can produce viruses that are novel, making it difficult for an immunized host to mount an effective immune response. Antigenic drifts were responsible for the mismatch between the vaccines available in 2014-15 and the circulating viruses, and the subpar 19% vaccine effectiveness that resulted. Antigenic shift, on the other hand, produces a sudden and sweeping change in Influenza A viruses caused by reassortment of genetic material from different A subtypes that results in new viral proteins and creates a

new Influenza A subtype. The reemergence of H1N1 in 2009 offers a recent example of antigenic shift², and the power such shifts have to create an influenza pandemic.

In addition, the vaccine production process introduces opportunities for mismatches. The propagation of influenza viruses in chicken eggs can lead to genetic changes, potentially creating a misalignment between the actual vaccine strain and the original reference strain.

Much like the virus itself, the public health impact of these types of vaccine mismatches is also largely unpredictable. It depends on an array of factors, including strain virulence, whether any immunity already exists in the population, the geographic distribution of the dominant strains, and the immunogenicity of the vaccine, among other considerations.³

Despite the erratic nature of influenza, even in a year with low vaccine effectiveness, immunizing all eligible members of the population six months and older persists as a powerful strategy for reducing the incidence of serious flu complications and deaths. In the nine years between 2005 and 2014, during which vaccine effectiveness fell as low as 21%, an estimated 40,127 deaths were averted by influenza vaccination.⁴ In 2014-15 when the vaccine was poorly matched to the circulating strains, CDC estimates that influenza vaccination still prevented an estimated 1.9 million illnesses, 966,000 medical visits, and 67,000 influenza-associated hospitalizations.⁵ With this season's good match, we can expect even better outcomes. It is not too late to get immunized or offer immunizations at your practice. Visit [King County's Influenza webpage](#) for additional resources.

¹ Seasonal Influenza Vaccine Effectiveness, 2005-2016 [Internet]. CDC. 2016 [cited 24 Feb 2017]. Available from: <https://www.cdc.gov/flu/professionals/vaccination/effectiveness-studies.htm>

² How the Flu Virus Can Change: "Drift" and "Shift". [Internet]. CDC. 2014 [cited 24 Feb 2017]. Available from: <https://www.cdc.gov/flu/about/viruses/change.htm>

³ Dos Santos G, Neumeier E, Bekkat-Berkani R. Influenza: Can we cope better with the unpredictable? *Human Vaccines & Immunotherapeutics* [Internet]. Mar 2016 [cited 2017 Feb 24]; 12(3): 699-708. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4964641/>

⁴ Foppa I, Cheng P, Reynolds S, Shay D, et al. Deaths averted by influenza vaccination in the U.S. during the seasons 2005/06 through 2013/14. *Vaccine* [Internet]. 12 June 2015 [cited 2017 Feb 24]; 33: 3003-3009. Available from: <http://dx.doi.org/10.1016/j.vaccine.2015.02.042>.

⁵ Estimated Influenza Illnesses and Hospitalizations Averted by Vaccination — United States, 2014-15 Influenza Season [Internet]. CDC. 2016 [cited 24 Feb 2017]. Available from: <https://www.cdc.gov/flu/about/disease/2014-15.htm>

To Increase HPV Vaccination Rates, Start With an Announcement, not a Discussion

HPV immunization rates lag dramatically behind those of [other vaccines recommended for 11- and 12-year-olds](#). In 2015, [70% of King County 13- to 17-year-olds](#) had not completed the HPV vaccine series, representing thousands of missed opportunities to prevent cancer. Recent [research published in Pediatrics](#) can help clinicians close the gap. Building on evidence that a strong recommendation from a healthcare provider is the best predictor of vaccination, researchers compared two styles for communicating with parents about HPV vaccination. Using an “announcement” approach, clinicians assume parents’ readiness to vaccinate. In contrast, a “conversation” method invites parents to discuss concerns before the provider’s recommendation.

These approaches were tested in 30 primary care practices serving adolescents in North Carolina. Each clinic was randomly assigned to receive an “announcement training,” a “conversation training,” or no training. Announcement trainings instructed providers to begin by stating that the child is due to receive three vaccinations, and then administer the vaccines without encouraging discussion. Providers were advised to address questions only at the parent’s request, and pair their answers with a strong, motivational recommendation for same-day vaccination. Conversation trainings coached providers to begin more broadly by introducing the three recommended vaccines, then discuss benefits, invite questions, and end with a strong recommendation. To deemphasize and routinize the HPV vaccine, both trainings directed providers to list it between the other recommended vaccines.

Six months after clinics received announcement trainings, 5% more of their 11- and 12-year-old patients had initiated HPV vaccination than in clinics that received no trainings. Conversation trainings did not increase vaccinations more than no trainings. These findings echo previous studies demonstrating that announcements are more effective than participatory discussions in reducing hesitancy toward childhood vaccinations.

Healthcare providers are encouraged to take advantage of every opportunity to vaccinate patients against HPV, beginning as early as nine years of age. For additional resources on communicating with parents about HPV, visit [CDC’s HPV webpage](#).

HPV Dosing Algorithm Simplifies New 2-Dose Recommendation

By now you’ve heard the good news: two doses of HPV vaccine given to adolescents between 9 and 14-years-old provide safe, effective, and long-lasting protection against HPV-related cancers. This recent recommendation from the Advisory Committee on Immunization Practices (ACIP) eliminates the need for a third medical appointment, breaking down the barriers parents and healthcare providers face to achieving full HPV protection for younger adolescents.

Do you have questions about the new dosing schedule? The Minnesota Department of Health has created a handy [algorithm](#) to help. Healthcare providers can use this flowchart to determine how many doses of HPV vaccine a particular patient needs based on age and vaccination history.

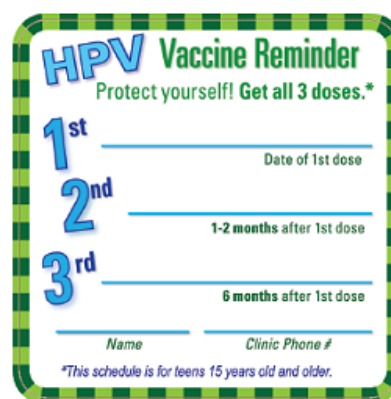
Healthcare providers are encouraged to consider beginning the HPV series with patients at age nine years.

Free HPV Reminder Magnets Keep Your Patients on Track

Adolescents’ lives can be jam-packed, creating a full calendar for parents to manage. Remembering the dates of upcoming HPV vaccinations can fall low on the priority list.

HPV reminder magnets are a fun take-home for patients and an easy way to remind families of upcoming vaccination appointments.

Public Health - Seattle & King County invites you to order 2- and 3-dose HPV reminder magnets free of charge to help keep your patients on schedule. Visit Public Health’s website to [place your free order](#).



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