INFO BRIEF

E-Scooter Management in Midsized Cities in the United States

Pedestrian and Bicycle Information Center
www.pedbikeinfo.org

Introduction

Cities are increasingly looking at micromobility options to help meet their transportation, health, and other goals. The term micromobility includes several classes of devices that are typically low speed (i.e., less than 20 miles per hour (MPH)) and lightweight (i.e., less than 100 pounds) and are partially- or fully-motorized (Pedestrian and Bicycle Information Center, 2019; Society of Automotive Engineers, 2019). These devices can be personally owned or part of a shared, or rented, fleet offered for public use. The most common shared micromobility systems involve electric bicycles (e-bikes) and electric scooters (e-scooters).

The micromobility landscape has changed significantly in recent years. Between 2016 and 2017, the number of bikeshare bikes in the United States (U.S.) more than doubled from around 40,000 bikes to almost 100,000 bikes (National Association of City Transportation Officials, 2019b). This growth primarily occurred in traditional bikeshare programs, in which bikes could be checked out and returned to designated stations or docks. At the same time, there has been enormous growth and an increasingly diverse number of micromobility options. In 2017, the first dockless bikeshare systems were launched in the U.S. and were quickly followed by dockless e-scooter systems. By the end of 2018, 85,000 e-scooters were available in about 100 U.S. cities, with approximately 38.5 million trips taken on dockless e-scooters (National Association of City Transportation Officials, 2019a). A new Bureau of Statistics (BTS) interactive map released in 2019 shows that there are now nearly 300 bikeshare or e-scooter sharing systems in the U.S.

As a significant portion of the e-scooter program growth has occurred in midsized cities, this Info Brief focuses on midsized cities' experience with and perspectives of e-scooters. The information was gathered through interviews with city staff from nine cities and covers both challenges and opportunities that have emerged with e-scooter adoption. Interviews focused on experience with permitting and regulatory issues, potential safety concerns, and infrastructure design observations. It documents anecdotal evidence and noteworthy practices and identifies issues for future discussion.

Study Methods

The project team interviewed staff in nine cities (Figure 1), ranging in population from 50,000 to 880,000 (Table 1). All cities have e-scooter programs and some also offer other micromobility options such as docked bikeshare, dockless bikeshare, and e-bikes. Cities selected for this study represent those with both new and more established programs and represent diverse geographies across the U.S.

Table 1. Cities interviewed regarding e-scooter programs.

City	Population
Columbus, Ohio	880,000
Charlotte, North Carolina	860,000
Portland, Oregon	650,000
Memphis, Tennessee	650,000
Tucson, Arizona	540,000
Spokane, Washington	220,000
Providence, Rhode Island	180,000
South Bend, Indiana	100,000
Charlottesville, Virginia	50,000
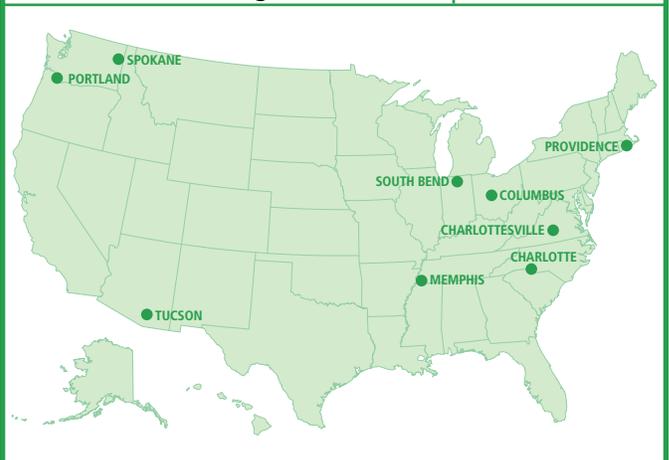
Figure 1. Map of cities interviewed.

The interviews covered three main topics, each with several sub-topics (see Figure 2):

1. Safety

What are the key safety concerns in each jurisdiction? Has the jurisdiction conducted any safety analyses on e-scooter crashes to date? Are there trends in crash types or in the locations where crashes are occurring? Are there efforts to standardize reporting or conduct more regular safety analyses?

2. Regulation and Permitting

How is each jurisdiction permitting (or preparing to permit) e-scooters? If fees are being charged, how are they assessed and used? Are there new or emerging ideas relating to e-scooter permitting and regulation that balance the needs of the agency and the private sector? What are the most important considerations for cities preparing for e-scooters?

3. Infrastructure Design

Does the jurisdiction consider the physical dimensions and operating characteristics of e-scooters in its design of on-street infrastructure? To what extent does the jurisdiction's bike infrastructure appear to be compatible with and meeting the needs of people traveling by e-scooter? How are e-scooters considered in active transportation planning and network mapping and development?
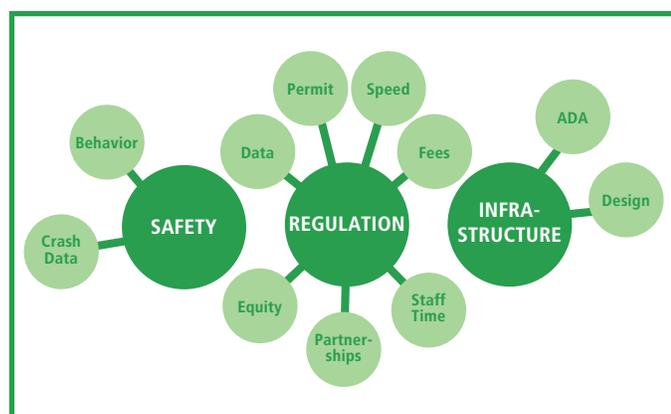

Figure 2. E-scooter interview subject areas.

Key Findings

1. Safety

Safety is a primary concern for e-scooter program staff and the public at large. The safety performance of e-scooter programs is informed by the increasing availability of information as more cities adopt e-scooter programs and share findings from pilot evaluations. Yet best practices are not well-established as many cities and research organizations are actively exploring the impacts of different regulatory and infrastructure approaches to improve safety. Generally, cities are interested in creating standardized reporting structures to allow for a better understanding of potential public health risks. They are also working with e-scooter providers to encourage education and rider training for safer device operation and increased helmet use.

Crash and Injury Data

Identifying crashes that involve e-scooters can be challenging as there are no universally adopted standardized reporting mechanisms and vendor and police reporting generally under-represents e-scooter crashes. To date, emergency department data are regarded as the most comprehensive source of crash information and several cities are working with their local health departments and hospitals to standardize reporting to more easily identify e-scooter-involved injuries. For example, the North Carolina Department of Health and Human Services distributed guidance statewide on ways to code micromobility-related injuries. The information was shared in the form of a poster to

Figure 3. Poster used in North Carolina and other cities and States to promote more consistent coding of micromobility related injuries in hospitals.

be displayed in clinical and administrative settings where e-scooter injuries are triaged, described, and coded. The poster (see Figure 3) has since been requested for use in several other jurisdictions.

All interviewed cities had trouble tracking crash data from police reported sources. This is in part due to 1) underreporting (e.g., if a crash is not reported to police or if it doesn't meet the standards to be reported, such as injury or property damage above a certain level), and 2) misclassification of the crash (e.g., e-scooter crash gets classified as a motorcycle crash). To help address these issues, Charlotte, North Carolina provided guidance to their officers on how to document the role of e-scooters in the open text narrative field of their crash reporting form to help more consistently track and identify reported e-scooter crashes and compare them to other modes. Many cities reported working with local health departments and law enforcement agencies to share crash and injury data and improve ways to identify incidents.

Several interviewees noted the challenges in comparing crash trends or injury rates across modes, given that even traditional modes of travel, such as walking and bicycling, do not have comprehensive exposure data. For example, the number of trips, time spent, or distance traveled by mode is not consistently quantified.

Safety Norms and Behaviors

Some cities expressed concerns about low helmet usage among e-scooter riders. Recent studies have shown low rates of helmet use among injured riders and the riding population at large, with head injuries involved in 40 percent or more of e-scooter injuries seen in the emergency department (Austin Public Health, 2019; Portland Bureau of Transportation, 2019; Trivedi et al., 2019). While helmets are an established method for preventing or mitigating head injuries among bicyclists, the effectiveness of approaches to encourage more widespread helmet adoption, while maintaining high levels of participation in bicycling and scooting activities, are less established.

Among those interviewed, Spokane, Washington had a mandatory helmet requirement for both bicyclists and e-scooter riders. There was support, however, to remove the required helmet use for bikeshare bicyclists and shared e-scooters riders. The City revised the municipal code to exempt shared micromobility riders 18 years or older by stating an exemption of "application-based rental of electronically activated personal transportation devices."

Cities also expressed concerns about where e-scooter riders were choosing to ride and to park their devices. In addition to considering ways to establish more clear places to ride and park through infrastructure, paint, and signage enhancements (discussed in following sections), most cities had some form of training or ambassador program and/or communications effort to help engage the public in adopting a safer and more considerate riding culture (see Figure 4).

Figure 4. City staff leading an e-scooter educational event in Spokane, Washington.

2. Regulation
Policy and Permitting

All interviewed cities identified a need to regulate e-scooter programs in a way that balances orderly use of the public right-of-way while maintaining private sector interest. This includes addressing policy gaps and creating a procurement or permitting process to allow e-scooter programs to operate. In response to e-scooter programs, several cities updated or were planning to update policies to better define e-scooters and their use in the public right-of-way. Additionally, all cities established expected service levels including vehicle minimums and maximums, operating speed thresholds, and incident response times.

These policy updates were observed in Spokane, Washington. At the time of the city's e-scooter program implementation, the municipal code did not allow for sidewalk riding in the downtown area and also banned e-scooters and other low-speed devices in their "congestion area," thus creating a situation where e-scooter riders could not legally travel in the downtown core. The City updated its municipal code to remove the ban within the congestion area, which now allows for e-scooter operation within the downtown core.

For permitting, cities used several different procurement models, including request for proposals (RFP), sole source direct contracting, memoranda of understanding, and right-of-way permit processes. Most cities first trialed e-scooters under a pilot program framework. They also created permit structures, used in combination with some form of procurement or application process, to allow evaluation and vendor approval. Many of the interviewed cities shared a preference to work with a small set of vendors to help build relationships and minimize staff time.

Cities identified e-scooter fleet sizes that would ensure that the program provides enough utility (i.e., density of devices sufficient to meet the demand) while managing the size of the program. Charlottesville, Virginia had originally set a

maximum fleet size to ensure that the supply did not exceed demand and to allow for a slower pace of public e-scooter adoption. In retrospect, City officials there expressed concern that their original maximum fleet size projection was too conservative, and the program did not provide adequate coverage or density to serve the entire city.

Fees

Permit fees are generally not used to make a profit but rather to help pay for city staff time to oversee and monitor the program, offset any cost burdens associated with impounded vehicles, respond to community complaints, and support other activities related to the program. Although some of the cities did not initially charge fees during their pilot programs, by the time of the interviews, all cities had adopted a fee schedule to charge vendors for operating in the public right-of-way. All cities interviewed reported that they had underestimated the time required to implement and manage an e-scooter program. The staff time required to start an e-scooter program was typically rolled into existing staff duties, though a number of cities created new staff positions using permit and usage fees charged to the companies.

A common fee structure was used by most cities, which was based on an initial permit fee and a per device fee. The initial permit fee ranged from several hundred to several thousand US dollars and was calculated by either estimating staff time to review and administer the program or by using an existing permitting fee schedule (i.e., Special Use of the Right-of-Way). The type of fee (i.e., application, per trip, per device, etc.) selected was usually related to the anticipated number of vendors, number of trips, and fleet size. The permit fee was collected when vendors submitted an application and ongoing operations fees were typically assessed and paid every month. Any required operations and maintenance reporting ran in parallel with the fee assessment on a monthly basis. Collected fees typically went into the city's general fund, or a separate fund was established for paying staff time and costs associated with overseeing the program.

Fee structures were often tailored to influence desired community transportation objectives. For example, Charlottesville, Virginia used fee revenues to install parking signs and pavement stencils to encourage more organized e-scooter parking. Variable fee structures were also observed. For instance, Charlotte, North Carolina employs a dynamic (parking) pricing model that charges higher fees in the downtown core and lower fees in low-density areas and adjacent to transit lines to encourage first- and last-mile transit use. In some cases, vendors were offered reduced fees for providing safety or infrastructure measures. Spokane, Washington reduced operator fees if companies provided helmets and/or designated parking areas.

Additional resources on policies, regulatory approaches, and case studies can be found on PBIC's Micromobility webpage (National League of Cities, 2019; Pedestrian and Bicycle Information Center, 2019; Transportation for America, 2019).

Data

Staff at interviewed cities noted that access to e-scooter program data is essential to managing the program and making planning decisions. Data standards have evolved rapidly as the e-scooter industry has developed. The cities interviewed encouraged the use of industry-standard data reporting formats, e.g., the Mobility Data Specification (MDS) (Los Angeles Department of Transportation, n.d.) and/or the General Bikeshare Feed Specification (GBFS) (North American Bikeshare Association (NABSA), n.d.), to ensure a usable data platform. Several cities used third-party platforms to streamline data provision and performance monitoring.

The data requirements for e-scooter vendors are generally established at the start of the program implementation and included in the permit or memorandum of understanding (MOU). South Bend, Indiana, for example, was able to monitor performance via their single vendor's internal dashboard.

Early on in their program implementation, some cities experienced data transparency issues where data was in different formats and the information requested was not standardized. To overcome this challenge, Tucson, Arizona partnered with the University of Arizona using a grant from National Institute of Transportation and Communities (NITC) to evaluate the e-scooter program. This partnership was created to allow the University of Arizona to process, aggregate, and analyze the vendors' data while protecting the public's personally identifiable information. The city also hired a third-party service to consolidate data from multiple vendors into an easy-to-use dashboard, which is the same strategy employed by Columbus, Ohio.

For a more in-depth discussion on e-scooter data issues, see this review of micromobility data policies (Remix, 2018).

Equity

Micromobility may improve access to transit, jobs, and other destinations and many cities see it as an opportunity to improve mobility options in traditionally underserved and disconnected communities. Most vendors have strategies to meet equity program requirements that include cash payment options, discount programs, and access for users without smartphones. During Portland, Oregon's first pilot, each vendor was required to have at least 100 e-scooters per day in East Portland, to provide micromobility options to traditionally underserved parts of the community. After evaluation of the program, only one vendor complied (2018 E-Scooter Findings Report, Portland Bureau of Transportation, 2019). Portland, Oregon now requires that 15 percent of the e-scooter fleet is available in East Portland and each vendor has to propose a plan to regularly report the distribution of e-scooters. The City identified several new opportunities for equitable access at the end of the pilot program, one of which resulted in the City encouraging vendors to provide e-scooters with a seat as part of the second phase of the pilot, which was thought in particular to improve comfort for older adult users and those unable to tolerate standing for longer rides.

Some cities require vendors to submit an "equity plan." For example, Providence, Rhode Island required e-scooter vendors to submit equity plans to demonstrate coverage in low-income and underserved communities. Cities acknowledged that plans alone, however, may not be enough to help reach equity goals and that performance measures, routine monitoring, enforcement structures, and broader public engagement may be needed to ensure that plans are sufficiently implemented.

For a broader array of equity practices beyond midsize cities, see this brief on equity (Remix, 2018).

Staff Time

Although e-scooter programs are typically funded and operated by non-governmental operators, town or city agency staff time is needed to implement and oversee the program. The degree of municipal involvement varies depending on the amount of desired oversight but could include policy review and update, program and request for proposal (RFP) development, development and distribution of marketing and education materials, customer service, performance monitoring, and evaluation. Staff typically includes multiple departments, including public works, planning, Mayor's Office, health departments, and others.

Regarding staff time, cities reported that they generally under-estimated the level of effort involved in setting up and managing the program. Tucson, Arizona Department of Transportation staff reported that they spent approximately 300 hours on the development of regulations and stakeholder engagement. Spokane, Washington hired a pedestrian and bike coordinator (in part) and partially supported this position using fees from the e-scooter program. Their duties include managing the e-scooter program.

Partnerships

Cities with micromobility programs often partner with other agencies, neighboring jurisdictions, universities, transit agencies, and Visitors Bureaus. These partnerships can help create regionally

"Scooters are transformative."
       – Charlotte, North Carolina

"Economics will drive their program. Working with a single vendor allows them to focus on working with us."
       – Spokane, Washington

"Having fleet caps helped with public perception."
       – Columbus, Ohio

"It's taking more time than anticipated. Even then, many things are not happening."
       – Charlottesville, Virginia

"We logged our hours so we know exactly how much time we spent."
       – Tucson, Arizona

consistent programs as well as support promotions or educational or enforcement initiatives. For example, Spokane, Washington worked with their Visitors Bureau to create "scooter routes" that would help orient visitors to the City.

In the cities with major universities, partnering experiences varied. For example, at the University of Virginia in Charlottesville, e-scooters from the neighboring City of Charlottesville program are allowed on campus, whereas the University of Arizona has banned the use of Tucson, Arizona's e-scooters on campus. Ohio State University issued its own RFP for an e-scooter vendor, separate from the program in Columbus, Ohio. In Spokane, Washington, the City and Gonzaga University had each implemented an e-scooter program with separate regulations. Over time, the parties worked together with the same provider for regional consistency.

Parking

Most e-scooters are parked using wheel-lock technology. Wheel-lock (or dockless) systems tend to cause parking issues because there are no requirements to return e-scooters to a dedicated

station. As a result, after use, riders may leave e-scooters in locations that are inappropriate or even hazardous to other road users. Several cities said that a majority of complaints they receive are related to e-scooter parking, on or near roads, sidewalks, and trails.

To resolve this issue, cities and vendors are using certain techniques to encourage more organized parking behavior, including designating appropriate locations, painting or using signs to create new parking spaces (see Figure 5), or providing hard-copy or in-app educational materials to show users where to park e-scooters.

Figure 5. E-Scooter Parking in South Bend, Indiana.

Cities such as South Bend, Indiana have created parking areas using pavement stencils.

Another strategy employed by most cities is to include parking and service level expectations as part of their regulations for and permits to vendors. Or, as in the case Portland, Oregon, parking enforcement issues tickets to vendors, who then pass on the cost to the customer.

Speed Management
Most cities had to change existing policies or set new policy to: define e-scooters as vehicles; determine appropriate operating space; and set maximum operating speeds within their local codes. Many cities initially set the maximum operating speed at 20 miles per hour and have since rolled back the maximum speed based on input from the community and safety experts. Memphis, Tennessee, for example, set a maximum

operating speed of 15 MPH, but staff felt that a maximum speed of 12 MPH would be more appropriate and consistent with existing facility design for bicycles. Spokane, Washington reported working with their vendor to geofence (i.e., establish virtual perimeters along) the multi-use pathway through Riverfront Park, such that devices operating within the zone were restricted to 7 MPH.

3. Infrastructure Design

Design
Policies about e-scooter usage and infrastructure design vary between cities. Cities generally first worked to define e-scooter operating space before considering infrastructure design. Several cities recognize that providing specific operating space for e-scooters would benefit all road users and cities are starting to consider e-scooters in their design and maintenance policies. Sometimes current infrastructure is not able to accommodate e-scooters, as reported by staff in Memphis, Tennessee, who noted that camera detection at signals has had difficulties detecting e-scooters.

Most cities identified in-street bike facilities, with separation from traffic, as the preferred operating space for e-scooters. They also considered it appropriate for e-scooters to share space in dedicated bikeway infrastructure. Cities have come to expect sidewalk riding where separate infrastructure, such as separated bike lanes, is

"We are fortunate to have some protected bike lanes downtown already."
— South Bend, Indiana

"On streets with no bike lane, expect sidewalk riding."
— Portland Bureau of Transportation, Oregon

"Half of the complaints received are about parking."
— Providence, Rhode Island

not available. Lower maximum posted speeds for vehicles and established maximum speeds for e-scooter operations (or nearby drivers) may help reduce crash risk. Both cities interviewed and other literature sources have indicated that e-scooters are more sensitive to road conditions, specifically potholes, gravel, uneven pavement, sewer covers, grate, and ineffective ramps, and pavement maintenance is critical to prevent injuries.

Most of the cities interviewed prefer e-scooter operation on the street and in bikeways, though some cities designate the sidewalk as the preferred operating space. Interviewees recognized that sidewalk riding will occur when on-street conditions are uncomfortable to the user. For instance, Providence, Rhode Island is considering pavement quality in its multimodal network build-out because e-scooters are sensitive to pavement conditions.

Accessibility

Accessibility has been a concern for cities developing e-scooter programs, and nearly all cities have included provisions to prohibit e-scooters from blocking sidewalk access for pedestrians, transit riders, and other users. Many cities reported concerns about e-scooters blocking sidewalks, and moreover, have received concerns from the disability advocacy community (including people using wheelchairs and assistive devices) about e-scooter company compliance with mobility requirements under the Americans with Disabilities Act (ADA).

Cities have worked with vendors to try to create specific solutions. Vendors in Charlotte, North Carolina geofenced an area around the Association for the Blind in response to a request from the disability community. E-scooter parking is prohibited within areas adjacent to the building and near key transit stops used by people traveling to and from the Association for the Blind, to prevent tripping hazards.

Discussion Guide

The following questions are intended to serve as a discussion guide, fostering dialogue in midsized cities about the planning and management of e-scooter programs.

Given the Local Context:

What is an appropriate level of staffing?
Program setup and ongoing oversight requires significant staff time, which may vary based on the number of micromobility vendors and other factors associated with the program. Cities will need to consider the resources available or needed, including from permit fees, to sufficiently cover the time and training of existing or newly-hired staff.

What is the right type and amount of regulation?
Regulation or a policy framework will be necessary to safely manage the public right-of-way, and existing policies may need to be updated to reflect new conditions. Critical policy elements to consider might include:

- Defining vehicle types or updating definitions to include e-scooters.
- Defining operating space and maximum speeds in relation to other road users.
- Considering the minimum and maximum number of vendors and fleet sizes and defining the service area.
- Considerations to address equity and other community or transportation goals.
- Defining data reporting standards.
- Defining a clear and transparent fee structure and appropriate methods to use fee payments to incentivize desired outcomes.

How should vendors be selected?
The process for vendor selection and number of vendors in any given community may vary. The selection process may involve considering factors such as:

- How much staff time is needed/available to coordinate with each vendor or manage the data provided by each vendor?
- What level of service can the vendor provide?
- How well does the vendor's services meet the needs of the community, and how will they adapt to input from the City?
- What is the vendor's track record in supporting

safety education, community engagement, data to improve risk assessment, and responsiveness to incidents?

How is e-scooter infrastructure and parking going to be planned and managed?
The safety and ability to access facilities for all road users depends heavily on the quality of infrastructure provided. E-scooter program staff will need to devote attention to considering:

- Are designated parking areas needed?
- Are vehicle speeds sufficiently low for e-scooters to operate in a shared street environment?
- Are sidewalk and roadway pavement conditions of sufficient quality for e-scooter use?
- Are there gaps in the connected bikeway network that need to be prioritized?
- What do the data sources (including hospital, police, complaint, public engagement efforts) indicate are areas for safety concerns that need attention?

Who are the key regional partners and how are they going to be engaged?
Regional consistency with neighboring jurisdictions, university partners, major campuses (including medical and business parks), and others is important to providing a seamless user experience and to meet broader community goals. Key considerations include:

- What other jurisdictions or partners should we be working with to determine regulations and permitting processes?
- Are there partners who can assist with encouraging safe behaviors and norms regarding e-scooters?
- What traditionally underserved or disenfranchised voices need to have a seat at the table in decision-making around e-scooters?

Conclusion

The micromobility landscape is rapidly changing, creating both challenges and opportunities for cities of all sizes to offer more diverse ways to meet their transportation and household needs. This Info Brief highlights practices and emerging challenges identified in interviews with staff in nine midsized cities, focusing on issues relating to safety, regulation, and infrastructure design. Interviews with a limited number of cities is not a sufficient basis for creating best practice guidance. However, in a rapidly evolving field, it is still important to document anecdotal evidence of noteworthy practices, highlight areas that potentially merit future attention and research, and foster dialogue about the planning and management of e-scooter programs.

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Powered Micromobility Committee of the SAE, Standard J3194, *A Taxonomy and Classification of Powered Micromobility Vehicles*, provides a set of definitions and a classification that can be used by regulators to standardize descriptions of micromobility devices (for either shared or personal use).

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